Mount Zion College of Engineering and Technology

To Make Man Whole!!

Institutional Distinctiveness

Felt Need And Impart Advanced Technology To Rural Students

7.3 Institutional Distinctiveness

Title: Felt need and impart advanced technology to Rural students

The Institution strives to empower rural students with knowledge and skills in their chosen fields by providing opportunities to realize their potential by motivating them toward community-linked initiatives, thereby shaping them for the future enhancement of their careers and higher studies.

Hence keeping in mind the vision statement of our college decided to be the preferred choice of all those who aspire for excellence by providing rural students with more certificate courses. Hence, the college, during all academic years, proposed various courses on recent trends and technology as listed below.

1. Proteus Virtual System Modeling
2. Circuit Wizard
3. Internet of Things
4. TEKLA Structure
5. Revit
6. STAAD PRO
7. Raspberry PI Programming/Interfacing
8. 3D Printing
9. Solid Works

MOUNT ZION COLLEGE OF ENGG. TECH.

Principal,
MOUNT ZION COLLEGE OF ENGG. TECH.,
Lenavilakku, Pilivalam (Po),
Thirumayam (Tk), Pudukkottai - 622 507

Objective

- To identify the rural students around our Institutional area.
- To motivate them to attend the technical course, we conduct
- To provide transport facility, food and accommodation
- To impart advanced software and hardware courses

The Context

Mount Zion College of Engineering and Technology has a set of high values and standards for improving community living. An amalgamation of learning and curiosity of actions from the Institution over the years provide good actions for the betterment of the marginalized community, predominantly the rural. We aim to deliver exceptional education and make local contributions to society. Our Institution collectively seeks solutions to address the issues relating to a comprehensive and all-encompassing strategy for developing rural community.

This emphasis is to create an enabling environment of equal opportunities for education to ensure sustainable development of the rural community to compete with the confident and attain technical excellence; Institution stimulates and supports students to participate in various rural developmental activities. Moreover, the college plays an active role in the communal range and offers all possible help to the underprivileged community.

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Thirumayam (Tk), Pudukkottai - 622 507

Work plan

- The rural students are identified by inquiring and collecting student information in nearby Institutions.
- The identified rural students have informed the opportunity of the technical course we conduct.
- The date and time of the course is planned and disseminated to all the willing students.
- The courses are planned for the weekend, holidays and semester vacation.
- Our eminent faculty are encouraged to organize and prepare the course planning and teaching materials.
- The administration has appointed the course coordinator to facilitate faculty and students.
- The successful students are awarded by course completion certificate.
- The management has allotted the fund for all expenses to engage the student during the course period.

Benefits to the Rural Student

- Rural students can gather advanced technical knowledge.
- They can get good jobs with better salaries.
- It may lead to higher studies.
- They are getting valuable opportunities to meet and interact with technical experts people and interact with them.
- They can get the opportunity to do a mini or major project in future.

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Evidence of Success

- So far we trained 5,980 rural students from 2016 to 2021. The rural students chose the various course in the relevant Department. The students are from rural area around the region Alangudi, Aranthangi, Karaikudi, Pattukkottai, Pudukkottai, Ponnamaravathi, Thanjavor, Thirumayam, and Trichy.
- The academic year 2020-2021 due to the COVID'19 we were conduct this technical workshop series through online, around 130 Electrical and Electronics and communication Engineering students were benefited.

Total participants (2016 to 2020)

Sl.No	Year	Number of participants
1	2016-2017	1651
2	2017-2018	1473
3	2018-2019	2026
4	2019-2020	700
5	2020-2021(ONLINE)	130
Grand Total		**5,980**

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Sl.no	year	department	Number of participants
1	2016-2017	CIVIL	451
		CSE	134
		ECE	220
		EEE	379
		MECH	446
		MECHATRONICS	21
		TOTAL	**1651**
2	2017-2018	CIVIL	339
		CSE	98
		ECE	135
		EEE	242
		MECH	656
		MECHATRONICS	3
		TOTAL	**1473**
3	2018-2019	CIVIL	354
		CSE	143
		ECE	144
		EEE	575
		MECH	781
		MECHANTRONICS	29
		TOTAL	**2026**
4	2019-2020	CIVIL	104
		CSE	27
		ECE	54
		EEE	236
		MECH	263
		MECHANTRONICS	16
		TOTAL	**700**
5	2020-2021	**TOTAL (ONLINE)**	**130**

MOUNT ZION COLLEGE OF ENGG. TECH

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The year 2016-2017

AREA	CIVIL	CSE	ECE	EEE	MECH	MECHATRONICS	Grand Total
ALANGUDI	26	14	13	13	5		71
ARANTHANGI	22	8	8	4	3		45
KARAIKUDI	46	15	33	65	44	1	204
PATTUKOTTAI	3	1	2		2	2	10
PONNAMARAVATHI	3			1	3		7
PUDUKKOTTAI	161	50	72	142	167	12	604
SIVAGANGAI	103	27	59	97	145	2	433
THANJAVUR	54	10	22	25	60	2	173
THIRUMAYAM	28	9	8	31	16	2	94
TRICHY	5		3	1	1		10
Grand Total	**451**	**134**	**220**	**379**	**446**	**21**	**1651**

The year 2017-2018

AREA	CIVIL	CSE	ECE	EEE	MECH	MECHATRONICS	Grand Total
ALANGUDI	25	4	19	18	57	1	124
ARANTHANGI	30	17	19	7	14		87
KARAIKUDI	27	3	25	23	38	1	117
PATTUKKOTTAI	2	5	6	7	24		44
PONNAMARAVATHI	11	3	1	6	20		41
PUDUKKOTTAI	118	32	31	79	208		468
SIVAGANGAI	66	13	20	65	131		295
THANJAVUR	31	15	11	21	142	1	221
THIRUMAYAM	28	5	2	15	14		64
TRICHY	1	1	1	1	8		12
Grand Total	**339**	**98**	**135**	**242**	**656**	**3**	**1473**

MOUNT ZION COLLEGE OF ENGG. TECH

Principal,
MOUNT ZION COLLEGE OF ENGG. TECH.,
Lenavilakku, Pilivalam (Po),
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The year 2018-2019

AREA	CIVIL	CSE	ECE	EEE	MECH	MECHATRONICS	Grand Total
ALANGUDI	33	9	12	55	90	2	201
ARANTHANGI	38	15	15	31	100	5	204
KARAIKUDI	55	24	52	86	53		270
PATTUKKOTTAI	13	2	3	17	74		109
PONNAMARAVATHI	7	2	2	8	20	1	40
PUDUKKOTTAI	86	45	9	172	215	17	544
SIVAGANGAI	42	37	38	117	69	1	304
THANJAVUR	22	7	8	45	118	3	203
THIRUMAYAM	54		2	39	32		127
TRICHY	4	2	3	5	10		24
Grand Total	**354**	**143**	**144**	**575**	**781**	**29**	**2026**

The year 2019-2020

AREA	CIVIL	CSE	ECE	EEE	MECH	MECHATRONICS	Grand Total
ARANTHANGI	18	2	1	21	58	1	101
KARAIKUDI		18	49	81			148
PATTUKKOTTAI			3	37	82		122
PONNAMARAVATHI	1			9	23	2	35
PUDUKKOTTAI	41	7	1	88	100	13	250
THIRUMAYAM	44						44
Grand Total	**104**	**27**	**54**	**236**	**263**	**16**	**700**

MOUNT ZION COLLEGE OF ENGG. TECH

Principal,
MOUNT ZION COLLEGE OF ENGG. TEC...
Lenavilakku, Pilivalam (Po),
Thirumayam (Tk), Pudukkottai - 622 507

2020-2021 (Online Mode)

Row Labels	PARTICIPANTS
ALANGUDI	13
KARAIKUDI	53
PUDUKKOTTAI	16
SIVAGANGAI	11
THIRUUMAYAM	37
Grand Total	**130**

Sl.No	File Description
1.	Form for conducting the program
2.	Photos
3.	Course materials
4.	feedback

MOUNT ZION COLLEGE OF ENGG. TECH.

Principal,
MOUNT ZION COLLEGE OF ENGG. TECH.,
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Mount Zion College of Engineering and Technology
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PERMISSION LETTER AND FORM FOR CONDUCTING THE PROGRAM

Mount Zion College of Engineering & Technology
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Date: 23.03.2016

R. Muthukumar, A.P/EEE,
Technical Workshop series'16 Course coordinators,
Department of Electrical and Electronics Engineering.

Submitted to The Principal.

Respected sir,

Sub: Request for permission for conducting "Technical Workshop Series'16"- Reg.

We have planned to conduct Technical Workshop for the surrounding rural students from 04.04.2016 to 26.05.2016.We are in a need of approximately four lakhs rupees (Rs 400000) to conduct this program. So, we request you to kindly grant permission to conduct this Technical Workshop.

Thanking you.

Yours Sincerely,

23/03/16

Place: Pudukkottai.
Date : 23.03.2016

MOUNT ZION COLLEGE OF ENGG. TECH.

Principal,
MOUNT ZION COLLEGE OF ENGG. TECH.,
Lenavilakku, Pilivalam (Po),
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Date: 10.02.2017

R. Muthukumar, A.P/EEE,
Technical Workshop series'17 Course coordinators,
Department of Electrical and Electronics Engineering.

Submitted to The Principal.

Respected sir,

Sub: Request for permission for conducting "Technical Workshop Series'17"- Reg.

The "Technical Workshop Series'17" is Planned to conduct for the nearby rural students from 06.03.2017 to 30.04.2017.We are in a need of estimated expenses of four lakhs fifty thousand rupees (Rs 4, 50,000) to conduct this program. So, we request you to kindly grant permission to conduct this Technical Workshop.

Thanking you.

Yours Sincerely,
10/02/17

Place: Pudukkottai.
Date : 10.02.2017

MOUNT ZION COLLEGE OF ENGG. TECH.

Principal,
MOUNT ZION COLLEGE OF ENGG. TECH.,
Lenavilakku, Pilivalam (Po),
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From

Date: 05.02.2018

M.Vinoth Kumar, A.P/Mech,
Technical Workshop series'18 Course coordinators,
Department of Mechanical Engineering.

Submitted to The Principal.

Respected sir,

Sub: Request for permission for conducting "Technical Workshop Series'18"- Reg.

We have decided to conduct Technical Workshop for rural students from 12.02.2018 to 30.03.2018.The amount of four lakhs eighty thousand rupees (Rs 4,80,000) is estimated to conduct this program. So, we request you to kindly grant permission and sanction the required amount.

Thanking you.

Yours Sincerely,
M. Gurunath
05/02/18

Place: Pudukkottai.
Date : 05 .02.2018

MOUNT ZION COLLEGE OF ENGG. TECH.

Principal,
MOUNT ZION COLLEGE OF ENGG. TECH.,
Lenavilakku, Pilivalam (Po),
Thirumayam (Tk), Pudukkottai - 622 507

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Date: 25.03.2019

M.Vinoth Kumar, A.P/Mech,
Technical Workshop series'19 Course coordinators,
Department of Mechanical Engineering.

Submitted to The Principal.

Respected sir,

Sub: Request for permission for conducting "Technical Workshop Series'19"- Reg.

The Technical Workshop is planned to conduct for the rural students from 01.04.2019 to 31.05.2019.We are in a need of approximately five lakhs rupees (Rs 500000) to conduct this program. So, we request you to kindly grant permission to conduct this Technical Workshop.

Thanking you.

Yours Sincerely,
M. Gunasekar
25/03/19

Place: Pudukkottai.
Date : 25.03.2019

MOUNT ZION COLLEGE OF ENGG. TECH.

Principal,
MOUNT ZION COLLEGE OF ENGG. TECH.,
Lenavilakku, Pilivalam (Po),
Thirumayam (Tk), Pudukkottai - 622 507

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Date: 24.04.2020

S.Ganesan, A.P/ECE,
Technical Workshop series'20 Course coordinators,
Department of Electronics and Communication Engineering.

Submitted to The Principal.

Respected sir,

Sub: Request for permission for conducting "Technical Workshop Series'20"- Reg.

The Technical Workshop is planned to conduct for the rural students through Google Meet from 04.05.2020 to 29.05.2020. So, we request you to kindly grant permission to conduct this Technical Workshop.

Thanking you.

Yours Sincerely,

24/04/20

Place: Pudukkottai.
Date : 24.04.2020

MOUNT ZION COLLEGE OF ENGG. TECH

Principal,
MOUNT ZION COLLEGE OF ENGG. TECH
Lenavilakku, Pilivalam (Po),
Thirumayam (Tk), Pudukkottai - 622 507

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FORM FOR CONDUCTING A PROGRAMME

Programme Information

Name of the Programme: Technical Workshop Series'16

Dates of the Programme: From: 04.04.2016 To: 26.05.2016

Time of the Programme: From: 9.30 A.M To: 4.45 P.M

No. of Participants expected: From: 1800 To: 2000

No. of Participants confirmed: 1651

Nature of the Programme:

☐ For Faculty ☐ For Students ☐ For Technical Staff ☐ For Non-Teaching Staff
☐ For School Staff ☐ For Other Rural students.

Programme Coordinator: R. Muthukumar AP/EEE

Department organizing the Programme:

☐ Aero	☑ Civil	☑ CSE	☑ ECE
☑ EEE	☐ IT	☑ Mech	☐ CS
☐ PED	☐ SE	☐ IE	☐ STE
☐ Maths	☐ S&H	☐ English	☐ Management
☐ ISTE	☐ CSI	☐ Lions Club	☐ Hostel
☐ NSS	☐ Rotaract	☐ YRC	☐ RRC
☐ Extra-curricular	☐ Sports	☐ Placement	☐ Other _____

Type of the Programme:

☐ Symposium	☐ Guest Lecture	☑ Workshop	☐ Conference
☐ Mini Projects	☐ Project Demos	☐ Seminar	☐ Co-curricular
☐ FDP	☐ Industrial Visit	☐ Inplant Training	☐ Paper Presentations
☐ Extra-curricular	☐ Sports	☐ Placement	☐ Other _____

Chief Guests:
1. _____
2. _____
3. _____

Resource Persons:
1. K. Rajadurai AP/civil, A. Sangeetha AP/CSE
2. K. Mohammed Ismail AP/ECE
3. R. Muthukumar AP/EEE L. Mamnudi Azaath AP/Mech

Funds required for the Programme: _____

Room No. & Room Name required: A310, A320, 0020, 0015, 0017

Other Facilities/Equipment required:

☑ LCD Projector ☑ Projector Screen ☑ Whiteboard ☐ Whiteboard Marker
☐ Chairs –No. _____ ☐ Tables –No. _____ ☐ Other _____

Attachments of the Programme:

☐ Newspaper AD Cutting ☐ Newspaper Report Cutting
☐ Approval Letter ☐ Budget Proposal ☐ Committees ☐ Flex
☐ Invitation ☐ Programme Sheet ☐ Photo CD/DVD ☐ Video CD/DVD
☐ Score sheet ☐ Certificates ☐ Other _____

APPROVAL BEFORE CONDUCTING THE PROGRAMME:

Staff/Student's Signature with Date | *HOD's Signature with Date* | *Principal's Signature with Date*

MOUNT ZION COLLEGE OF ENGG. TECH.

Principal,
MOUNT ZION COLLEGE OF ENGG. TECH.,
Lenavilakku, Pilivalam (Po),
Thirumayam (Tk), Pudukkottai - 622 507

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FORM FOR CONDUCTING A PROGRAMME

Programme Information

Name of the Programme: TECHNICAL WORKSHOP SERIES '17

Dates of the Programme: From: 6/03/2017 To: 30/04/2017

Time of the Programme: From: 09:30 AM To: 04:45 PM

No. of Participants expected: From: 1500 To: 2000

No. of Participants confirmed: 1473

Nature of the Programme:

- ☐ For Faculty
- ☐ For School Staff
- ☐ For Students
- ☑ For Other Rural Students
- ☐ For Technical Staff
- ☐ For Non-Teaching Staff

Programme Coordinator: R. Muthukumar AP/EEE

Department organizing the Programme:

☐ Aero	☑ Civil	☑ CSE	☑ ECE
☑ EEE	☐ IT	☑ Mech	☐ CS
☐ PED	☐ SE	☐ IE	☐ STE
☐ Maths	☐ S&H	☐ English	☐ Management
☐ ISTE	☐ CSI	☐ Lions Club	☐ Hostel
☐ NSS	☐ Rotaract	☐ YRC	☐ RRC
☐ Extra-curricular	☐ Sports	☐ Placement	☐ Other _____

Type of the Programme:

☐ Symposium	☐ Guest Lecture	☑ Workshop	☐ Conference
☐ Mini Projects	☐ Project Demos	☐ Seminar	☐ Co-curricular
☐ FDP	☐ Industrial Visit	☐ Inplant Training	☐ Paper Presentations
☐ Extra-curricular	☐ Sports	☐ Placement	☐ Other _____

Chief Guests:
1. _____
2. _____
3. _____

Resource Persons:
1. Rasadurai. K AP/CIVIL, Sangeetha A. AP/CSE
2. Ganesan S AP/ECE, MUTHUKUMAR. P AP/EEE
3. Mamundi Azath. L AP/MECH

Funds required for the Programme: _____

Room No. & Room Name required: A310, D020, 0015, 0017, A320

Other Facilities/Equipment required:

☑ LCD Projector	☑ Projector Screen	☑ Whiteboard	☐ Whiteboard Marker
☐ Chairs –No. _____	☐ Tables –No. _____	☐ Other _____	

Attachments of the Programme:

☐ Newspaper AD Cutting		☐ Newspaper Report Cutting	
☐ Approval Letter	☐ Budget Proposal	☐ Committees	☐ Flex
☐ Invitation	☐ Programme Sheet	☐ Photo CD/DVD	☐ Video CD/DVD
☐ Score sheet	☐ Certificates	☐ Other _____	

APPROVAL BEFORE CONDUCTING THE PROGRAMME:

Staff/Student's Signature with Date

C. S. Ganesh
HOD's Signature with Date

Principal's Signature with Date

MOUNT ZION COLLEGE OF ENGG. TECH.

Principal,
MOUNT ZION COLLEGE OF ENGG. TECH.,
Lenavilakku, Pilivalam (Po),
Thirumayam (Tk), Pudukkottai - 622 507

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FORM FOR CONDUCTING A PROGRAMME

Programme Information

Name of the Programme: Technical Workshop Series '18

Dates of the Programme: From: 12.02.2018 To: 30.03.2018

Time of the Programme: From: 9.30 Am To: 4.45 Pm

No. of Participants expected: From: 1500 To: 2500

No. of Participants confirmed: 2026

Nature of the Programme:

☐ For Faculty ☐ For Students ☐ For Technical Staff ☐ For Non-Teaching Staff
☐ For School Staff ☐ For Other Rural Students

Programme Coordinator: M. VINOTH KUMAR

Department organizing the Programme:

☐ Aero	☑ Civil	☑ CSE	☑ ECE
☑ EEE	☐ IT	☑ Mech	☐ CS
☐ PED	☐ SE	☐ IE	☐ STE
☐ Maths	☐ S&H	☐ English	☐ Management
☐ ISTE	☐ CSI	☐ Lions Club	☐ Hostel
☐ NSS	☐ Rotaract	☐ YRC	☐ RRC
☐ Extra-curricular	☐ Sports	☐ Placement	☐ Other _____

Type of the Programme:

☐ Symposium	☐ Guest Lecture	☑ Workshop	☐ Conference
☐ Mini Projects	☐ Project Demos	☐ Seminar	☐ Co-curricular
☐ FDP	☐ Industrial Visit	☐ Inplant Training	☐ Paper Presentations
☐ Extra-curricular	☐ Sports	☐ Placement	☐ Other _____

Chief Guests: 1. _____
2. _____
3. _____

Resource Persons: 1. M. Prabhakaran AP/Civil, A. Sangeetha, AP/CSE
2. R. Muthukumaar, AP/EEE, S. Ganesan, AP/ECE
3. L. Mamundi Azaath, AP/Mech.

Funds required for the Programme: _____

Room No. & Room Name required: A310, A320, 0020, 0015, 0017

Other Facilities/Equipment required:

☑ LCD Projector ☑ Projector Screen ☑ Whiteboard ☐ Whiteboard Marker
☐ Chairs –No. _____ ☐ Tables –No._____ ☐ Other _____

Attachments of the Programme:

☐ Newspaper AD Cutting ☐ Newspaper Report Cutting
☐ Approval Letter ☐ Budget Proposal ☐ Committees ☐ Flex
☐ Invitation ☐ Programme Sheet ☐ Photo CD/DVD ☐ Video CD/DVD
☐ Score sheet ☐ Certificates ☐ Other _____

APPROVAL BEFORE CONDUCTING THE PROGRAMME:

M. Gunasekaran
Staff/Student's Signature with Date

E. Mohan
HOD's Signature with Date

Principal's Signature with Date

MOUNT ZION COLLEGE OF ENGG. TECH.

Principal,
MOUNT ZION COLLEGE OF ENGG. TECH.,
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Thirumayam (Tk), Pudukkottai - 622 507

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FORM FOR CONDUCTING A PROGRAMME

Programme Information

Name of the Programme: TECHNICAL WORKSHOP - 2019

Dates of the Programme: From: 01/04/2019 To: 31/05/2019

Time of the Programme: From: 9.30 AM To: 4.45 PM

No. of Participants expected: From: 1500 To: 2000

No. of Participants confirmed: 700

Nature of the Programme:

☐ For Faculty ☐ For Students ☐ For Technical Staff ☐ For Non-Teaching Staff
☐ For School Staff ☐ For Other _____

Programme Coordinator: M. VINOTH KUMAR

Department organizing the Programme:

☐ Aero	☑ Civil	☑ CSE	☑ ECE
☑ EEE	☐ IT	☑ Mech	☐ CS
☐ PED	☐ SE	☐ IE	☐ STE
☐ Maths	☐ S&H	☐ English	☐ Management
☐ ISTE	☐ CSI	☐ Lions Club	☐ Hostel
☐ NSS	☐ Rotaract	☐ YRC	☐ RRC
☐ Extra-curricular	☐ Sports	☐ Placement	☐ Other _____

Type of the Programme:

☐ Symposium	☐ Guest Lecture	☑ Workshop	☐ Conference
☐ Mini Projects	☐ Project Demos	☐ Seminar	☐ Co-curricular
☐ FDP	☐ Industrial Visit	☐ Inplant Training	☐ Paper Presentations
☐ Extra-curricular	☐ Sports	☐ Placement	☐ Other _____

Chief Guests:
1. _____
2. _____
3. _____

Resource Persons:
1. M. PRABHAKARAN AP/CIVIL, A. SANGEETHA AP/CSE
2. S. GANESAN AP/ECE, R. MUTHUKUMAR AP/EEE
3. D. VINOTH RAJ AP/MECH

Funds required for the Programme: _____

Room No. & Room Name required: 0020, 0015, 0017, A310, A320

Other Facilities/Equipment required:

☑ LCD Projector ☑ Projector Screen ☑ Whiteboard ☑ Whiteboard Marker
☑ Chairs –No. 700 ☑ Tables –No. 700 ☐ Other _____

Attachments of the Programme:

☐ Newspaper AD Cutting ☐ Newspaper Report Cutting
☐ Approval Letter ☐ Budget Proposal ☐ Committees ☐ Flex
☐ Invitation ☐ Programme Sheet ☐ Photo CD/DVD ☐ Video CD/DVD
☐ Score sheet ☐ Certificates ☐ Other _____

APPROVAL BEFORE CONDUCTING THE PROGRAMME:

M. [signature] — *Staff/Student's Signature with Date*

E. [signature] — *HOD's Signature with Date*

[signature] — *Principal's Signature with Date*

MOUNT ZION COLLEGE OF ENGG. TECH.

Principal,
MOUNT ZION COLLEGE OF ENGG. TECH.,
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Thirumayam (Tk), Pudukkottai - 622 507

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FORM FOR CONDUCTING A PROGRAMME

Programme Information

Name of the Programme: Technical Workshop '20

Dates of the Programme: From: 04/05/2020 To: 29/05/2020

Time of the Programme: From: 10.00 AM To: 5.00 PM

No. of Participants expected: From: 500 To: 1500

No. of Participants confirmed: 130

Nature of the Programme:

☐ For Faculty ☐ For Students ☐ For Technical Staff ☐ For Non-Teaching Staff
☐ For School Staff ☐ For Other _____

Programme Coordinator: S. Ganesan, AP/ECE

Department organizing the Programme:

☐ Aero	☑ Civil	☑ CSE	☑ ECE
☑ EEE	☐ IT	☑ Mech	☐ CS
☐ PED	☐ SE	☐ IE	☐ STE
☐ Maths	☐ S&H	☐ English	☐ Management
☐ ISTE	☐ CSI	☐ Lions Club	☐ Hostel
☐ NSS	☐ Rotaract	☐ YRC	☐ RRC
☐ Extra-curricular	☐ Sports	☐ Placement	☐ Other _____

Type of the Programme:

☐ Symposium	☐ Guest Lecture	☑ Workshop	☐ Conference
☐ Mini Projects	☐ Project Demos	☐ Seminar	☐ Co-curricular
☐ FDP	☐ Industrial Visit	☐ Inplant Training	☐ Paper Presentations
☐ Extra-curricular	☐ Sports	☐ Placement	☐ Other _____

Chief Guests:
1. _____
2. _____
3. _____

Resource Persons:
1. M. Prabhakaran, AP/Civil, A. Sangeetha, AP/CSE
2. R. Muthukumaran, AP/EEE, S. Ganesan, AP/ECE
3. A. Denzil Infant, AP/EEE, D. Vinothraj, AP/Mech

Funds required for the Programme: _____

Room No. & Room Name required: A310, A320, 0020, 0015, 0017

Other Facilities/Equipment required:

☑ LCD Projector ☑ Projector Screen ☑ Whiteboard ☑ Whiteboard Marker
☐ Chairs –No. _____ ☐ Tables –No._____ ☐ Other _____

Attachments of the Programme:

☐ Newspaper AD Cutting ☐ Newspaper Report Cutting
☐ Approval Letter ☐ Budget Proposal ☐ Committees ☐ Flex
☐ Invitation ☐ Programme Sheet ☐ Photo CD/DVD ☐ Video CD/DVD
☐ Score sheet ☐ Certificates ☐ Other _____

APPROVAL BEFORE CONDUCTING THE PROGRAMME:

Staff/Student's Signature with Date

HOD's Signature with Date

Principal's Signature with Date

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PHOTOS

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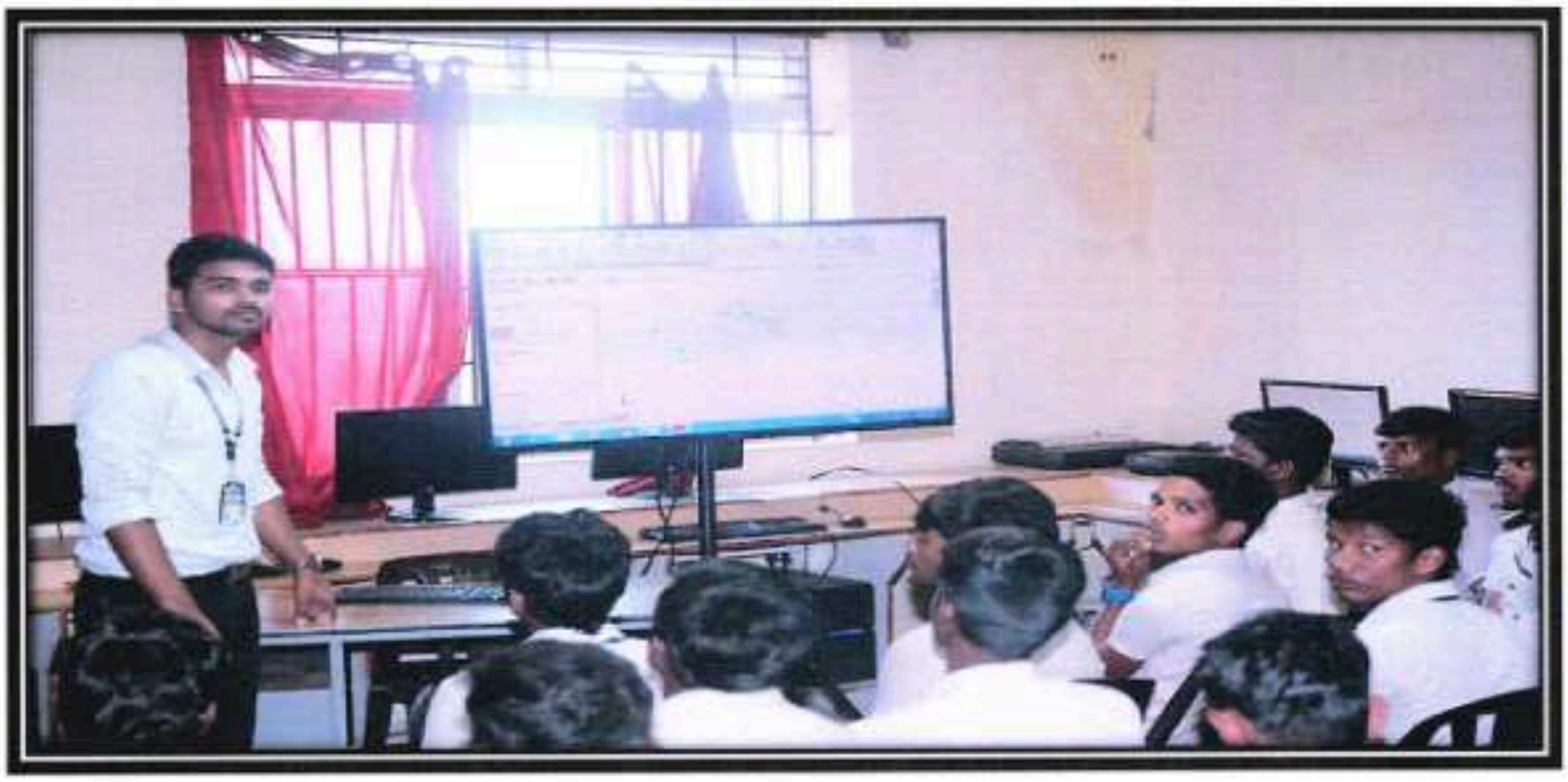

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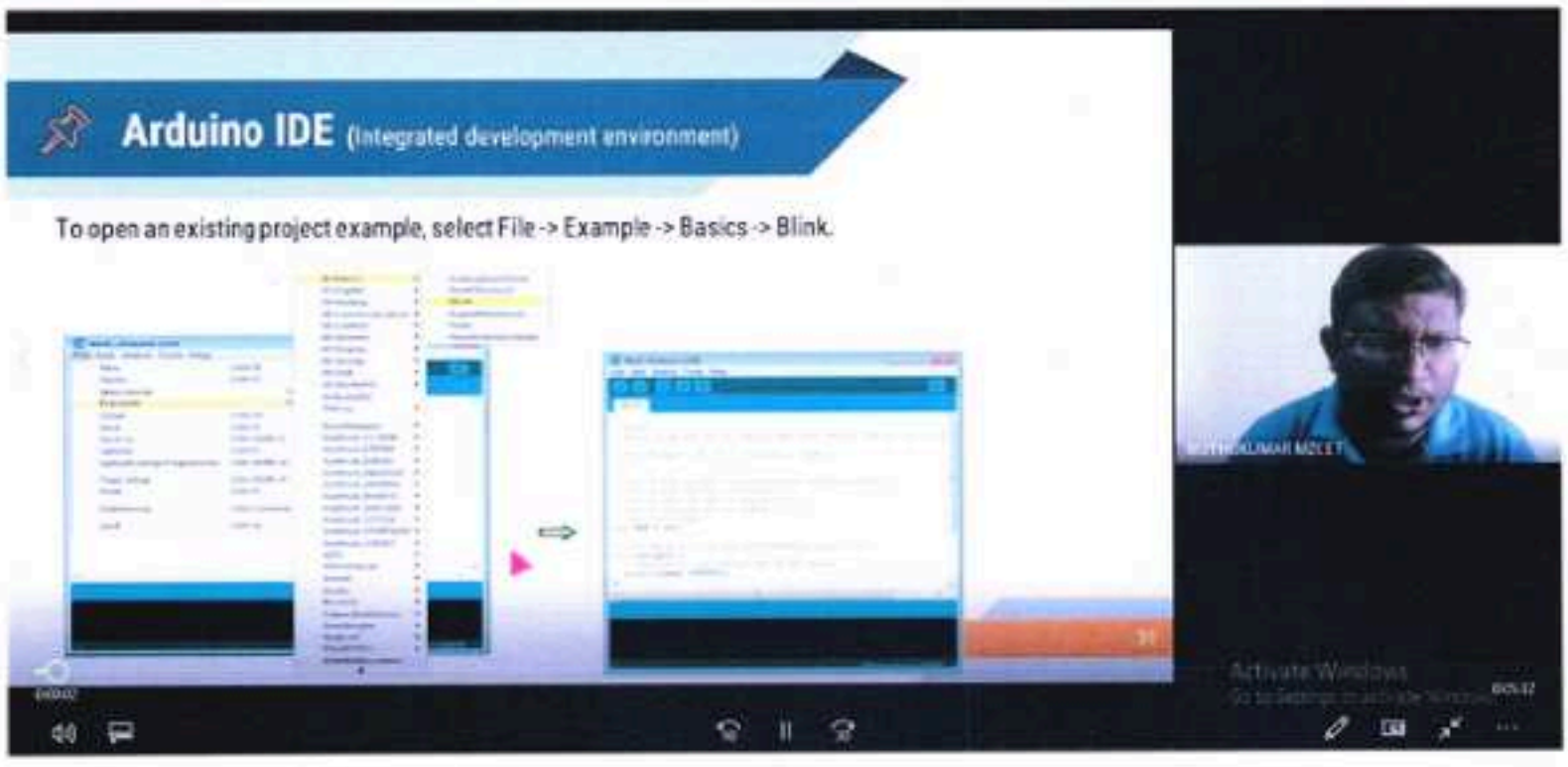
Technical Workshop series'20

Online Workshop- Google meet



Online workshop-Arduino

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COURSE MATERIALS

MOUNTZION COLLEGE OF ENGINEERING AND TECHNOLOGY

PUDUKKOTTAI

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

CIRCUIT WIZARD COURSE MANUAL

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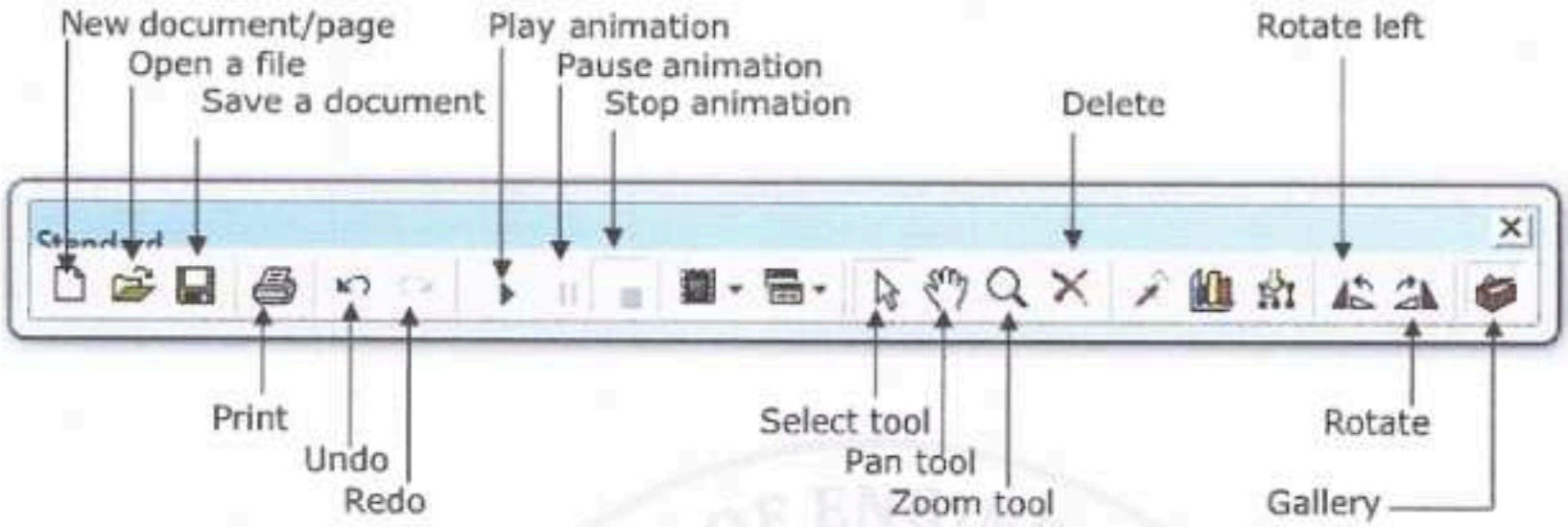
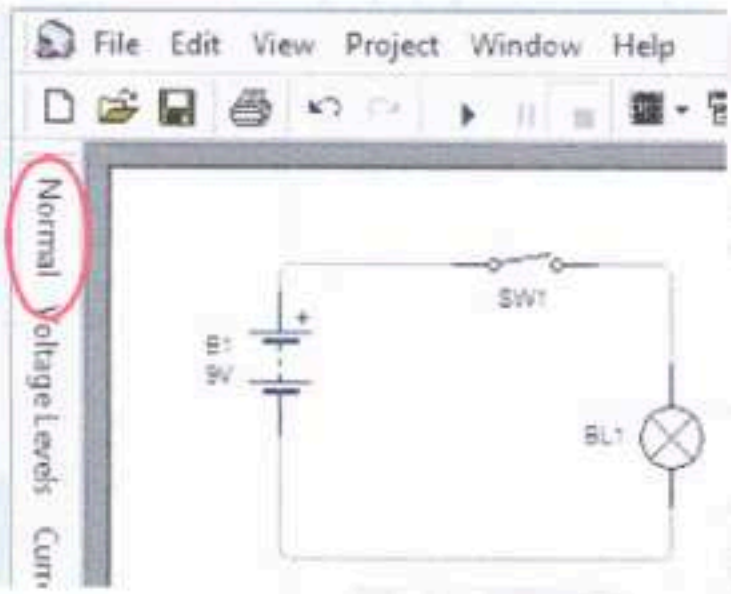
1.2 Standard Toolbar

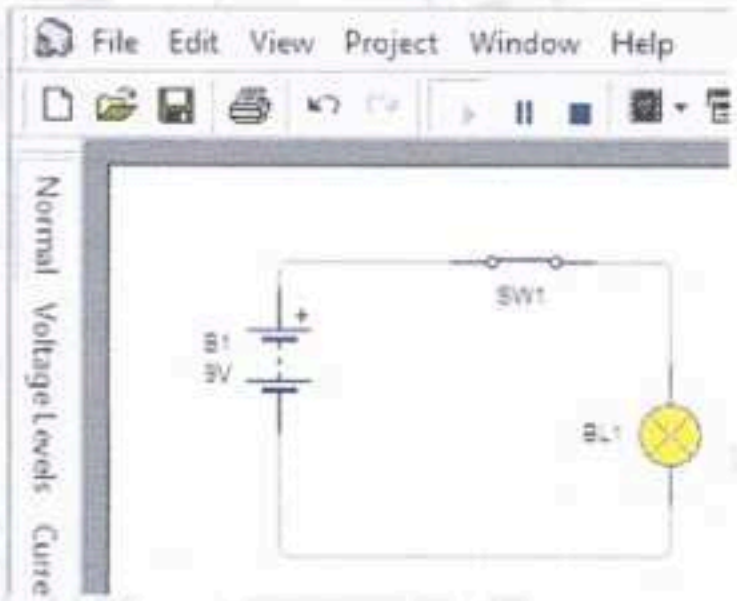


1.3 Style Sheets

Change the way in which the circuit is displayed.

Normal style sheet: When the circuit is animated the components will respond as in a real circuit.

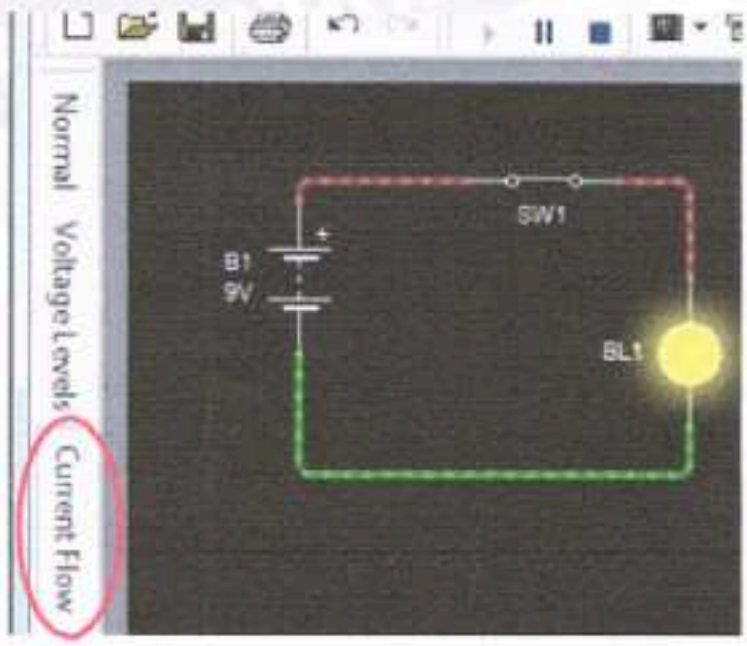




Current Flow style sheet: When the circuit is animated current flow is displayed.

Red = high voltage level
Green = low voltage level

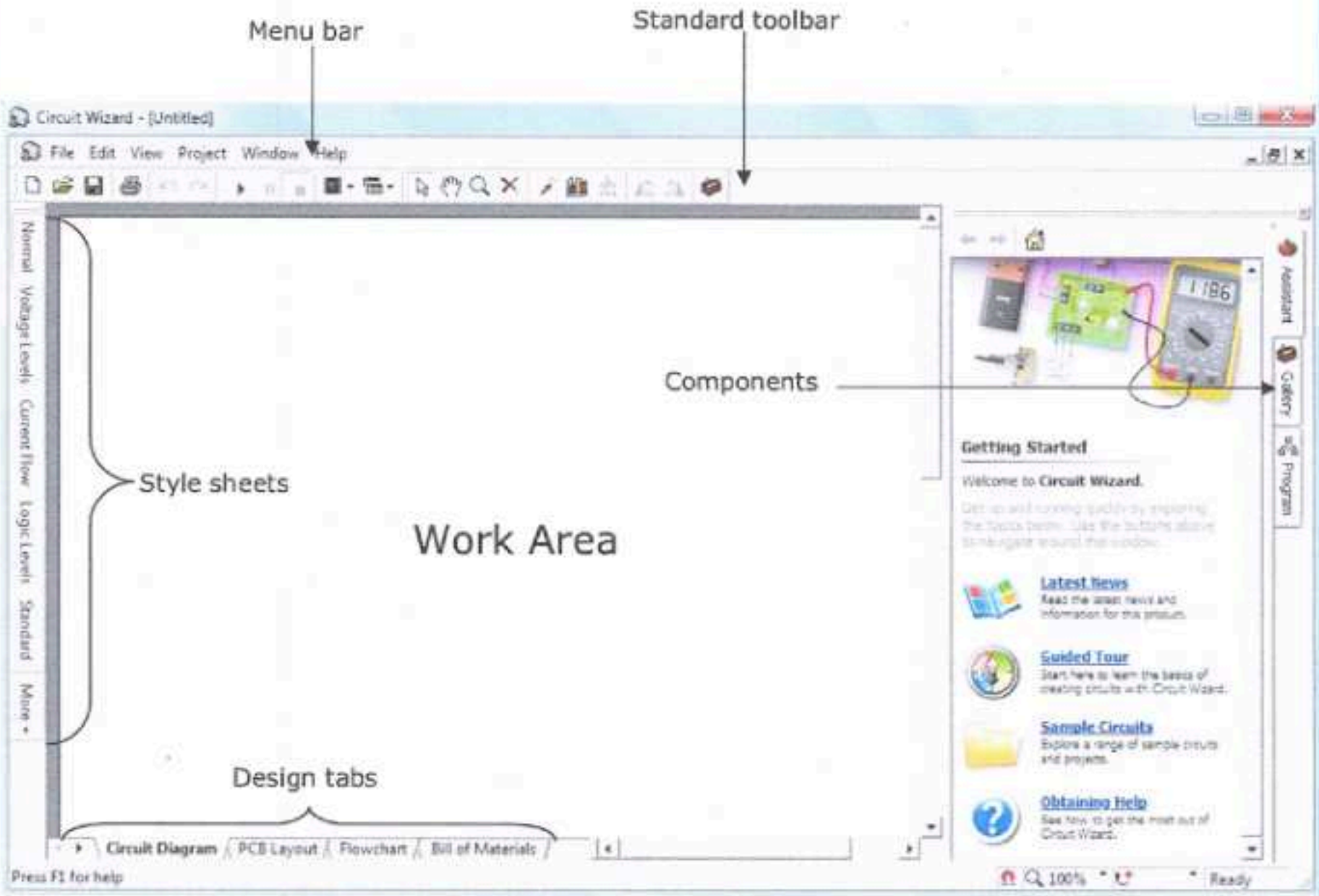
It has a black background for contrast. This can be changed by selecting View → Display → Background and selecting a colour of choice.



Circuit Wizard

To open Circuit Wizard: Click the circuit wizard icon  on the desktop or use the start menu.

1.1 Circuit Wizard Interface:



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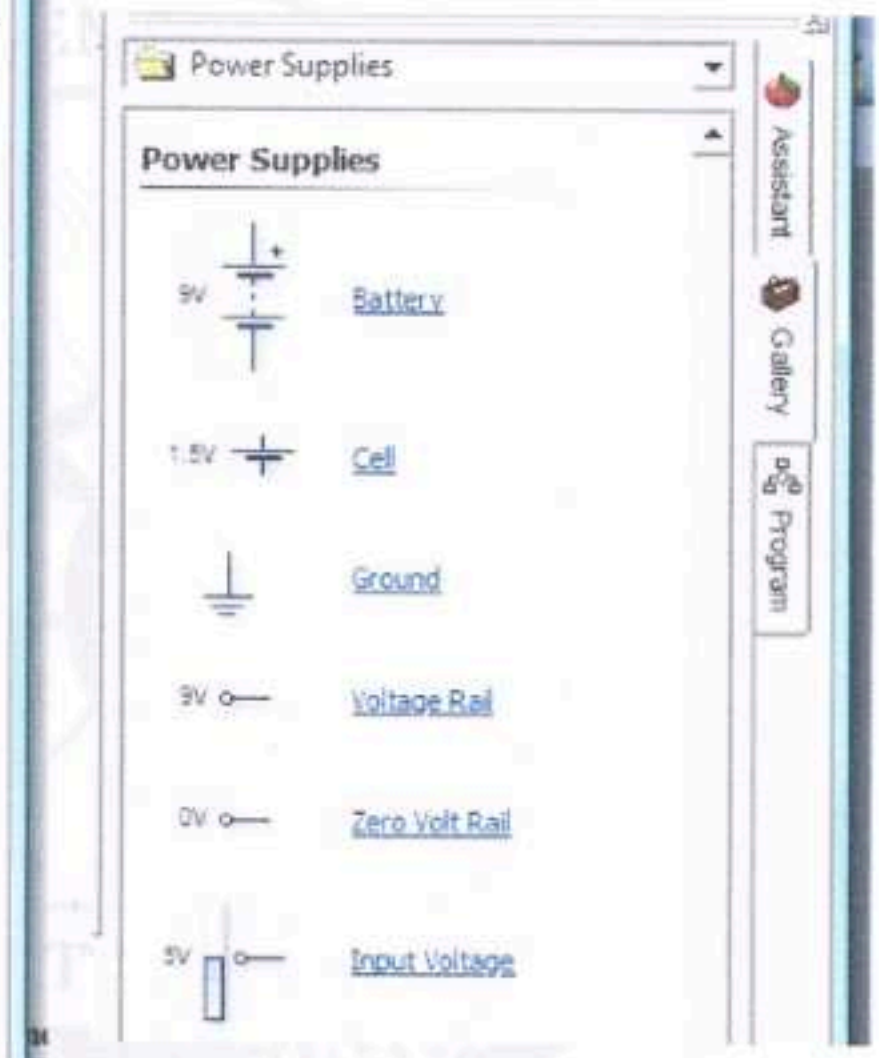
1.4 Gallery

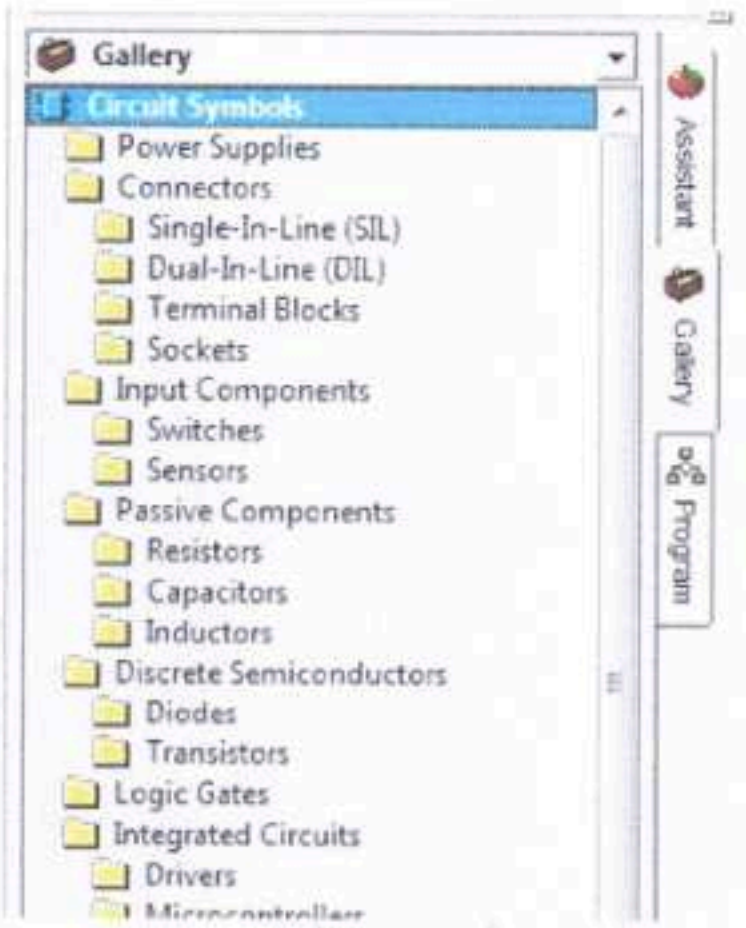
The gallery gives quick access to all the available components. When the gallery tab is first selected the components are displayed grouped by their function into folders as shown below left.

Clicking on any folder such as Power Supplies will open the folder and display its contents (below right). Any component can be inserted into the work area by clicking on it and dragging it into the work area.



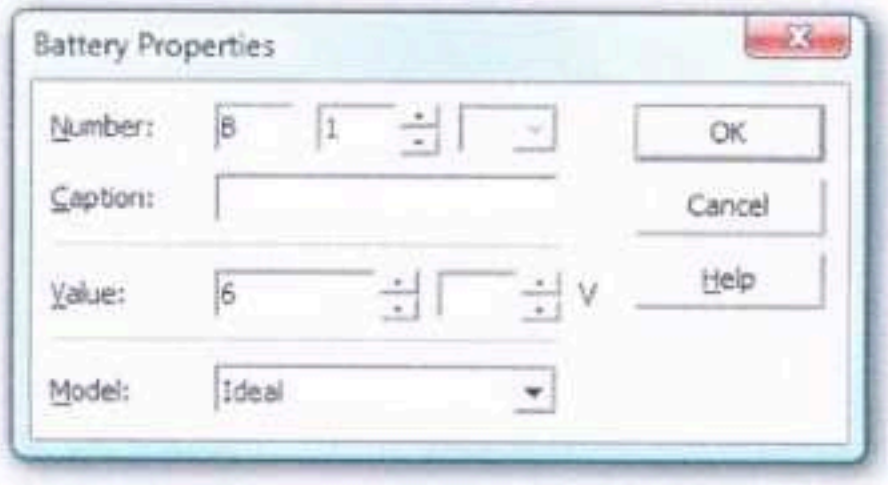
To insert a component from another folder click the drop down list to display the folders.

Gallery display when drop down list is selected.



1.5 To Set the Properties of a Component

Double click the component to open the Property window. The default setting for the battery is 9V. Type or select a new value as shown below. The change takes affect when OK is clicked.



Modified Symbol

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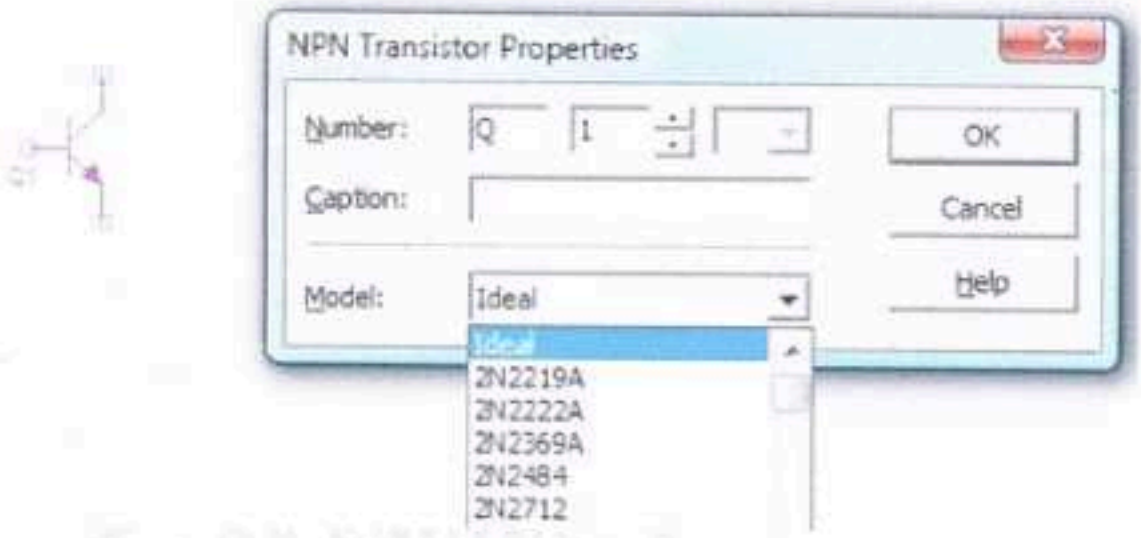
For some components such as transistors specific types can be selected in the property window as shown below.

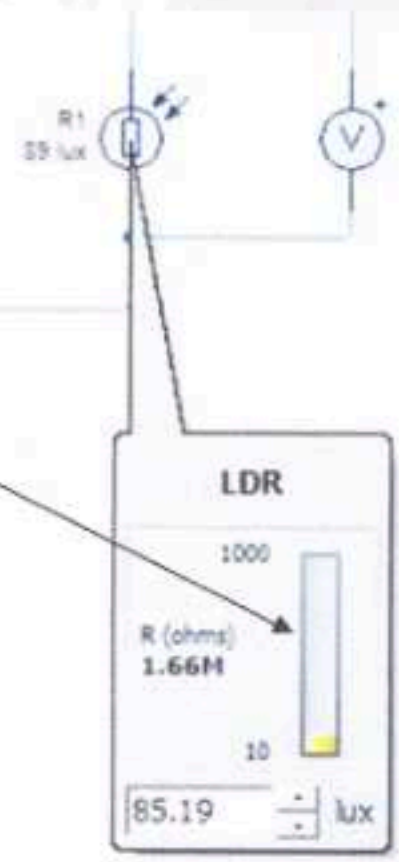


1.6 Using the Digital Multimeter

Right click on the digital multimeter and select the instrument type: voltage, current or ohm.

1.7 Sensor Simulation

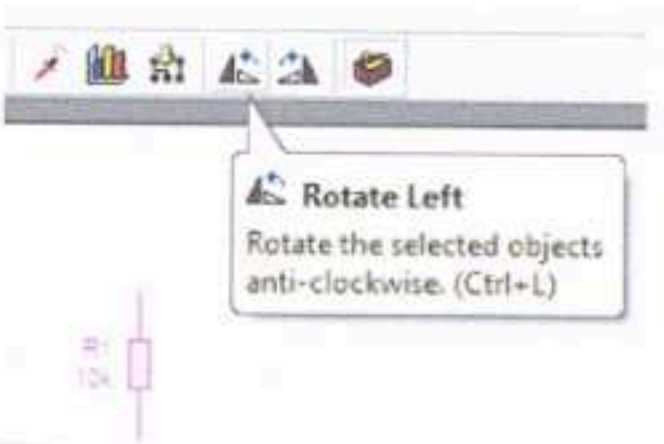
Animate the circuit. Right click on the sensor such as the LDR shown on right. Change the resistance of the LDR to mimic dark and light conditions by dragging the bar up or down with the mouse.



1.8 Rotating a Component

Select the component. Clicking rotate left will turn the component 90° anticlockwise for each click.

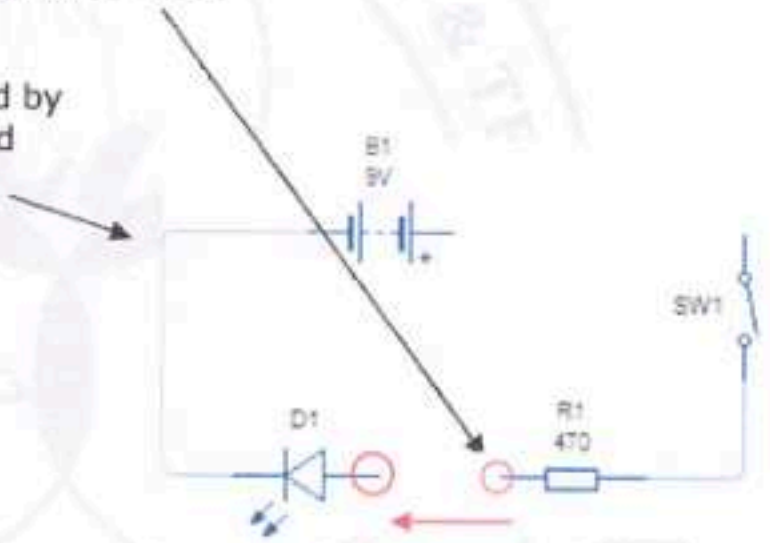
Clicking rotate will turn the component 90° clockwise for each click.



1.9 Drawing a Circuit

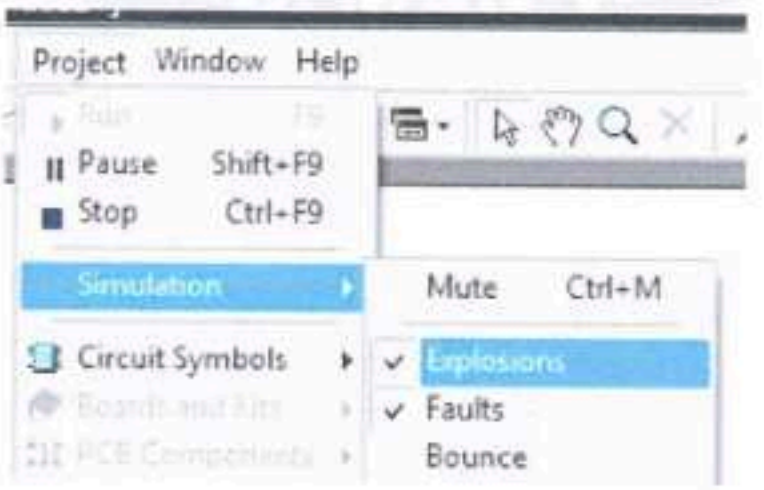
Place the components into the work area. To connect with a wire move the cursor over the components pin, click and drag to connecting pin or wire.

A bend in the wire connection can be created by releasing the mouse at the bend position and completing the link by clicking on the components connecting pin.



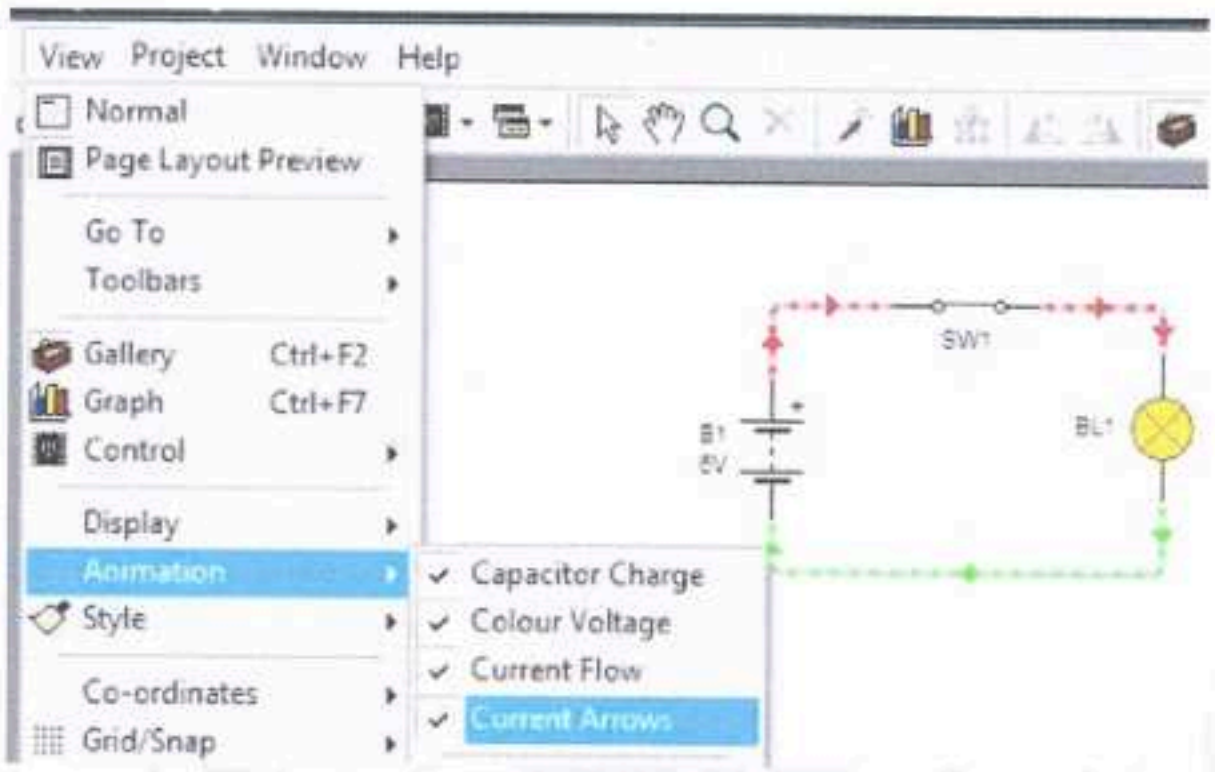
1.10 Circuit Simulation

Before simulating a circuit turn on Explosions and Faults as shown below to ensure the simulation mimics a real circuit as closely as the software allows.



1.11 Current Direction

Viewing the direction of current flow can be enhanced by turning on Current Arrows using the View Menu.

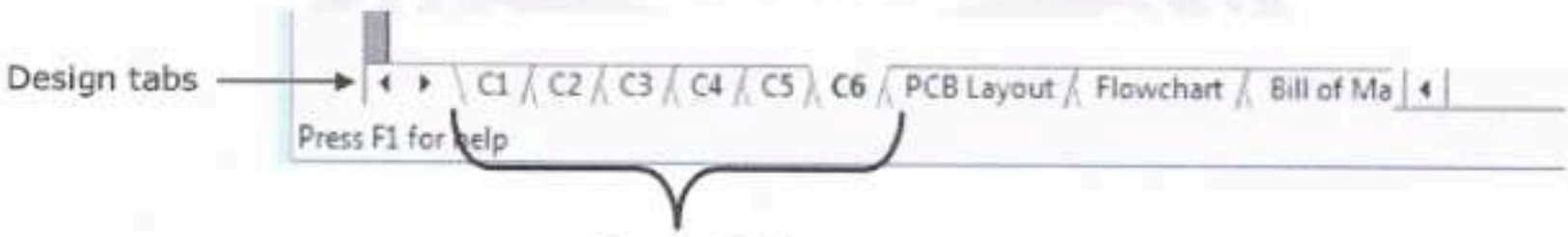


1.12 Course Structure

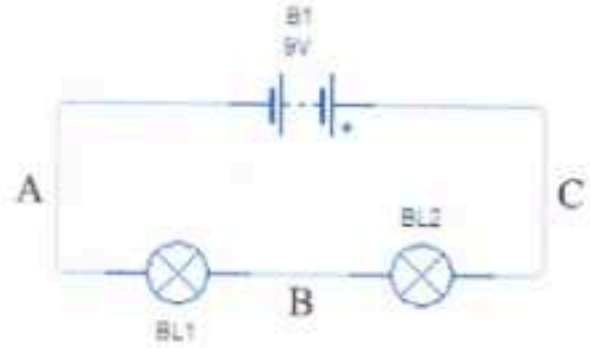
There are five Circuit Wizard files to be used in this course:

- Electric Circuits
- Motor Control
- Sensors
- Transistor Circuits
- Relay Control

Each file has a number of circuits that can be opened by clicking on the tabs in the design tabs area.



2. Electric Circuits



1. Open the file called **Electric Circuits.**

What type of circuit is Circuit 1?

_____

Delete the connections between the components. Insert an ammeter at points A, B and C and connect all components to form a circuit. Record the current at A, B and C.

A:_____ **B:**_____ **C:**_____

2. Build the series circuit below.

Bulb 1 Bulb 2

Remove Bulb 1 what happens? _____

_____

Replace Bulb 1 and remove Bulb 2. What happens?

_____

_____

Explain why the above happens:

_____

_____

_____

Suggest a suitable application for a series circuit: _____

_____

_____

3. Use the multimeter to measure the voltage of the battery and the resistance of the given resistor.

Voltage:_____ Resistance of resistor: _____

Apply Ohm's Law and calculate the current flowing in the circuit.

$$I = \frac{V}{R} = \_\_\_\_ = \_\_\_\_\_$$

Build a series circuit with the battery, resistor and crocodile clips. Use the multimeter to check your answer.

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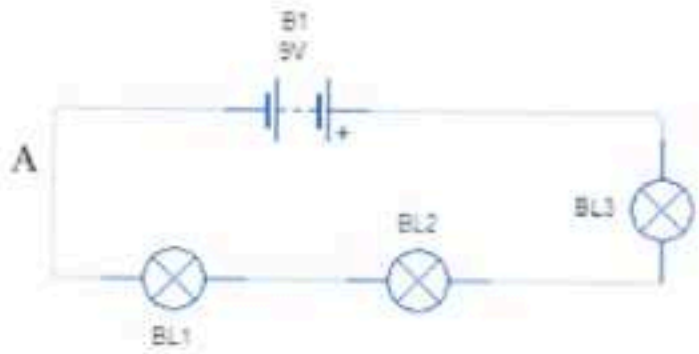
4. Open Circuit 2 (tab C2). Measure the current at point A.
Is the current the same, larger or smaller than the current in Circuit 1? _____



Explain your answer:

_____

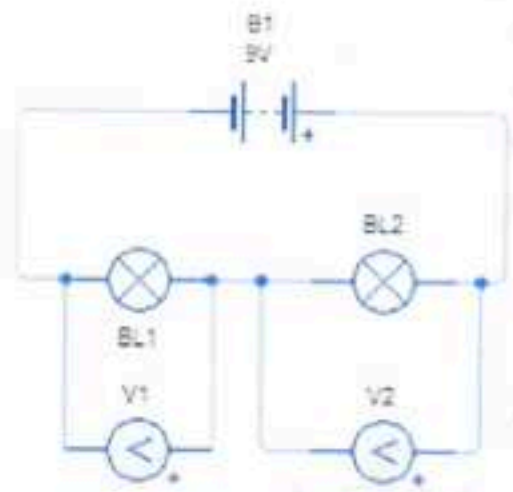
_____

_____

_____

_____

5. Open Circuit 3 (tab C3) and insert voltmeters to measure the voltage across each bulb.



V1 =_____ V2 = _____

V1+V2 = _____

Explain your answers?

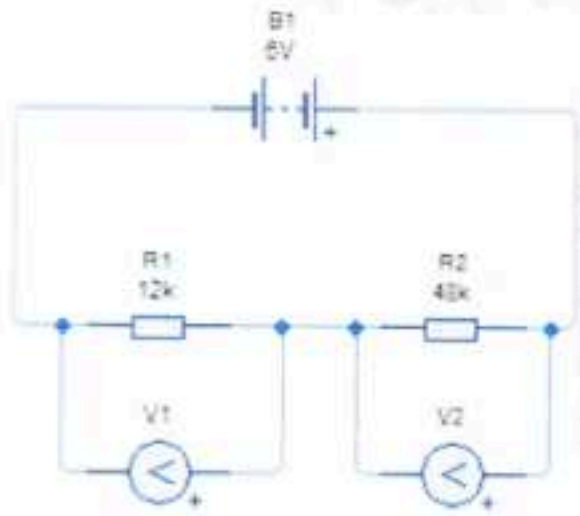
_____

_____

_____

_____

6. Open Circuit 4 (tab C4) and measure the voltage across each resistor.



V1 =_____ V2 = _____

V1 + V2 = _____

Why are the voltages not equal?

_____

_____

_____

Calculate the voltage division for each resistor using the formulae below:

$$V1 = \frac{R1}{R1 + R2} x\ Vin = \frac{\quad}{+} x \quad = \_\_\_\_\_$$

$$V2 = \frac{R2}{R1 + R2} x\ Vin = \frac{\quad}{+} x \quad = \_\_\_\_\_$$

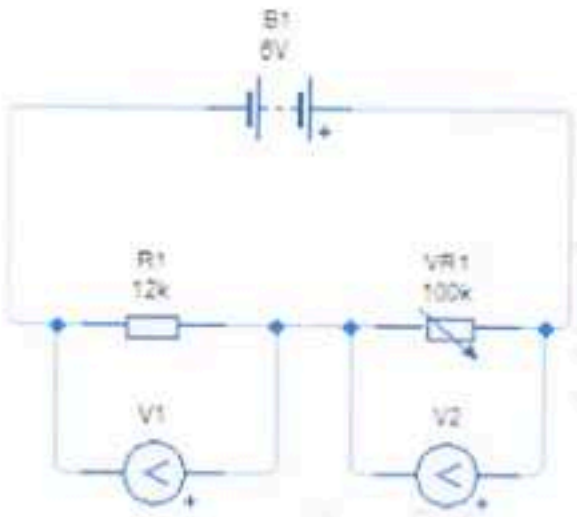
Compare the ratios R1:R2 and V1:V2. What do you notice?

_____

_____

_____

Replace R2 with a variable resistor. Change R2 so that it is larger and then smaller than R1 and note the reading of V2 compared to V1.



Explain what happens:

_____

_____

_____

_____

_____

_____

7. Complete the following sentence from the list below:

In a series circuit there is_____path for the_____to flow around. The current in a series circuit is the_____at all points in the circuit. The _____is divided between the_____in the ratio of their_____.

(components, voltage, applied voltage, one, two, current, resistance, same, different)

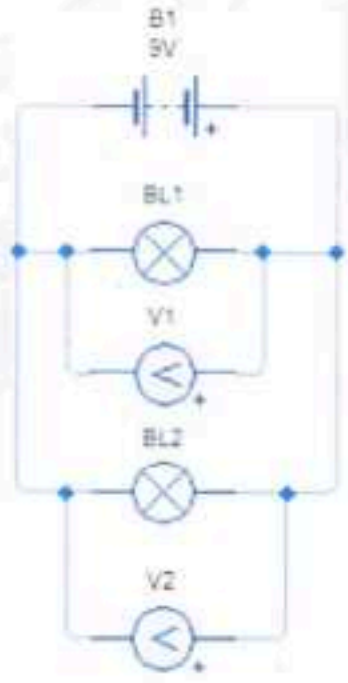
8. Open Circuit 5 (tab C5).

What type of circuit is Circuit 5? _____

How many paths can the current flow around in this circuit?

_____

_____



Measure the voltage across BL1 and BL2.

V1 =_____ V2 = _____

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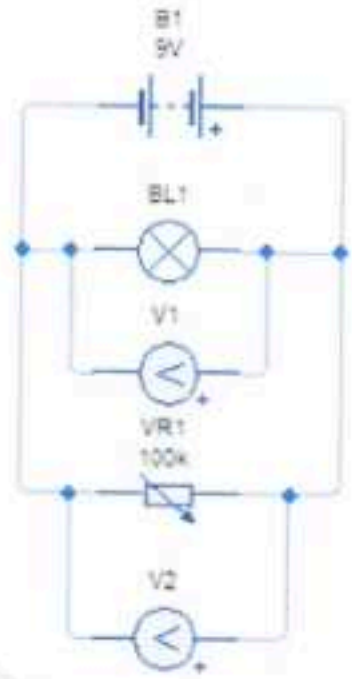
Insert a variable resistor in place of BL2 as shown opposite.

Vary the resistance of the variable resistor and note the value of V1 and V2.

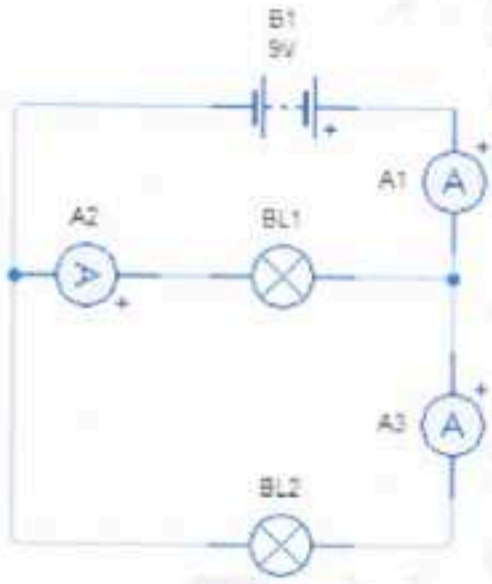


Complete the following sentence from the list below:

The_____across each_____ in a parallel circuit is_____to the_____.

(equal, voltage, all, applied voltage, current, different, resistance, path)

9. Open Circuit 6 (tab C6). Insert ammeters as shown and measure the current.

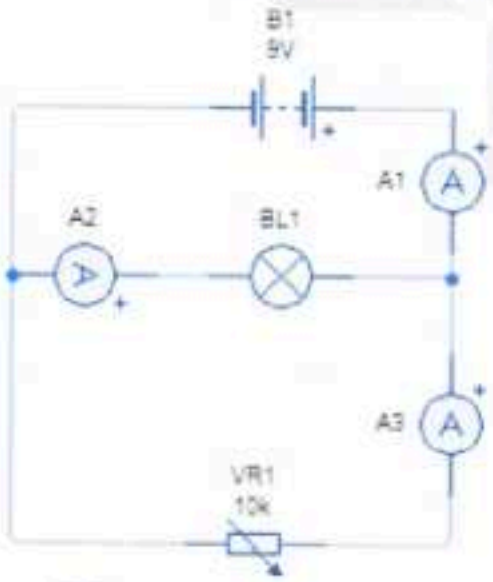


A1 = _____ A2 = _____

A3 = _____

A2 + A3 =_____+_____ = _____

Change BL2 to a 10k variable resistor and animate the circuit. Vary the resistance of the variable resistor and note the ammeter readings.



What happens to the current in a parallel circuit?

_____

_____

_____

_____

_____

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10. Build the parallel circuit below.

Bulb 1 Bulb 2

Remove Bulb 1 what happens? _____

_____

Replace Bulb 1 and remove Bulb 2. What happens?

_____

_____

Explain why the above happens:

_____

_____

_____

Suggest a suitable application for a parallel circuit: _____

_____

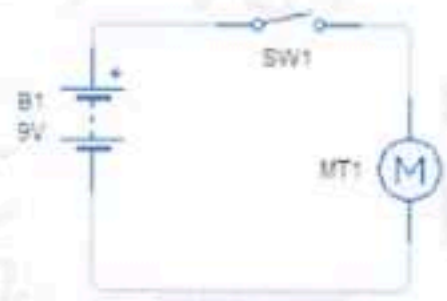
_____

11. Replace bulbs with the given resistors and use the multimeter to confirm the voltage drop across each resistor is equal to the applied voltage.

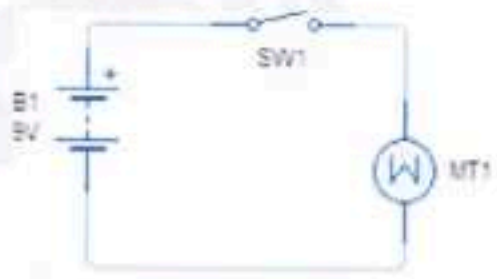
3. Motor Control

12. Open the file **Motor Control**.

Animate Circuit 1a and note the rotation of the motor.



Animate Circuit 1b and note the rotation of the motor.



What is the difference between the two circuits?

_____

_____

What is the cause of this difference?

_____

_____

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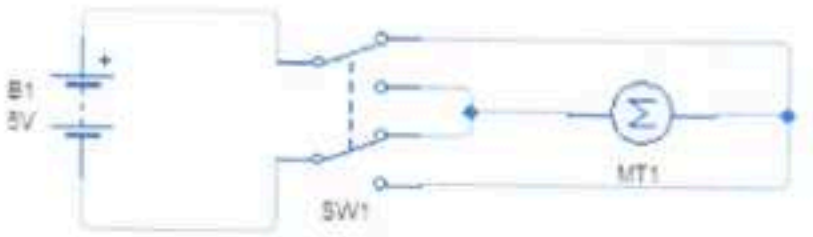
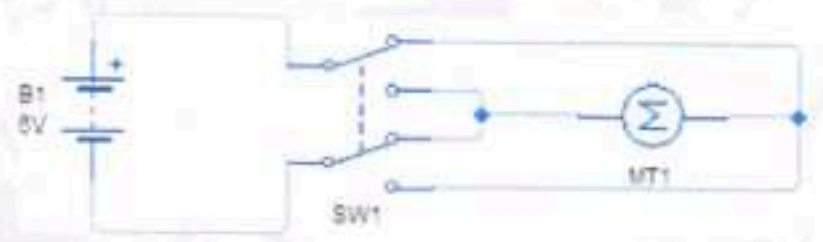
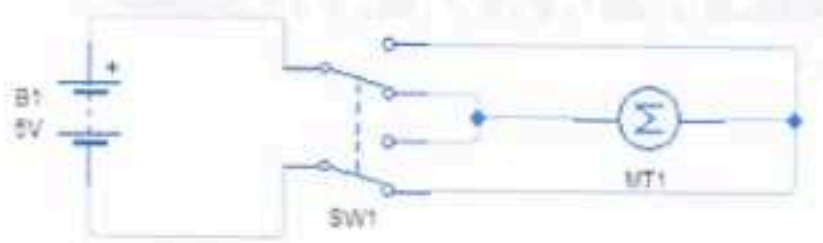
13. Open Circuit 2 (tab C2). Use the 6V battery, DPDT switch and motor to create the circuit below.



Animate the circuit and explain what happens:

Draw in the path of current flow for each throw of the switch below.





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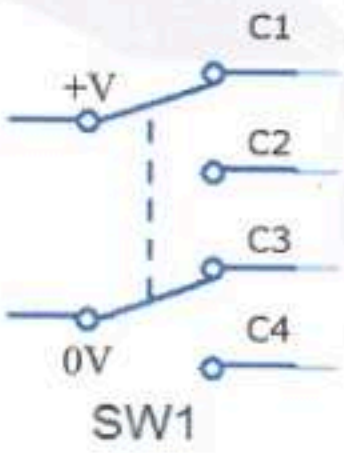
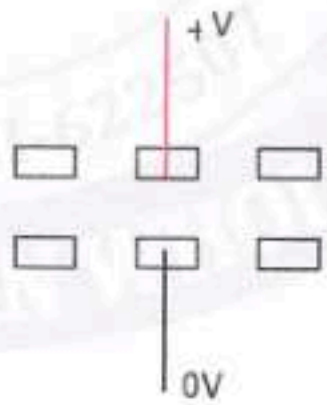
14. Using the multimeter set to continuity testing as shown below, match the contacts on the DPDT symbol to those on the DPDT switch.





DPDT switch contacts

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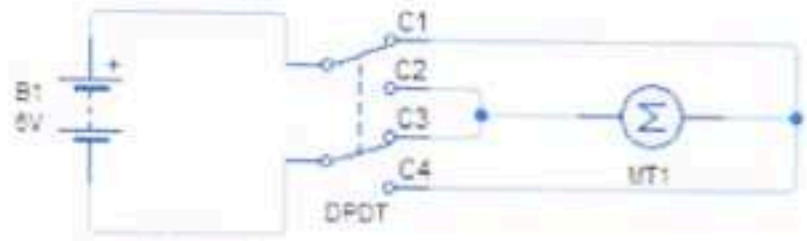
15. Label the contacts on the DPDT switch below and use the circuit diagram to complete the real wiring diagram.

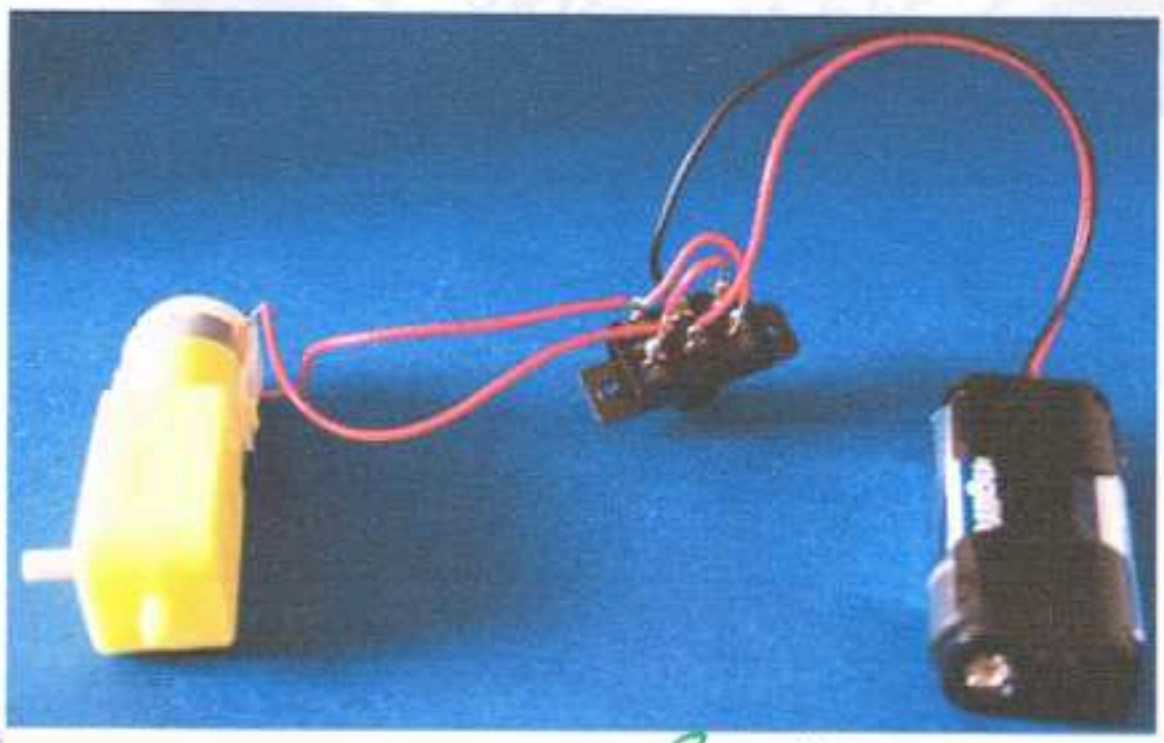


Suggest a suitable application for the circuit: _____

_____

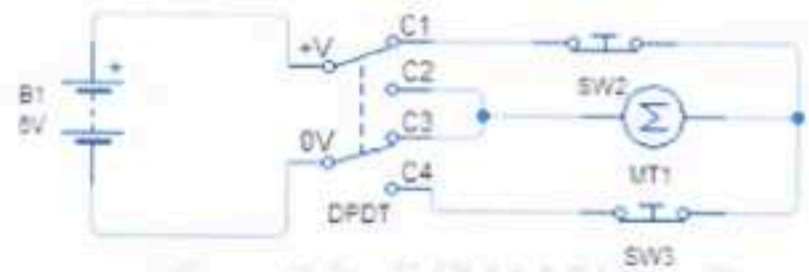
_____

16. Build the DPDT motor control circuit and test the motor is rotating forward and reverse.



17. Open Circuit 3 (tab C3). SW2 and SW3 are push-to-break switches. They are to be used as limit switches for the motor. Insert the limit switches into the circuit diagram as shown below.

Animate the circuit and check they are in the correct position. (Do not forget to open SW2 and SW3 to test the motor stops in both directions)



Suggest a suitable application for the circuit: _____

_____

_____

18. Label the contacts on the DPDT switch below and use the circuit diagram to complete the real wiring diagram.

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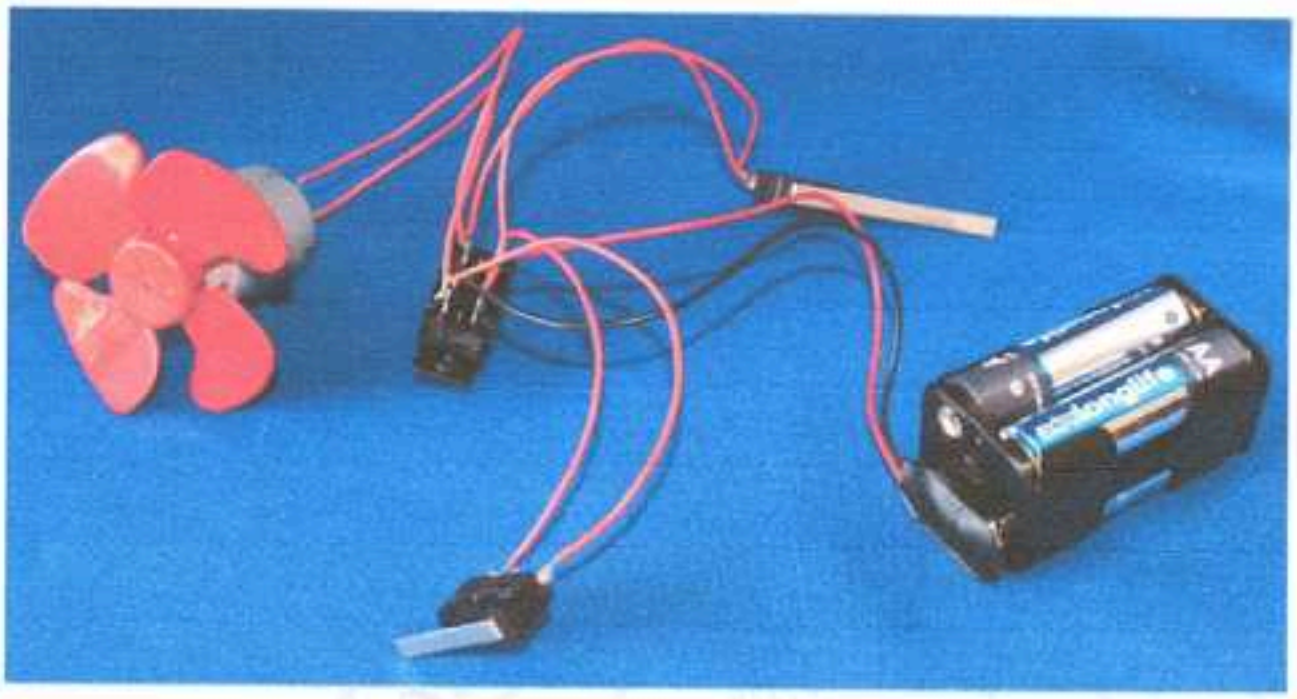
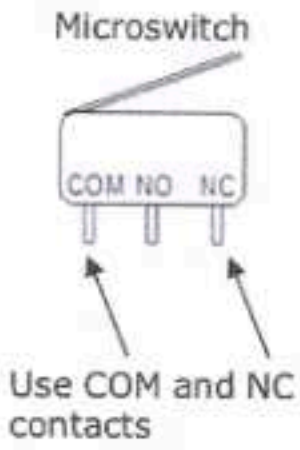
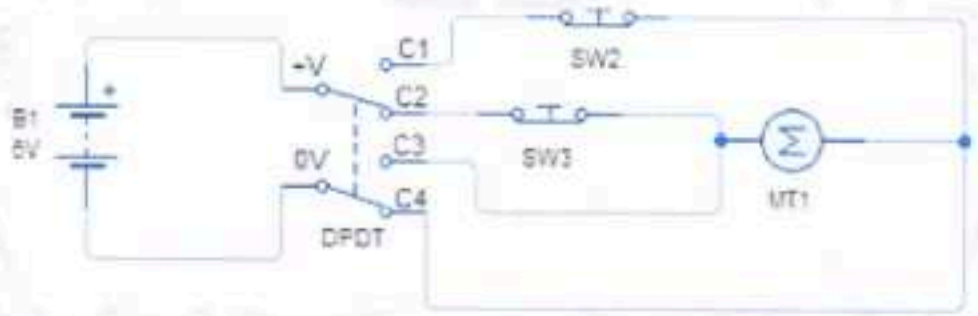
19. Build the motor control limit switch circuit and test the limit switches operate correctly.





20. Reposition SW2 and SW3 as shown below, animate and test the limit switches. Will the limit switches operate as required?



Complete the real wiring diagram.

SW3

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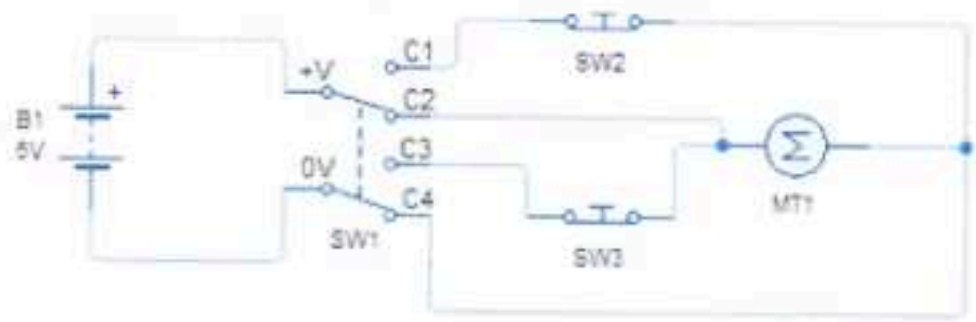
21. Open Circuit 4 (tab C4). SW2 and SW3 have been repositioned as shown below. Animate and test the circuit.



Will the limit switches operate as required? _____

Explain your answer:

_____

_____

_____

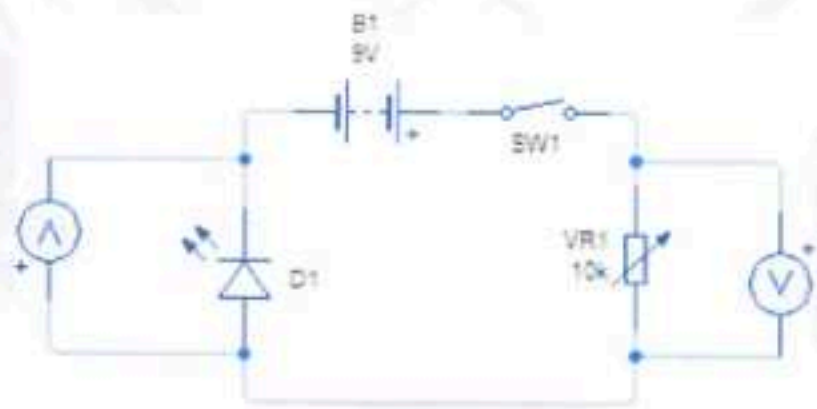
_____

_____

_____

4. Sensors

22. Open the file **Sensors.**
Insert two voltmeters as shown below into Circuit 1a and animate the circuit.



What happens to the voltages as the resistance of the variable resistor is reduced?

_____

_____

Why will the LED fail as the resistance of the variable resistor is reduced?

_____

_____

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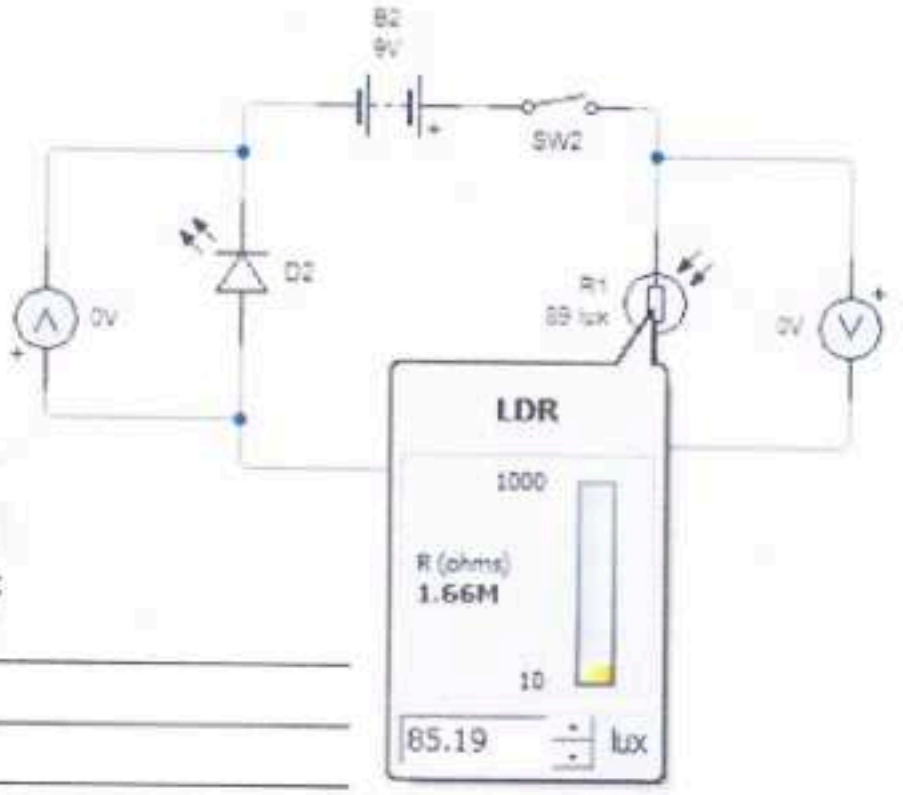
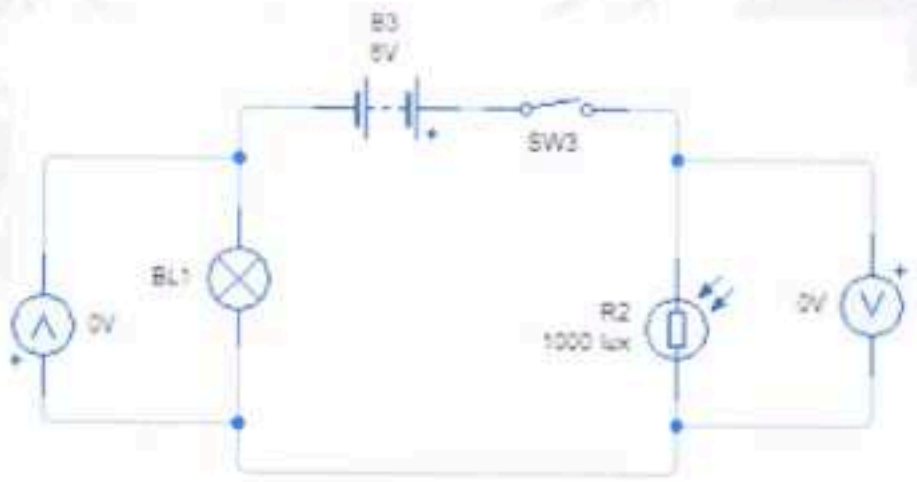
The variable resistor has been replaced by an LDR in Circuit 1b. Animate the circuit and vary the resistance of the LDR.



Explain how the LDR works in this circuit:

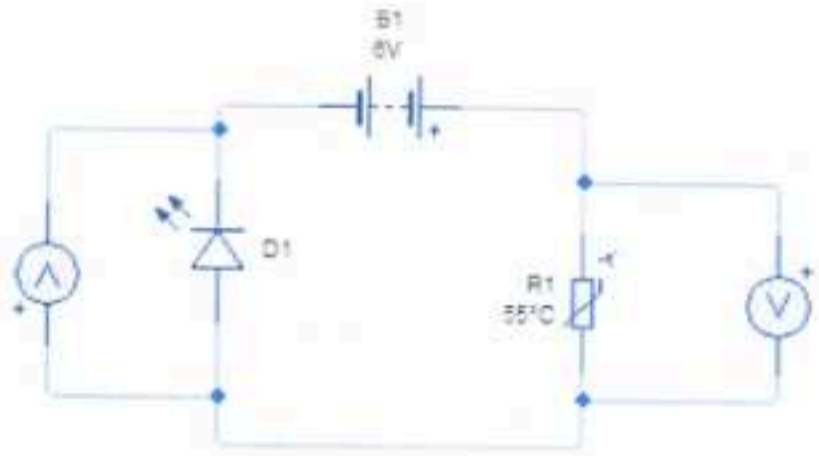
What is the advantage of using the LDR instead of the variable resistor?

Scroll down and animate Circuit 1c.



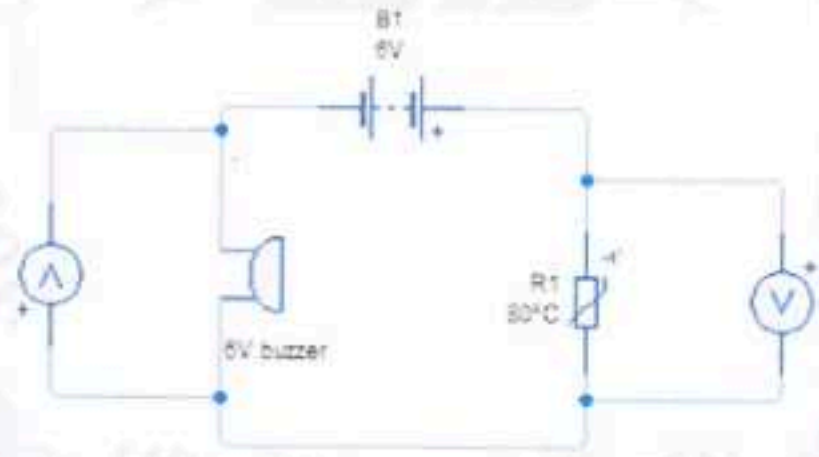
Why is there a poor level of light from the bulb?

23. Open Circuit 2 (tab C2). Animate the circuit and vary the resistance of the thermistor.



Explain how the thermistor operates in this circuit:

Animate Circuit 2b where the LED has been replaced with a 6V Buzzer.



Why is there no sound?

How can the LDR and Thermistor circuits above be modified to increase the level of light from the signal lamp and sound from the Buzzer??????????

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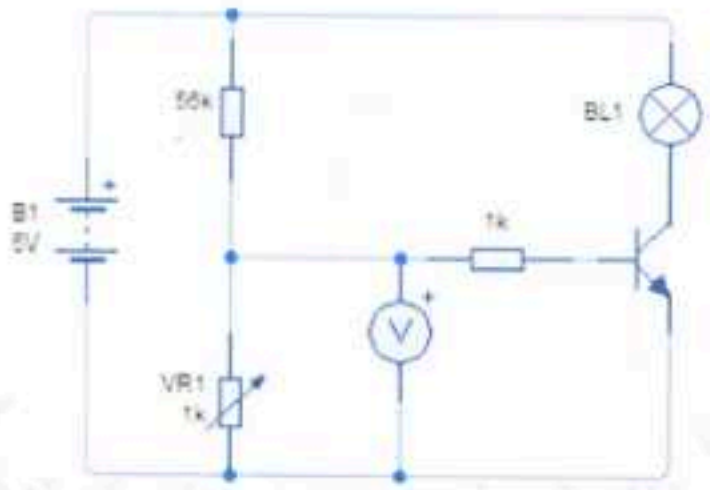
5. Transistor Circuits

24. Open the file **Transistor Circuits**. Animate Circuit 1.



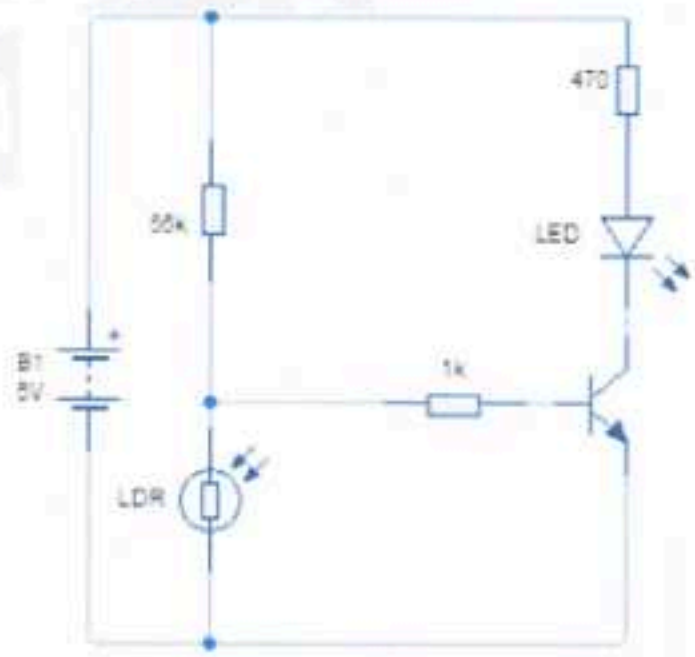
Why is bulb BL1 not lighting?

Increase the resistance of the variable resistor and note the voltage reading across the base of the transistor.

What effect does this have on the circuit?

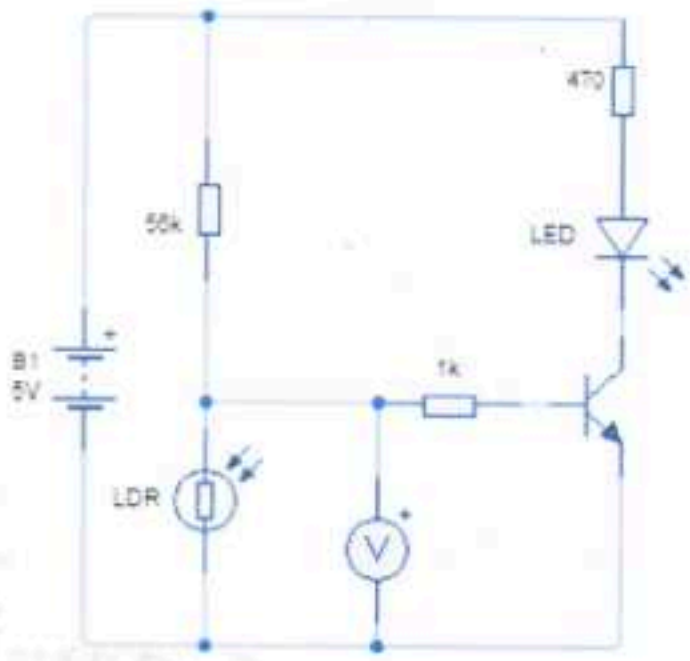
25. Open Circuit 2 (tab C2). Animate the circuit.

How does the circuit operate?

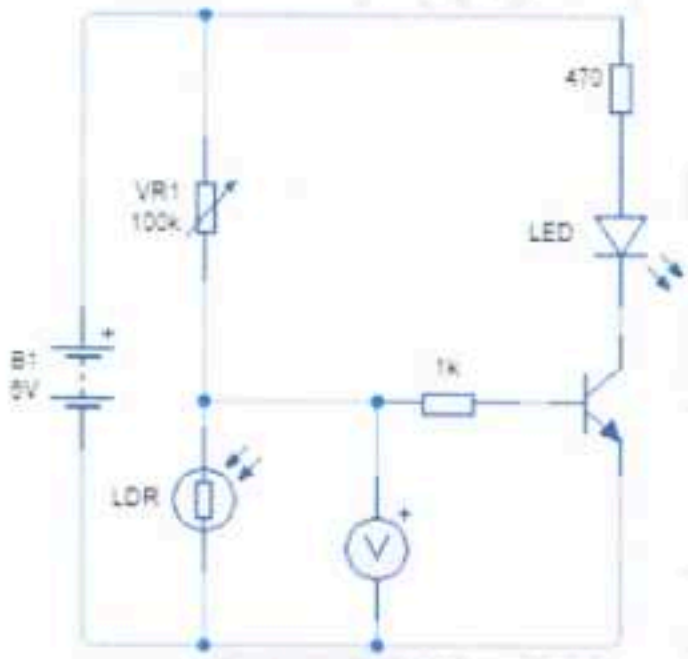


Insert a voltmeter across the LDR and complete the following sentence:

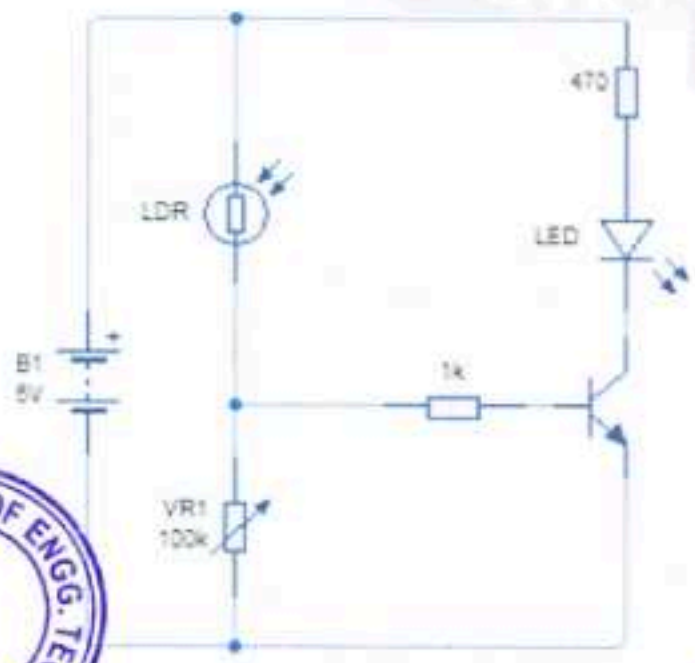
As it gets_____the_____ of the LDR_____. This increases the_____between the _____and_____of the transistor. Current flows in the circuit turning on the LED.



26. Scroll down to Circuit 2b. Change the 56k resistor to a 100k variable resistor. What effect does changing the resistance of the variable resistor have on the circuit?



Open Circuit 3 (tab C3). The position of the LDR and variable resistor, have been changed. What effect does this have on the operation of the circuit?



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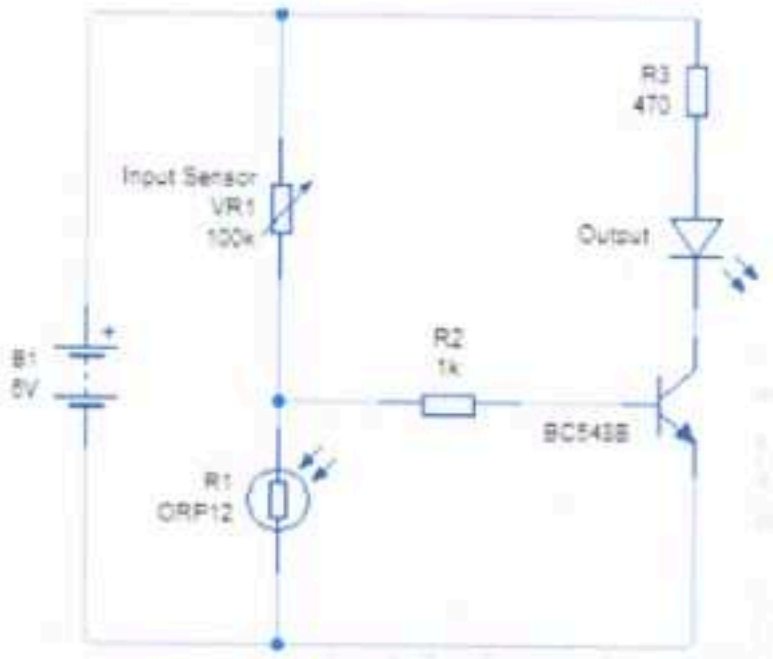
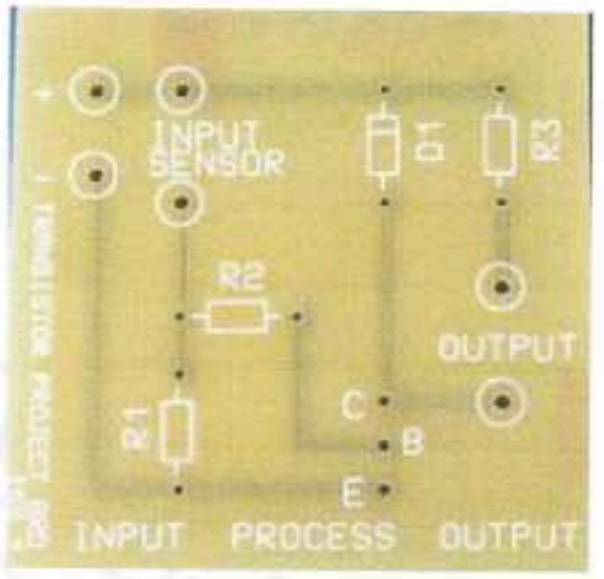
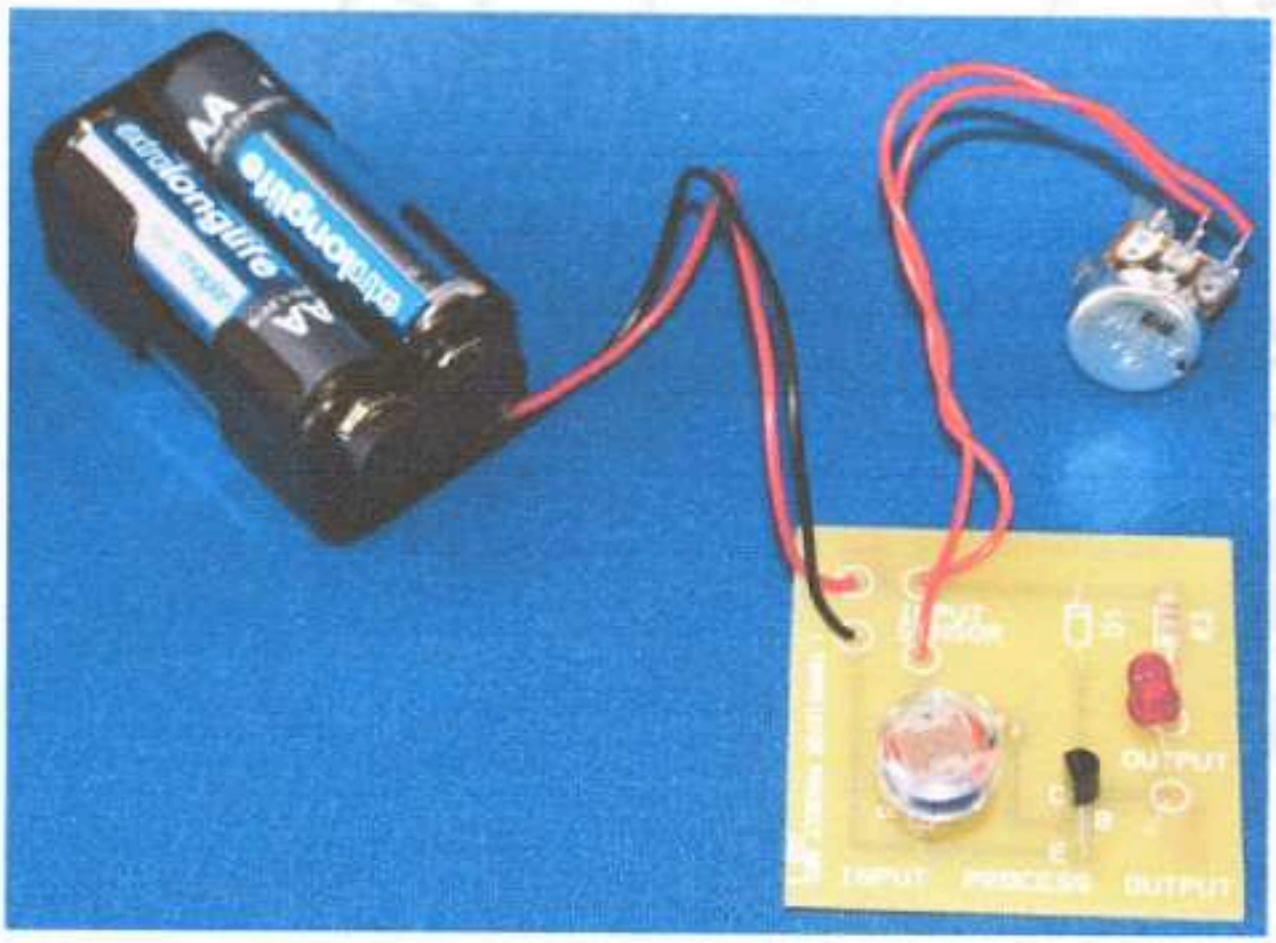
27. Build the LDR transistor circuit below on the PCB provided and test the voltage levels in the circuit. (No diode required for D1 in this circuit).







BC548
BC548A
BC548B
BC548C

Suggest a suitable application for the circuit:

_____

_____

_____

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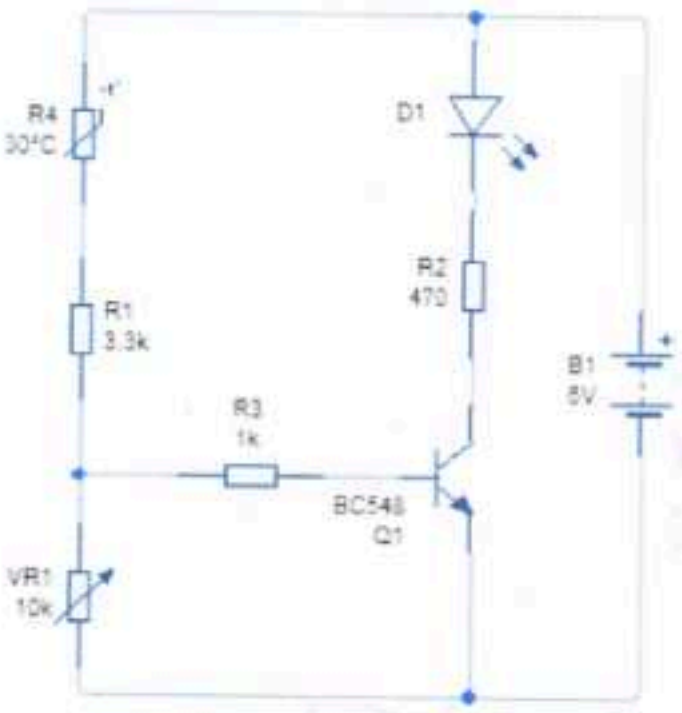
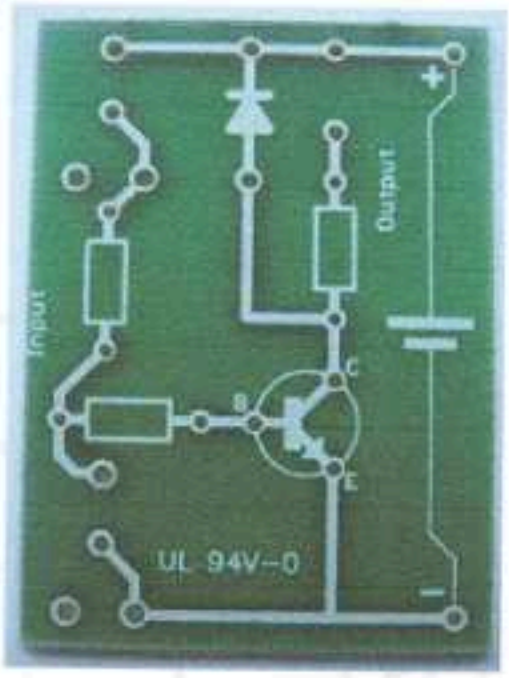
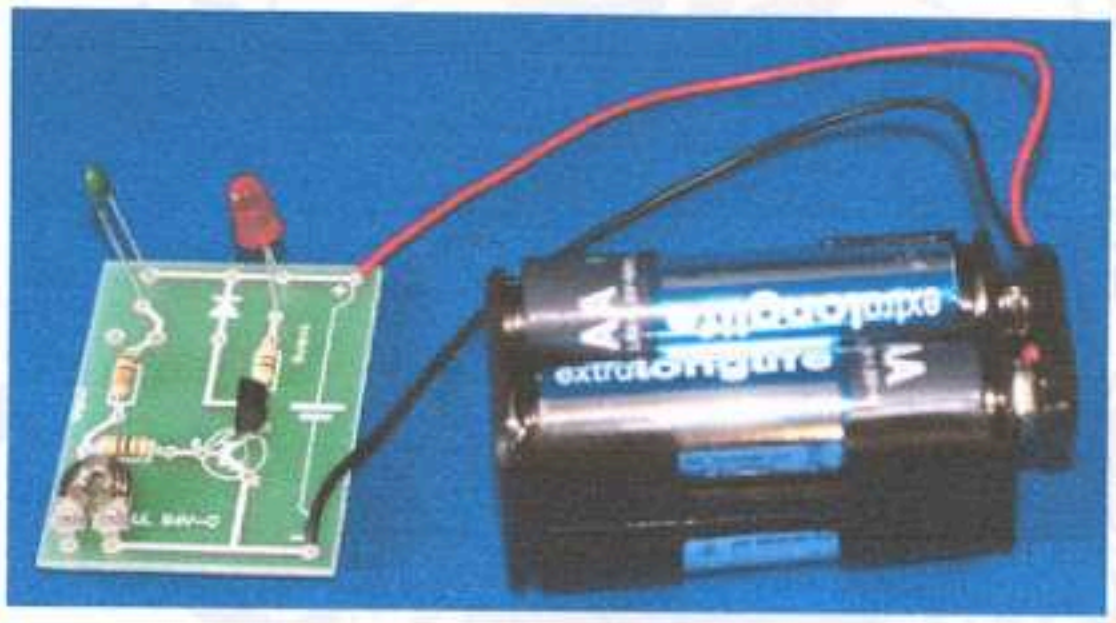
28. Build the thermistor transistor circuit below on the PCB provided and test the voltage levels in the circuit. (No diode required for circuit).







Suggest a suitable application for the circuit:

_____

_____

_____

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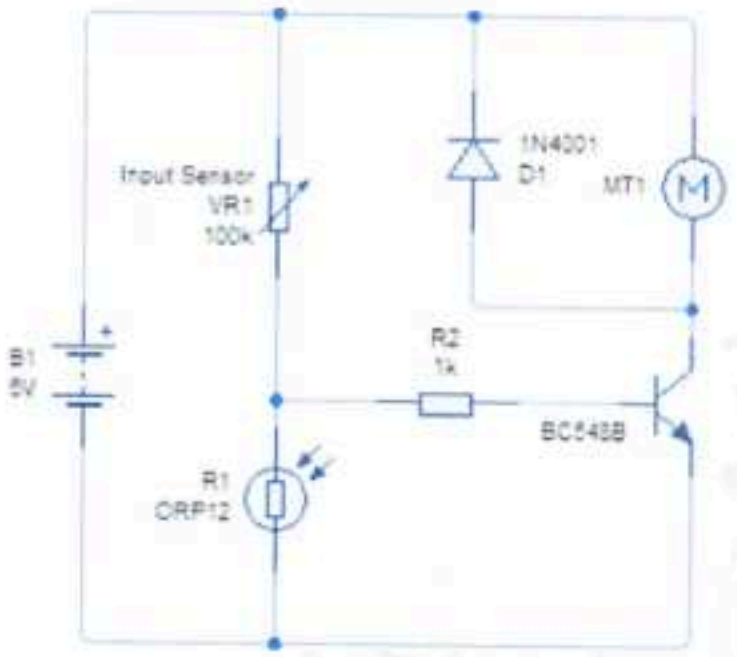
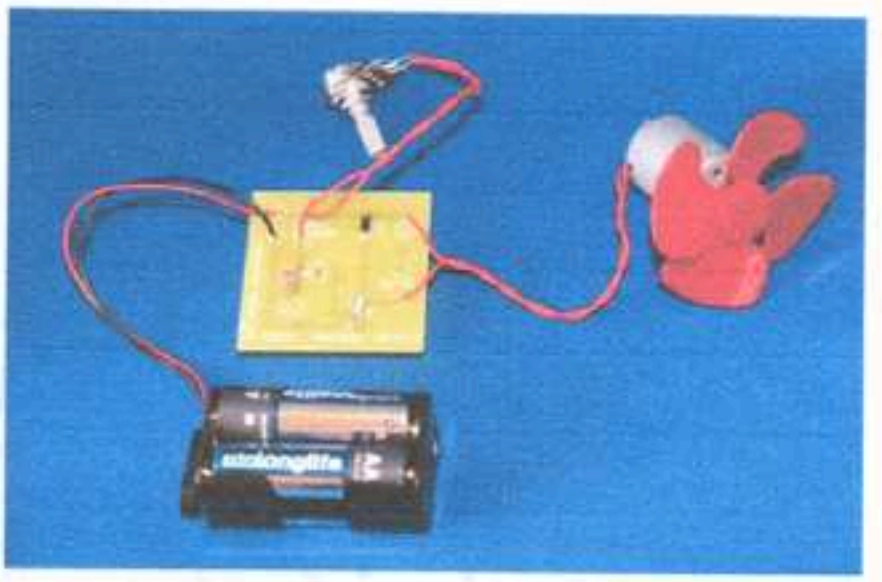
29. BCX38B is a darlington pair transistor and can be used on the project board when the output is a motor/solenoid or bulb. A diode is required when the output is a motor or solenoid. Build the circuit below. The protective resistor (R3) used with an LED on the PCB is not required.

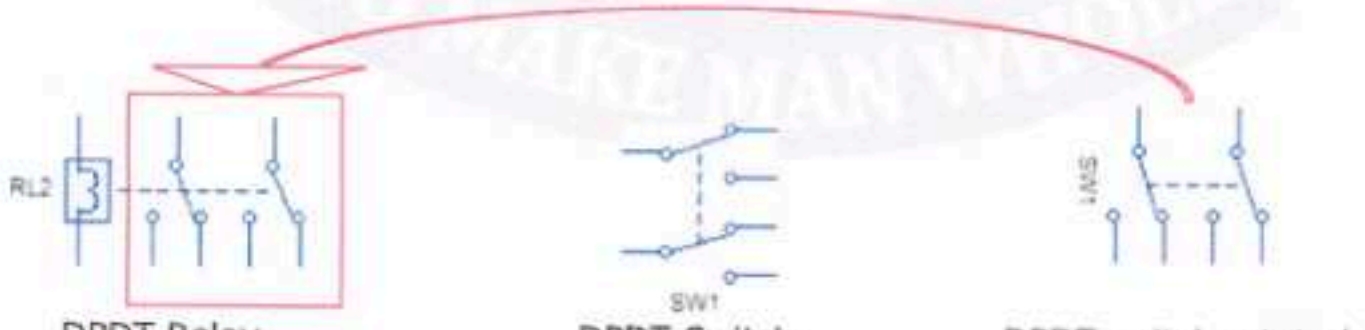




Suggest a suitable application for the circuit:

6. Relay Control

30. The electric symbol for the DPDT Relay and DPDT switch in its normal and rotated position are shown below. In its rotated position the DPDT switch is the same as the selected part of the relay.



DPDT Relay DPDT Switch DPDT switch rotated

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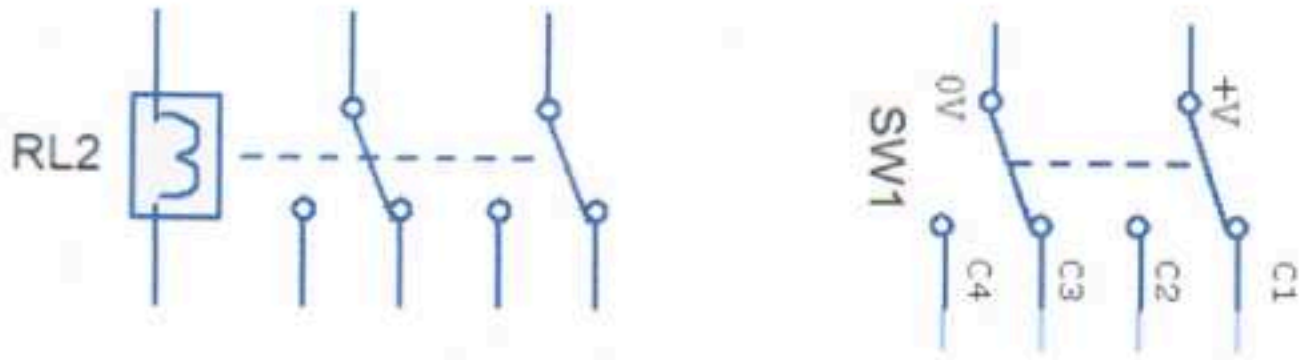
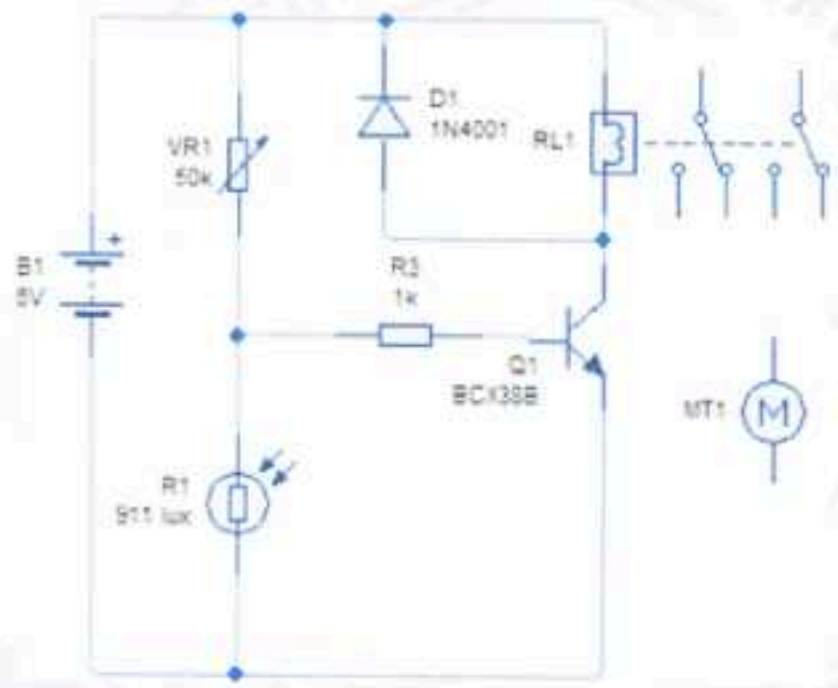
Mark the contacts on the relay to match those on the DPDT switch.



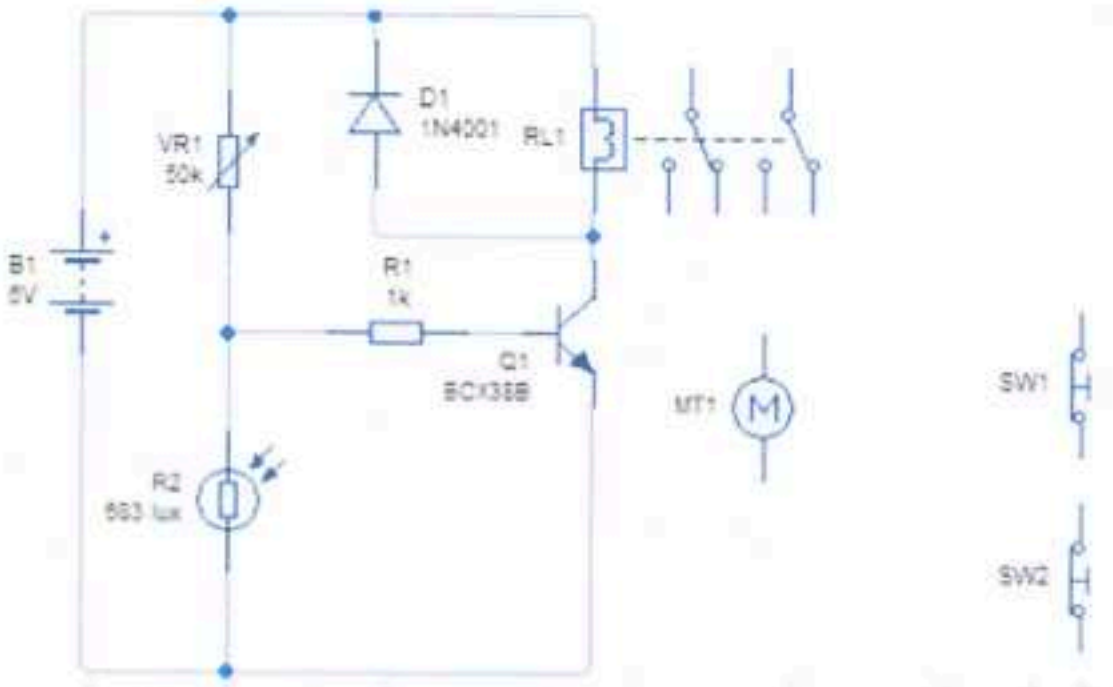
31. Open the file Relay and complete the Circuit 1 diagram so the relay will rotate the motor forward and reverse. Animate the circuit to check that it operates correctly.



Explain how the circuit operates:

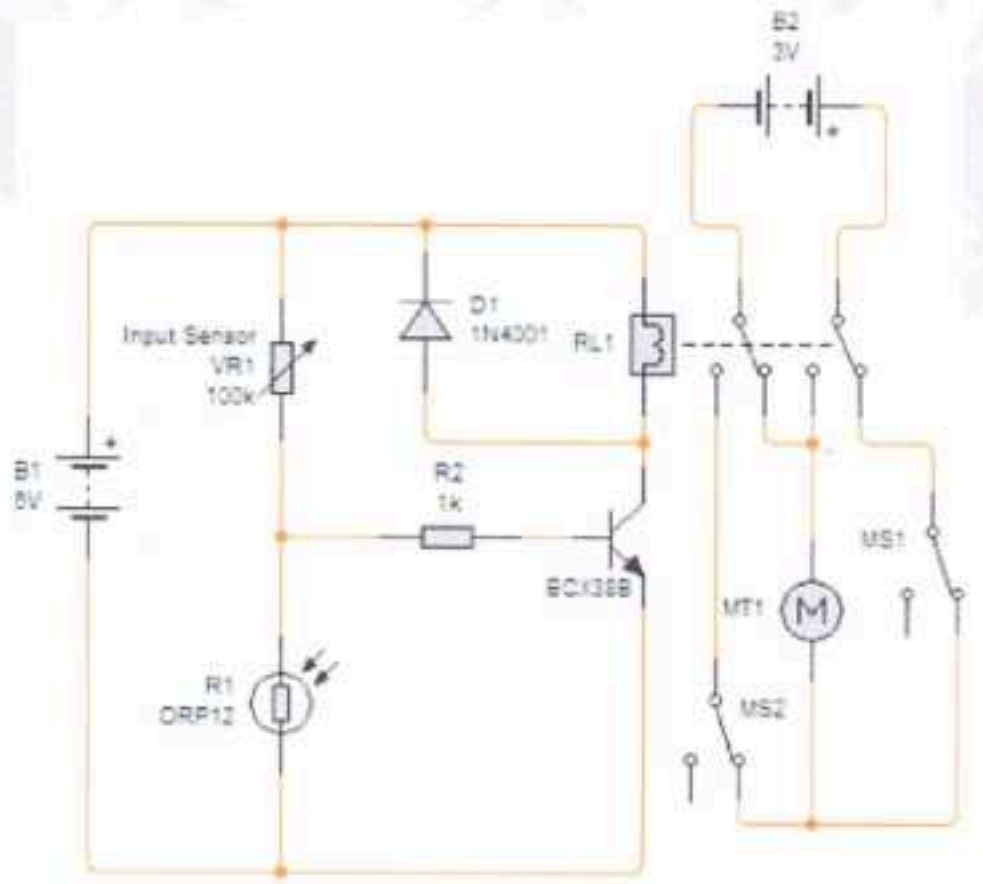
Suggest a suitable application for the circuit:

32. Open Circuit 2 (tab C2) and complete the wiring diagram to include limit switches. Move the limit switches SW1 and SW2 as required. Animate the circuit to confirm that the motor will rotate forward and reverse with limit switch operation in both directions.



Suggest a suitable application for the circuit:

33. Use the transistor project board to build the Relay circuit below and test its operation.



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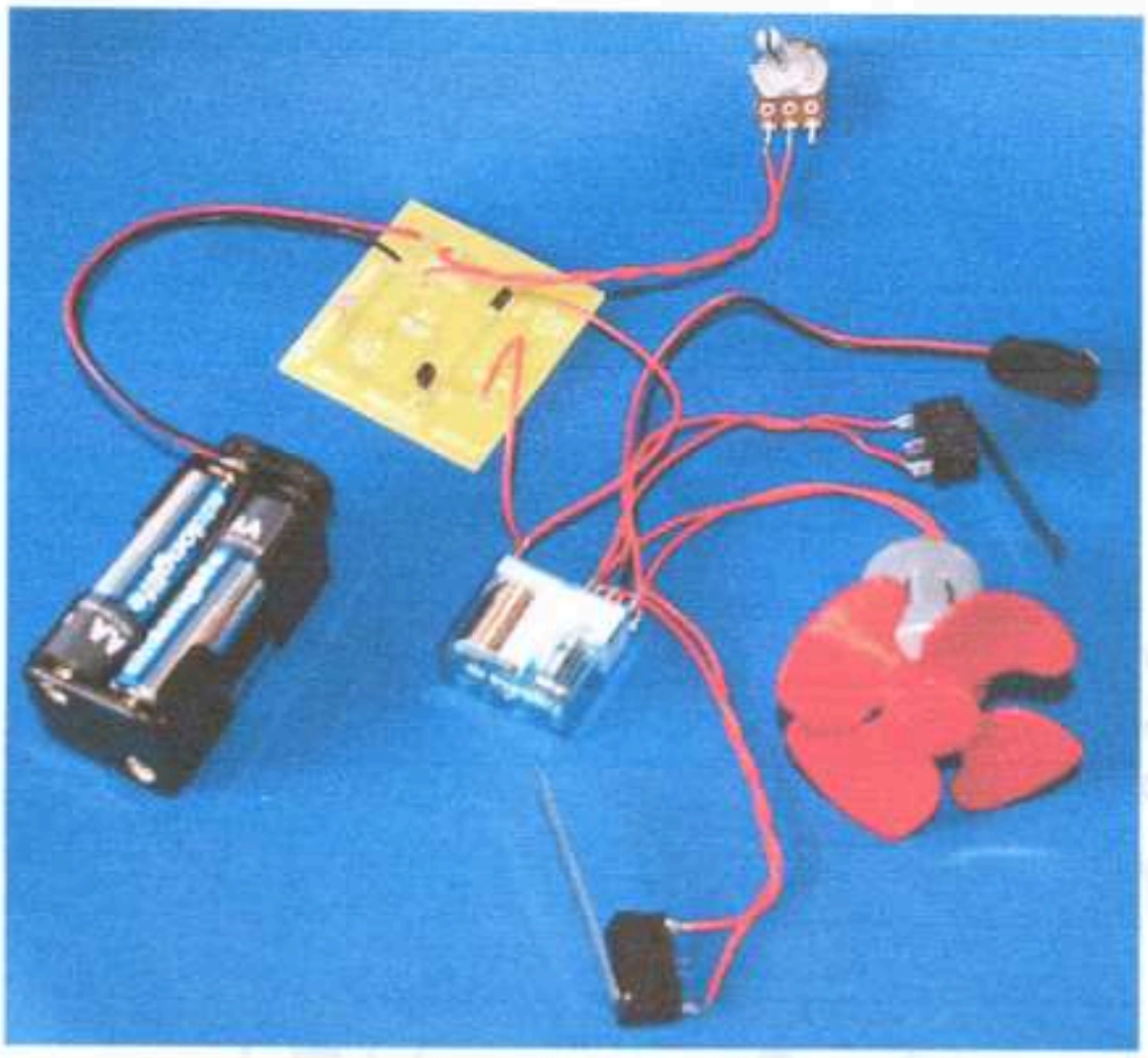

BCX38A/B/C

E-Line
TO92 Compatible

Suggest a suitable application for the circuit:

_____

_____

_____

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TABLE OF CONTENTS

Getting Started

Understanding the Basics

In this lesson, you learn what Autodesk Revit is and how its parametric change engine benefits you and your work. You begin with the fundamental concepts on which Revit is built. You learn the terminology, the hierarchy of elements, and how to perform some common tasks in the product.

Understanding the Concepts

What is Autodesk Revit ?

The Revit platform for building information modeling is a design and documentation system that supports the design, drawings, and schedules required for a building project. Building information modeling (BIM) delivers information about project design, scope, quantities, and phases when you need it.

In the Revit model, every drawing sheet, 2D and 3D view, and schedule is a presentation of information from the same underlying building model database. As you work in drawing and schedule views, Revit collects information about the building project and coordinates this information across all other representations of the project. The Revit parametric change engine automatically coordinates changes made anywhere—in model views, drawing sheets, schedules, sections, and plans.

What is meant by parametric?

The term parametric refers to the relationships among all elements of the model that enable the coordination and change management that Revit provides. These relationships are created either automatically by the software or by you as you work. In mathematics and mechanical CAD, the numbers or characteristics that define these kinds of relationships are called parameters; hence, the operation of the software is parametric. This capability delivers the fundamental coordination and productivity benefits of Revit: Change anything at any time anywhere in the project, and Revit coordinates that change through the entire project.

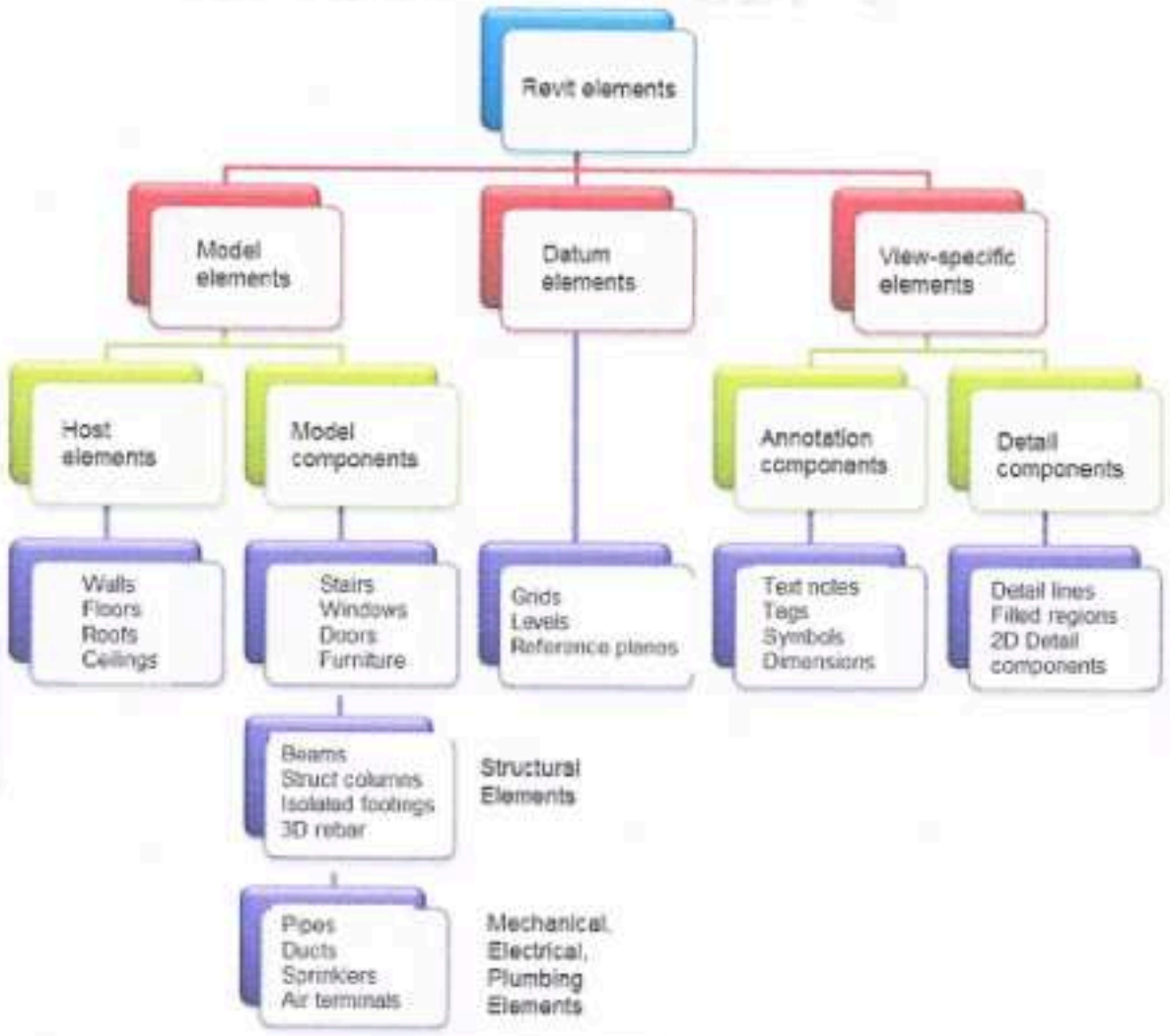
The following are examples of these element relationships:

- The outside of a door frame is a fixed dimension on the hinge side from a perpendicular partition. If you move the partition, the door retains this relationship to the partition.
- Windows or pilasters are spaced equally across a given elevation. If the length of the elevation is changed, the relationship of equal spacing is maintained. In this case, the parameter is not a number but a proportional characteristic.
- The edge of a floor or roof is related to the exterior wall such that when the exterior wall is moved, the floor or roof remains connected. In this case, the parameter is one of association or connection.

Element behavior in a parametric modeler

In projects, Revit uses 3 types of elements:

- *Model elements* represent the actual 3D geometry of the building. They display in relevant views of the model. For example, walls, windows, doors, and roofs are model elements.
- *Datum elements* help to define project context. For example, grids, levels, and reference planes are datum elements.
- *View-specific elements* display only in the views in which they are placed. They help to describe or document the model. For example, dimensions, tags, and 2D detail components are view specific elements.



There are 2 types of *model elements*:

- Hosts (or host elements) are generally built in place at the construction site. For example, walls and roofs are hosts.
- Model components are all the other types of elements in the building model. For example, windows, doors, and cabinets are model components.

There are 2 types of *view-specific elements*:

- Annotation elements are 2D components that document the model and maintain scale on paper. For example, dimensions, tags, and keynotes are annotation elements.
- Details are 2D items that provide details about the building model in a particular view. Examples include detail lines, filled regions, and 2D detail components.

This implementation provides flexibility for designers. Revit elements are designed to be created and modified by you directly; programming is not required. If you can draw, you can define new parametric elements in Revit.

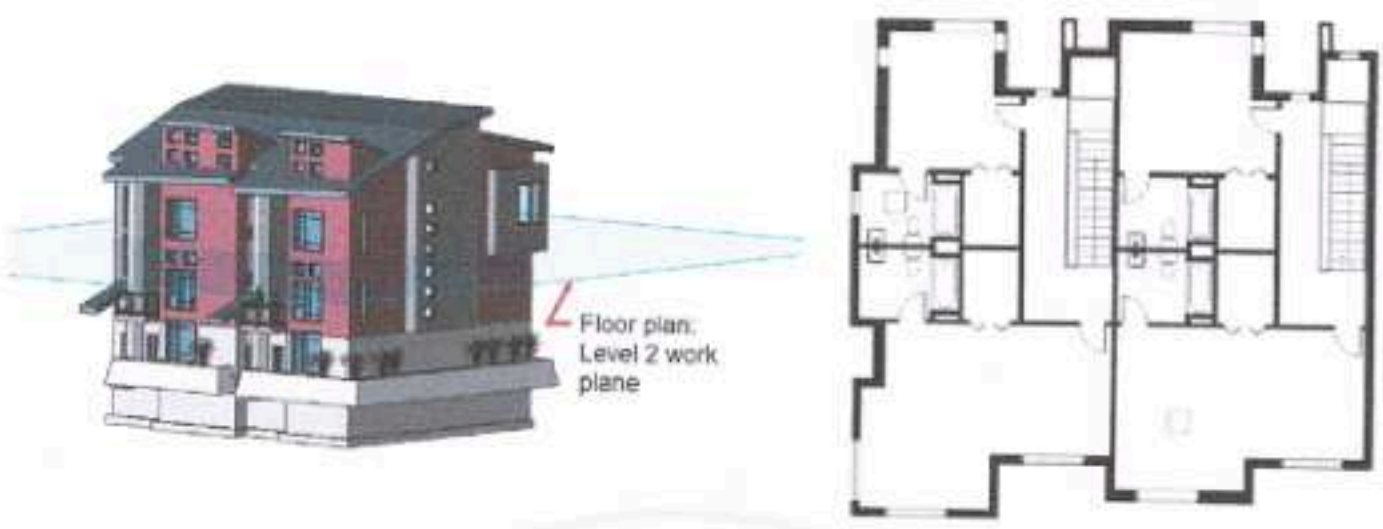
In Revit, the elements determine their behavior largely from their context in the building. The context is determined by how you draw the component and the constraint relationships that are established with other components. Often, you do nothing to establish these relationships; they are implied by what you do and how you draw. In other cases, you can explicitly control them, by locking a dimension or aligning 2 walls, for example.

Understanding Autodesk Revit 2015 terms

Most of the terms used to identify objects in Revit are common, industry-standard terms familiar to most architects. However, some terms are unique to Revit. Understanding the following terms is crucial to understanding the software.

Project: In Revit, the project is the single database of information for your design—the building information model. The project file contains all information for the building design, from geometry to construction data. This information includes components used to design the model, views of the project, and drawings of the design. By using a single project file, Revit makes it easy for you to alter the design and have changes reflected in all associated areas (plan views, elevation views, section views, schedules, and so forth). Having only one file to track also makes it easier to manage the project.

Level: Levels are infinite horizontal planes that act as a reference for level-hosted elements, such as roofs, floors, and ceilings. Most often, you use levels to define a vertical height or story within a building. You create a level for each known story or other needed reference of the building; for example, first floor, top of wall, or bottom of foundation. To place levels, you must be in a section or elevation view.

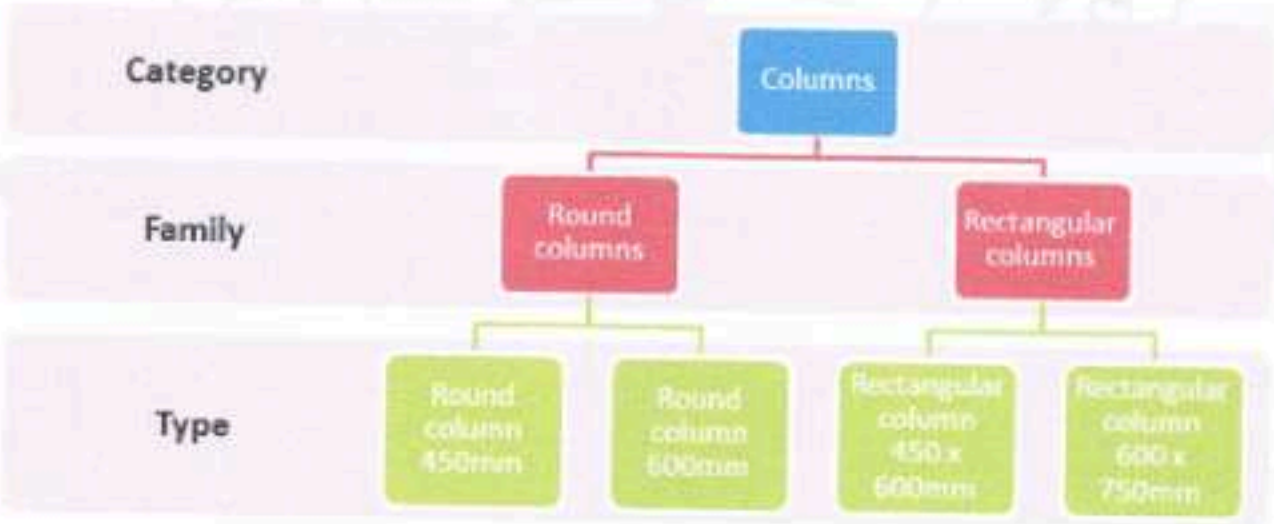


Level 2 work plane cutting through the 3D view with the corresponding floor plan next to it

Element: When creating a project, you add Revit parametric building elements to the design. Revit classifies elements by categories, families, and types.

Category: A category is a group of elements that you use to model or document a building design. For example, categories of model elements include walls and beams. Categories of annotation elements include tags and text notes.

Family: Families are classes of elements in a category. A family groups elements with a common set of parameters (properties), identical use, and similar graphical representation. Different elements in a family may have different values for some or all properties, but the set of properties—their names and meaning – is the same. For example, 6-panel colonial doors could be considered one family, although the doors that compose the family come in different sizes and materials.



There are 3 kinds of families:

- *Loadable families* can be loaded into a project and created from family templates. You can determine the set of properties and the graphical representation of the family.
- *System families* include walls, dimensions, ceilings, roofs, floors, and levels. They are not available for loading or creating as separate files.
    - Revit predefines the set of properties and the graphical representation of system families.
    - You can use the predefined types to generate new types that belong to this family within the project. For example, the behavior of a wall is predefined in the system. However, you can create different types of walls with different compositions.
    - *System families* can be transferred between projects.
- *In-place families* are custom families that you create in the context of a project. Create an in-place family when your project needs unique geometry that you do not expect to reuse or geometry that must maintain one of more relationships to other project geometry.
    - Because in-place families are intended for limited use in a project, each in-place family contains only a single type. You can create multiple in-place families in your projects, and you can place copies of the same in-place family element in your projects. Unlike system and standard component families, you cannot duplicate in-place family types to create multiple types.

Type: Each family can have several types. A type can be a specific size of a family, such as a 30l X 42l title block or a 32" x 84" door. A type can also be a style, such as default aligned or default angular style for dimensions.

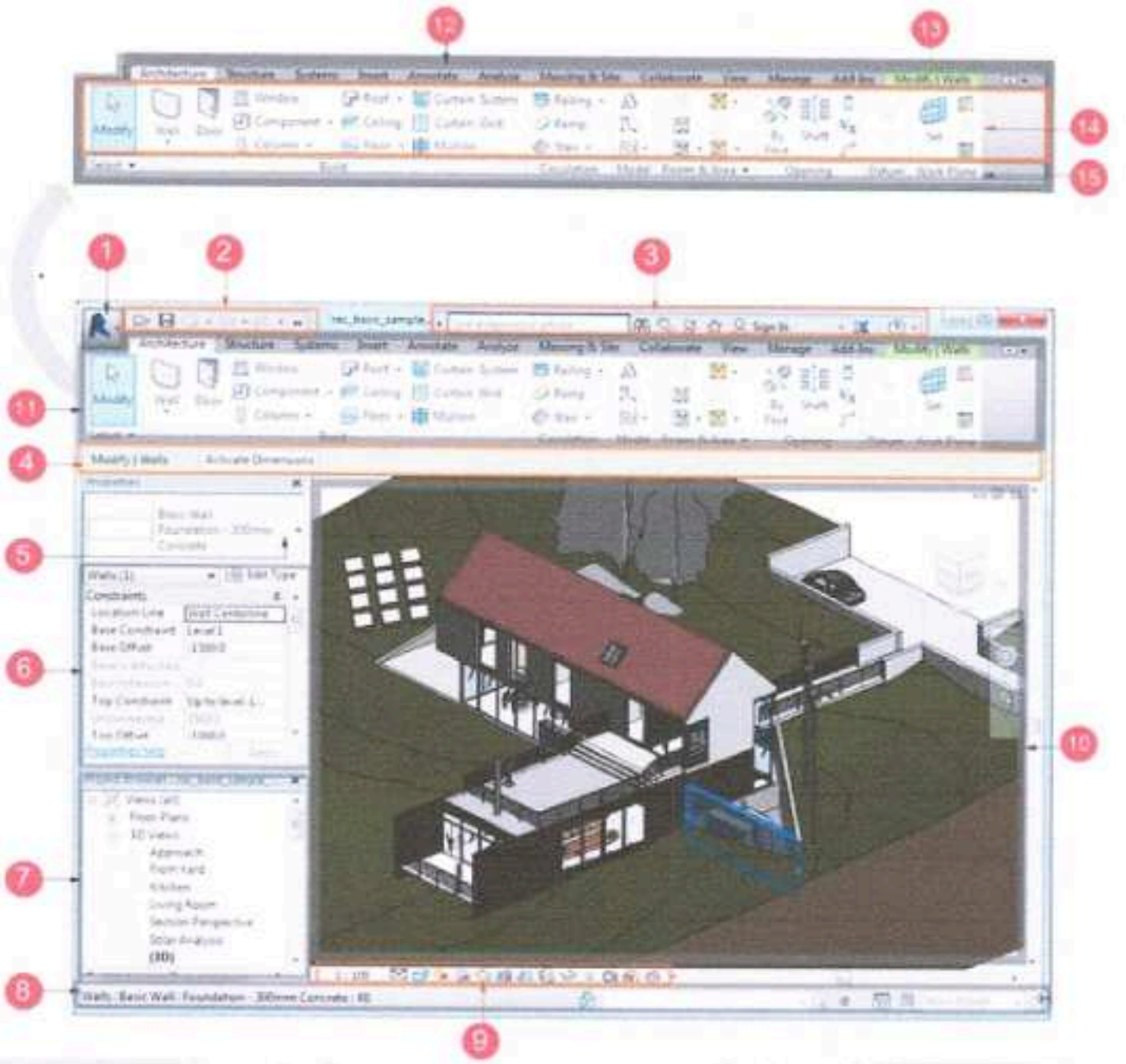
Instance: Instances are the actual items (individual elements) that are placed in the project and have specific locations in the building (model instances) or on a drawing sheet (annotation instances).

Understanding the Revit User Interface

Revit is a powerful CAD product for the Microsoft® Windows operating system. Its interface resembles those of other products for Windows featuring a ribbon that contains the tools used to complete tasks.

In the Revit interface, many of the components (such as walls, beams, and columns) are available at the click of a button. You can place these components in the drawing and immediately determine whether they meet your design requirements.

The Revit interface is designed to simplify your workflow. With a few clicks, you can change the interface to better support the way that you work. For example, you can set the ribbon to one of the three display settings for optimum use of the interface. You can also display several project views at one time, or layer the views to see only the one on top.



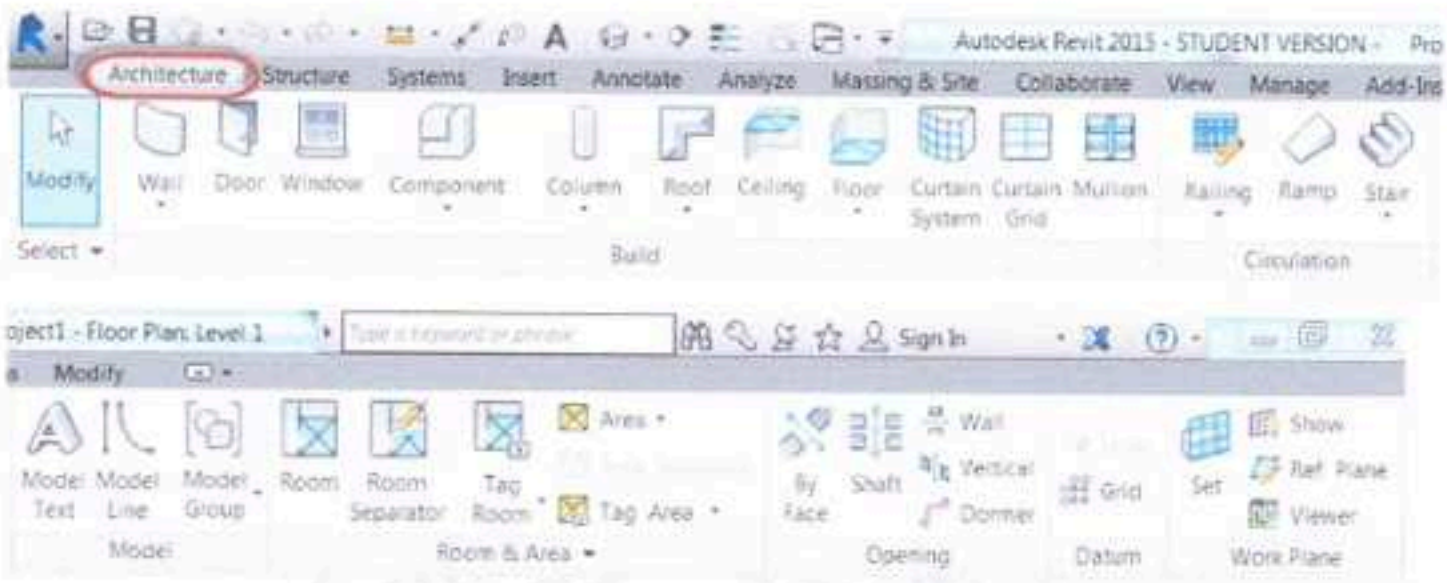
1 Application Menu
2 Quick Access Toolbar
3 InfoCenter
4 Options Bar
5 Type Selector
6 Properties Palette
7 Project Browser
8 Status Bar
9 View Control Bar
10 Drawing Area
11 Ribbon
12 Tabs on the ribbon
13 A contextual tab on the ribbon, providing tools relevant to the selected object or current action
14 Tools on the current tab of the ribbon
15 Panels on the ribbon

Hints

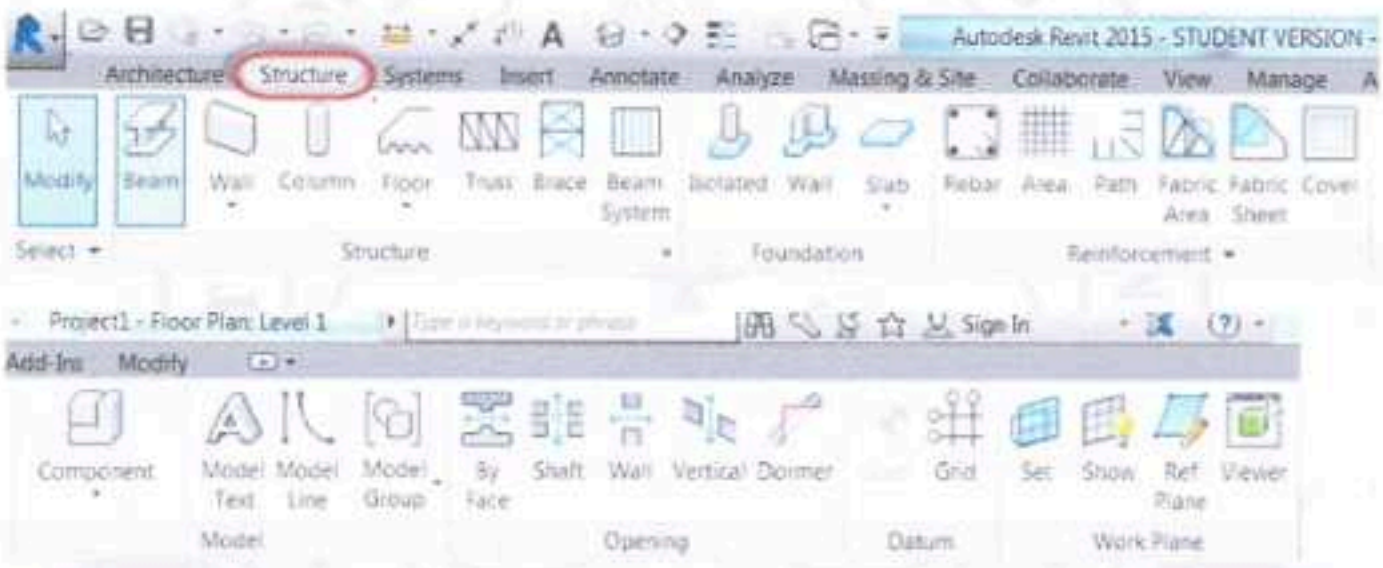
Project Browser: Select Views label at top of Project Browser window and right click to access Properties to change View Filters.

Options Bar: The features shown in this area are tool dependent. See the Wall Tool example below.

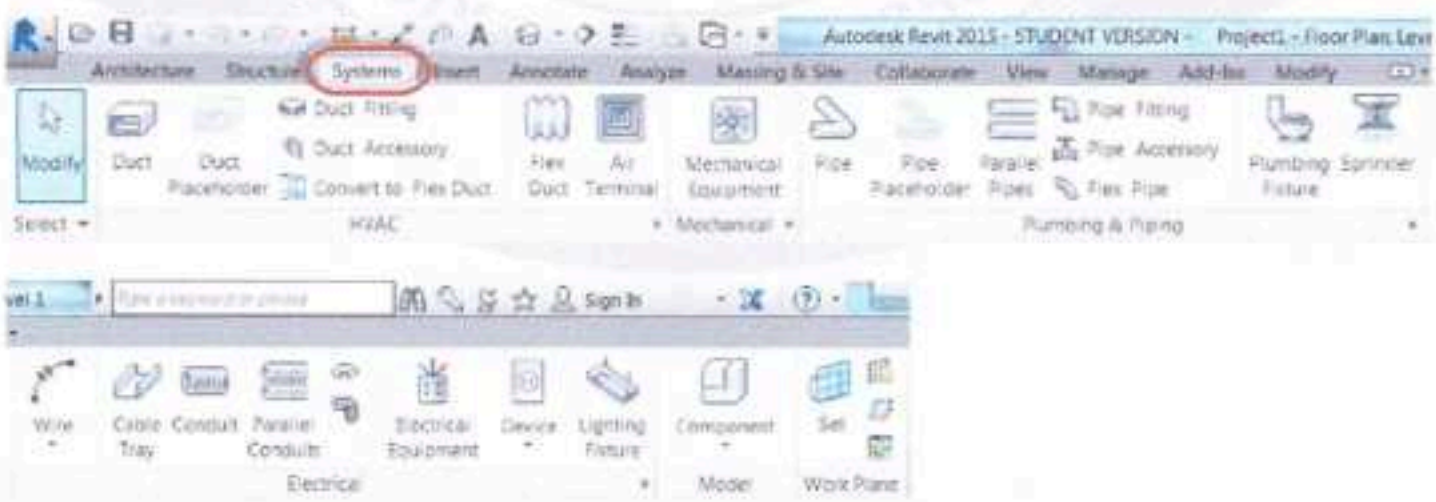
Architecture Ribbon



Structure Ribbon



Systems Ribbon



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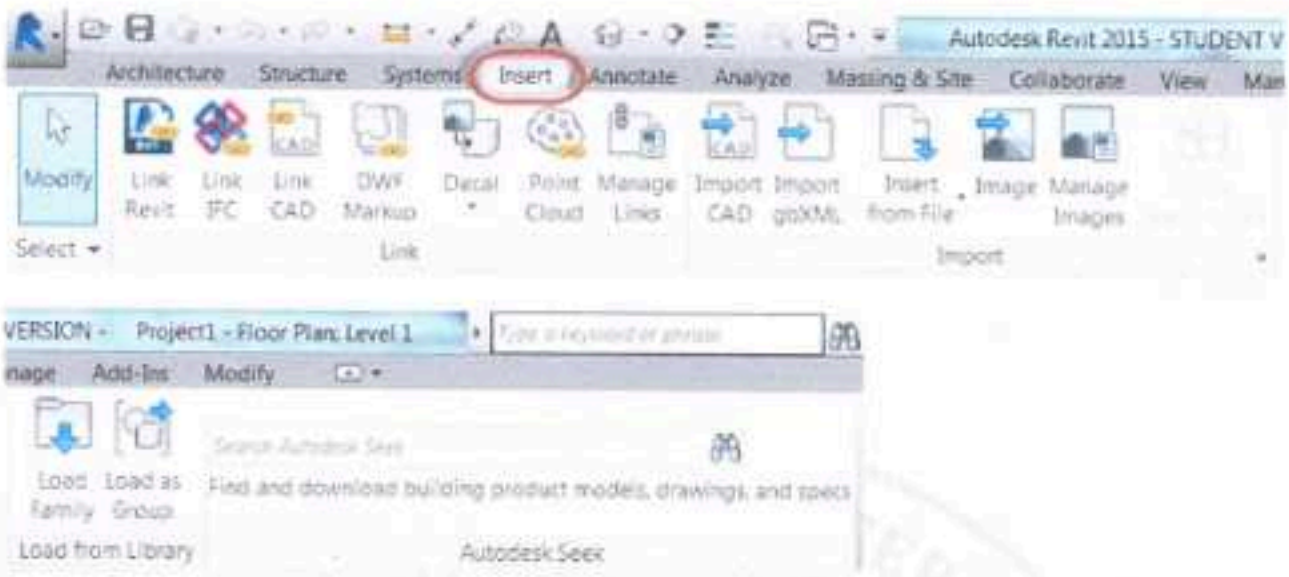
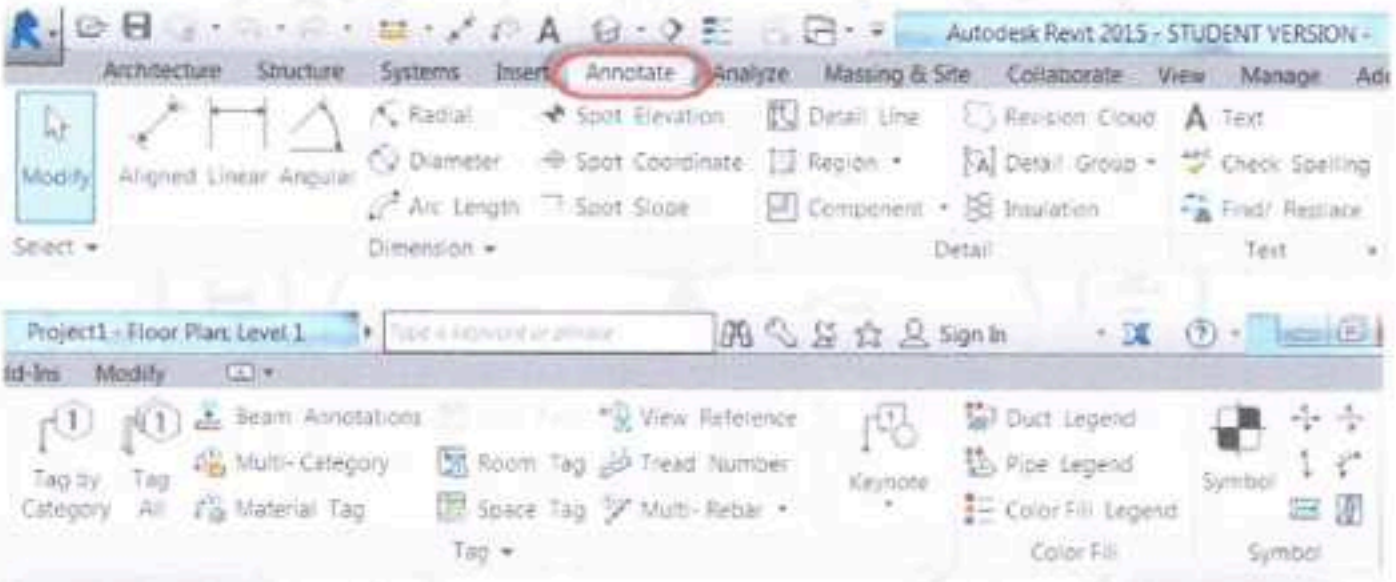
Thirumayam (Tk), Pudukkottai - 622 507

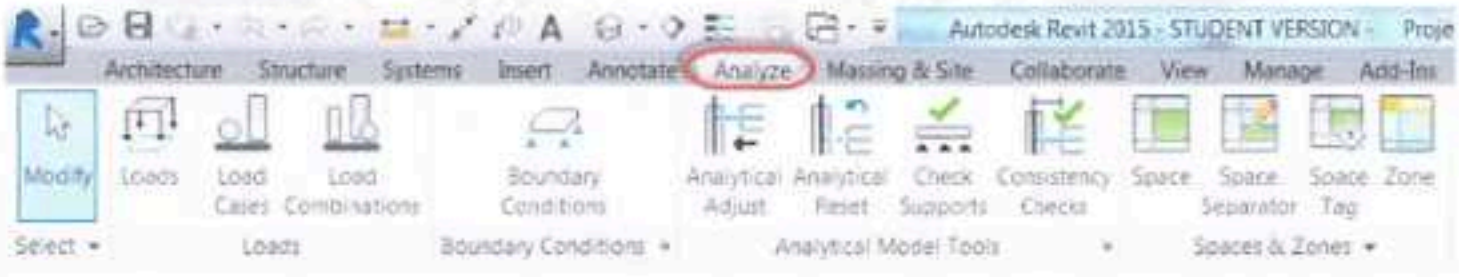
Insert Ribbon

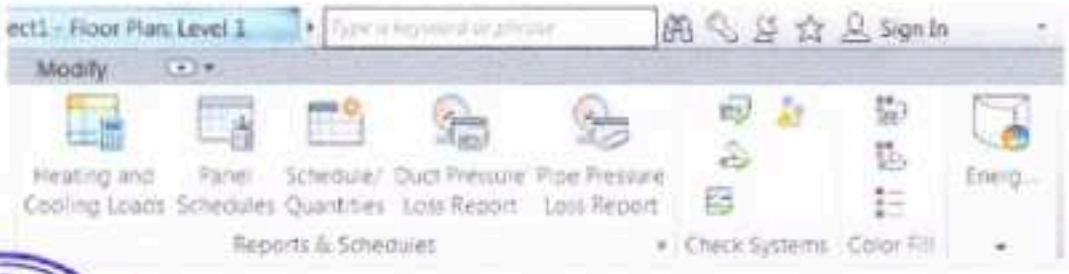


Annotate Ribbon

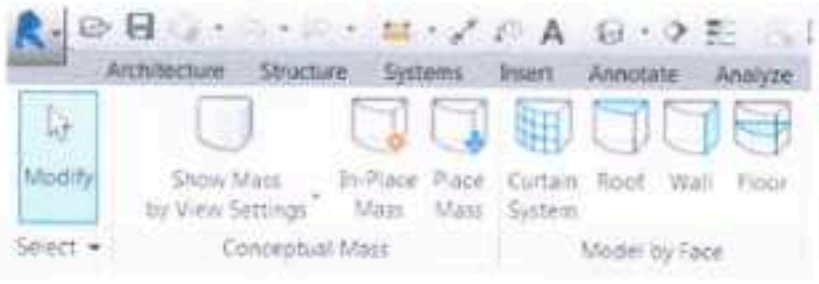


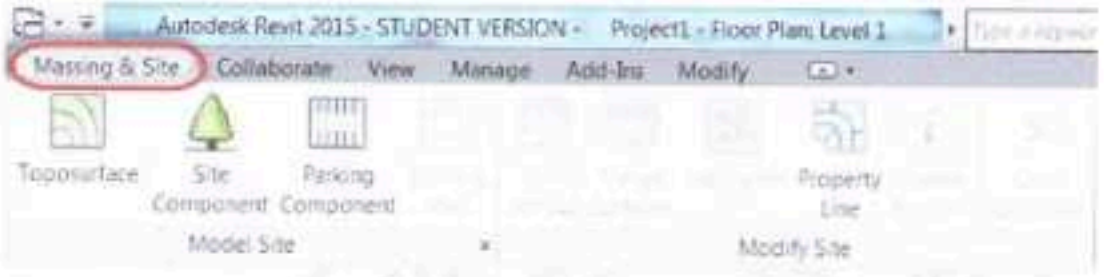
Analyze Ribbon



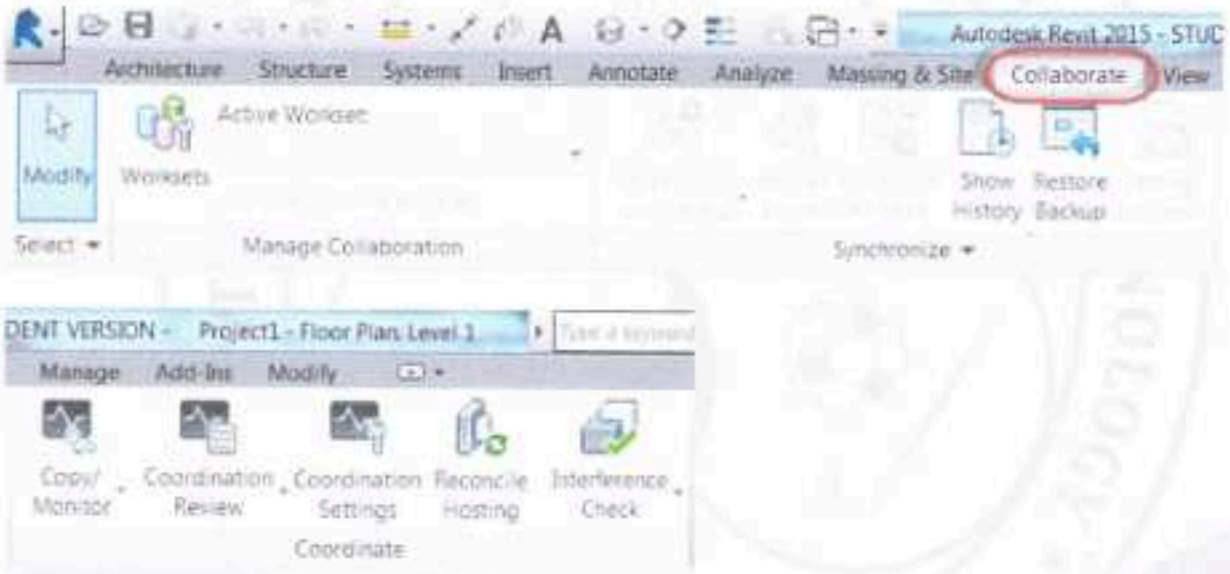


Massing & Site Ribbon

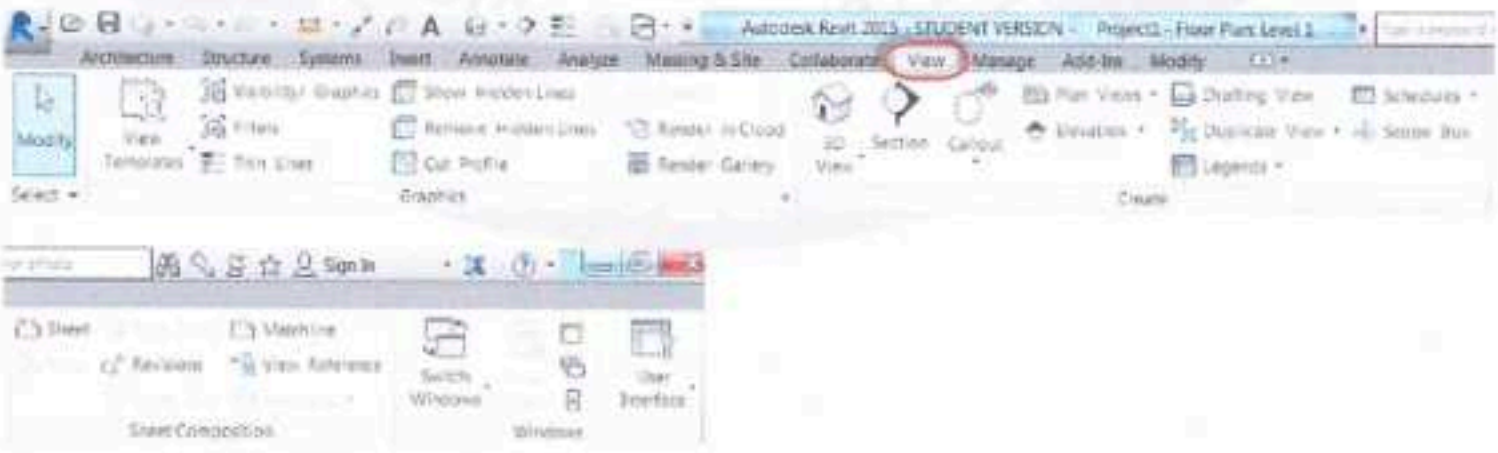




Collaborate Ribbon



View Ribbon



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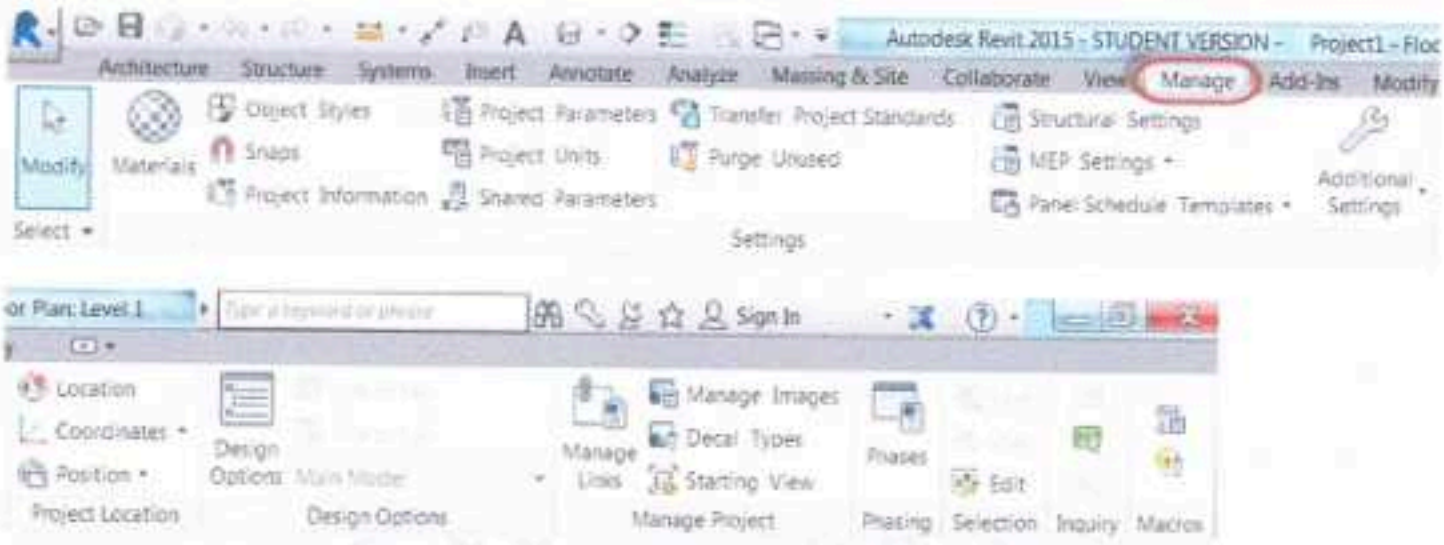
Thirumayam (Tk), Pudukkottai - 622 507

Manage Ribbon



Add-ins Ribbon

Mark 1: *These are examples of free plug-ins that you may obtain from the Autodesk Exchange to add additional productivity enhancements to Revit.*

The Autodesk Exchange app link is located in the upper right hand corner of the user interface next to the help button.

Modify Ribbon

Context tabs display as you work. The *Modify | Place Wall* context tab is shown.

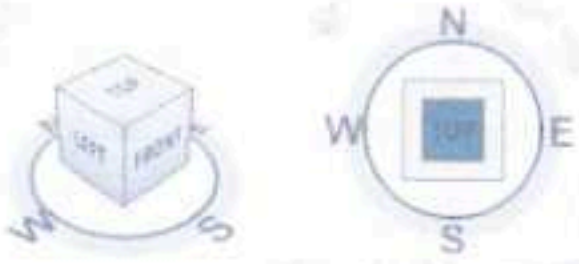
Note: Context tabs only appear when an object of that type is selected in the canvas window. Walls

Doors

Windows

The View Cube

You can click and drag the ViewCube to reorient the view of a model to a custom viewpoint or click on one of the twenty-six predefined viewpoints that are available. As you drag, the mouse pointer changes to indicate that you are reorienting the current view of the model. If you drag the ViewCube close to one of the preset orientations and it is set to snap to the closest view, the ViewCube rotates to the closest preset orientation.



The Steering Wheel

Pressing and dragging on a wedge of a wheel is the primary mode of interaction. After a wheel is displayed, click one of the wedges and hold down the button on the pointing device to activate the navigation tool. Drag to reorient the current view. Releasing the button returns you to the wheel.

Navigation Bar

You can control which navigation tools are displayed on the navigation bar with the Customize menu. The Customize menu is displayed by clicking the Customize button. From the Customize menu, you click the navigation tools that you want displayed on the navigation bar. The position of the navigation tools on the navigation bar is predefined and cannot be changed.

Creating a Project

In this first exercise, you create and name a project in which you will create the building model shown.

The completed project. (Ambient shadows and gradient background not included in this tutorial)

01 Create a project

1) Launch the Autodesk® Revit® application.
2) Click ▼ ▶ New ▶ PROJECT.
3) In the New Project dialog box, under Create New, verify that Project is selected.
4) Under Template file, verify the second option is selected, and click BROWSE.
5) Verify C:\ProgramData\Autodesk\RVT 2015\Templates\US Imperial *default.rte* [*DefaultMetric.rte*] is selected, and click OPEN.
6) In the New Project dialog box, click OK.

02 Name and save the project file

1) Click ▼ ▶ SAVE.
2) In the left pane of the Save As dialog box, click DESKTOP, and then, in the upper right corner of the dialog box, click the CREATE A NEW FOLDER ICON, give the folder the name of **Training Files**.
3) Make Training files the active folder.
4) For File name, enter **Revit 2015_Getting Started**, and click SAVE.

03 Zoom to a view

1) In Project Browser, double-click Elevations (Building Elevation) ► SOUTH.

2) Enter **ZR**, to zoom to a specific region. Note that the cursor changes to a magnifying glass.

3) In the drawing area, move the cursor diagonally and click to draw a rectangle around the level markers. The area within the rectangle is magnified to fill the drawing area so that you can work with the level marker text.

04 Rename levels

1) Double-click the *Level 1* text, enter **00 Foundation**, and press ENTER. Use a number as a prefix to the name so the plans are sorted by level.

2) In the Alert dialog box, click YES to rename corresponding views. The floor and ceiling plans for Level 1 are renamed *00 Foundation*.

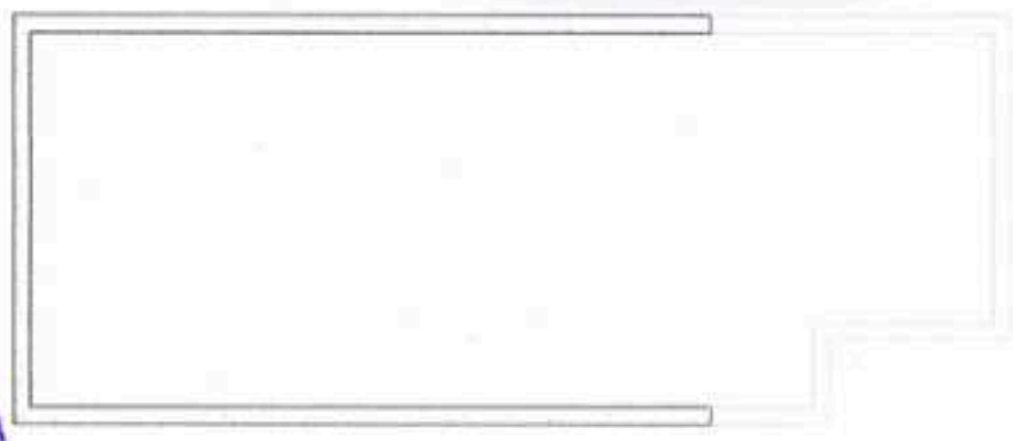
3) Using the same method, rename *Level 2* and its corresponding views as **01 Lower Level.**

05 Create levels in the building

1) Enter **ZO** to zoom out.
2) Click Architecture tab ► Datum panel ► Level LEVEL.
3) On the Draw panel, click PICK LINES.
4) On the Options Bar enter **10** [3000 mm] for the Offset.
5) In the drawing area, highlight the 01 Lower Level line; when a dashed line is displayed above the level line, click to create a level (Level 3).
6) Using the same method, create a level above Level 3.
7) On the Panel Level tab, click MODIFY to end the command.
8) Rename the new levels and all corresponding views:
   - Level 3: Rename as **02 Entry Level**
   - Level 4: Rename as **03 Roof**
9) Double-click the level dimensions, and enter new values:
   - 0' 0" [0 mm]: Change to **-14' 0"** [-5250 mm]
   - 10' 0" [4000 mm]: Change to **-10' 0"** [-3050 mm]
   - 20' 0" [7000 mm]: Change to **0' 0"** [0 mm]
   - 30' 0" [10000 mm]: Change to **10' 0"** [3050 mm]
10) Press ESC twice to deselect and exit command.
11) Save the project file.

Creating Walls

In this exercise, you work on different levels to add foundation walls to the project.



The completed exercise

06 Create walls

1) In Project Browser, under Floor Plans, double-click *00 Foundation* to open that view in the drawing area.

2) Click Architecture tab ► Build panel ► WALL.

3) In Properties palette ► Change Element Type drop-down and select *Basic Wall: Retaining - 12" Concrete* [Basic Wall : Retaining - 300mm Concrete].

4) On the Options Bar below the tool ribbon:

   - For Height, select *02 Entry Level*.
   - For Location Line, verify that *Wall Centerline* is selected.
   - Verify that *Chain* is selected.

5) In the drawing area, draw walls on the foundation level:

   - Click in the lower-right quadrant to select the wall start point.
   - Move the cursor to the left, enter **40'** [12000 mm], and press ENTER.

   NOTE: You do not need to specify the unit; Autodesk® Revit® software uses the units specified in the project template.

   - Beginning at the new endpoint, move the cursor up, enter **22'** [6900 mm], and press ENTER.
   - Move the cursor to the right, enter **40'** [12000 mm], and press ENTER.

6) On the Modify | Place Wall tab, click MODIFY to exit the command.

7) In Project Browser, under Floor Plans, double-click *01 Lower Level*.

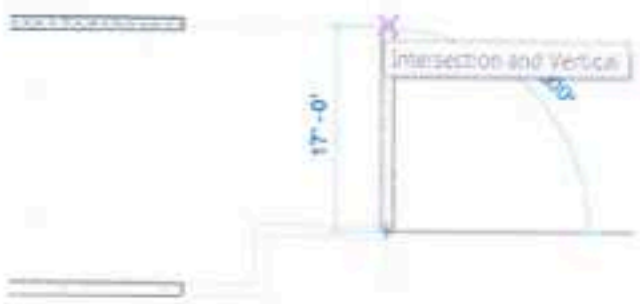
8) Click Architecture tab ► Build panel ► WALL.

9) In Properties palette ► Change Element Type drop-down and select *Basic Wall: Foundation - 12" Concrete* [Basic Wall : Foundation - 300mm Concrete].

10) On the Options Bar, for Depth, select *00 Foundation* and for Location Line, verify that *Wall Centerline* is selected.

11) Draw walls on the lower level:

   - In the drawing area, click the right endpoint of the south wall as the wall start point.
   - Move the cursor to the right, enter **6' 6"** [1950 mm], and press ENTER.
   - Move the cursor up, enter **5'** [1500 mm], and press ENTER.
   - Move the cursor to the right, enter **10' 6"** [3150 mm], and press ENTER.
   - Move the cursor up, and select the intersection with the extension of the north wall.



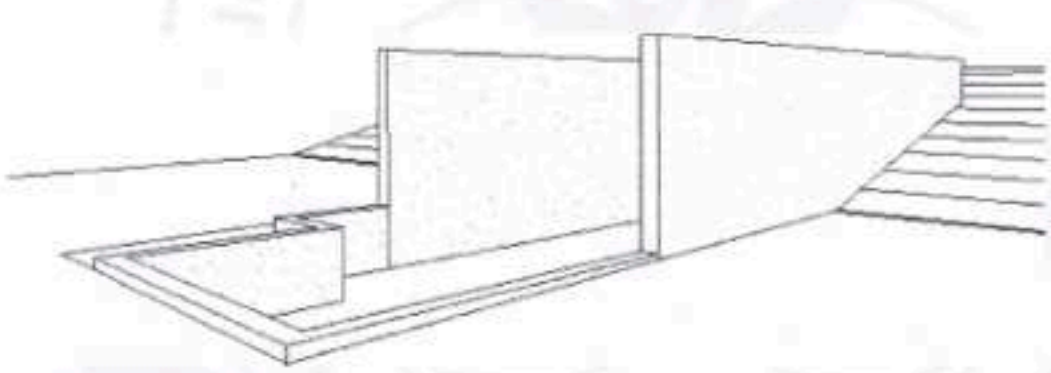
- Select the right endpoint of the north wall to complete the chain and connect the walls.

12) On the Place Wall panel, click MODIFY.

13) Save the project file.

Creating Terrain

In this exercise, you create a 3D view and add a toposurface to the building site.



The completed exercise

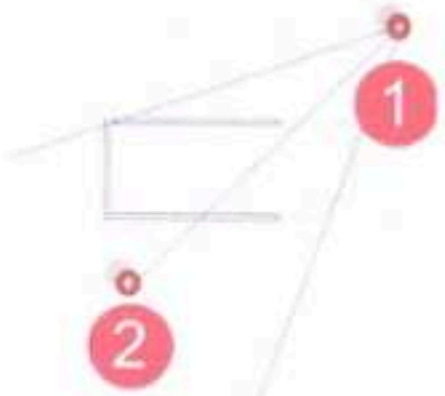
07 Creating terrain

1) In Project Browser, under Floor Plans, double-click *02 Entry Level*.

2) Create a 3D view:

- Click the View tab ▶ Create panel ▶ 3D View drop-down ▶ Camera CAMERA.
- Click in the upper-right corner of the drawing area to place the camera.

- Click to place the camera target point, as shown.



A 3D view is created. The view you create may differ slightly from the illustrations shown in the exercises because of minor variations in camera placement. Drag the blue circular controls that display on the crop region of the resulting view so that you can see the building.

3) In Project Browser, expand 3D Views, right-click *3D View 1*, and click RENAME.

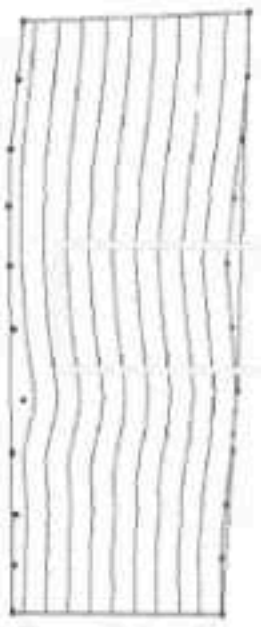
4) In the Rename View dialog box, enter **To Building**, and click OK.

5) Create a graded building site:

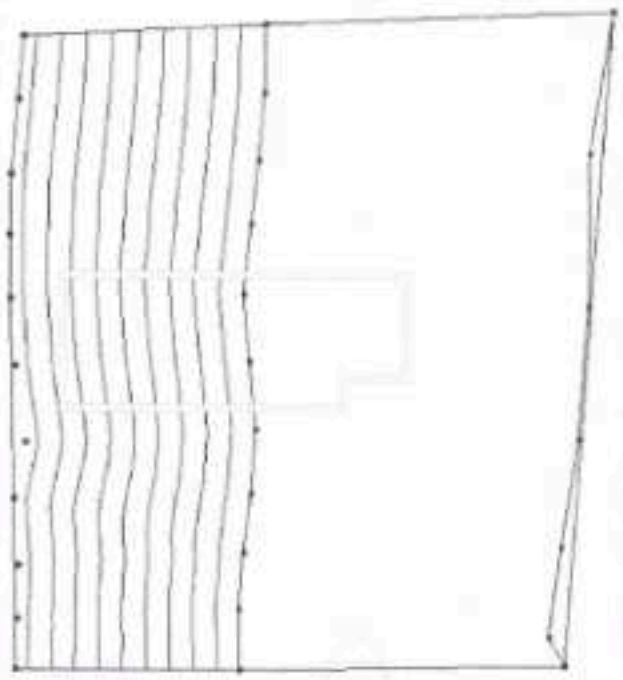
- In Project Browser, under Floor Plans, double-click *Site*.
- Click Massing & Site tab ▶ Model Site panel ▶ TOPOSURFACE.
- On the Options Bar, for Elevation, enter **-0' 6"** [-150 mm].
- Add points to the left of the building, as shown. The order of the point selection is not important.

- On the Options Bar, for Elevation, enter **-10'** [-4000 mm].

- Add points near the center of the building, as shown. Contour lines are displayed.



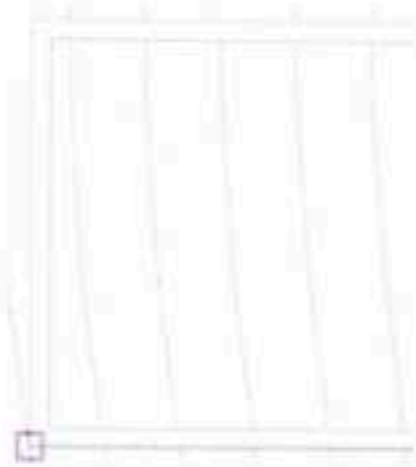
- On the Options Bar, for Elevation, enter **-11'** [-4300 mm].
- Add points to the right of the building, as shown.



- Click Edit Surface tab ▶ Surface panel ▶ Surface FINISH SURFACE.

6) Create a pad surface:

- Click Massing & Site tab ▶ Model Site panel ▶ Building Pad BUILDING PAD.
- On the Draw panel, click RECTANGLE.
- Select the outer endpoint at the lower left of the building, as shown.
- Select the outer endpoint at the upper right of the building.



- On the Create Pad Boundary tab, in the Building Pad panel, click Mode FINISH EDIT MODE.

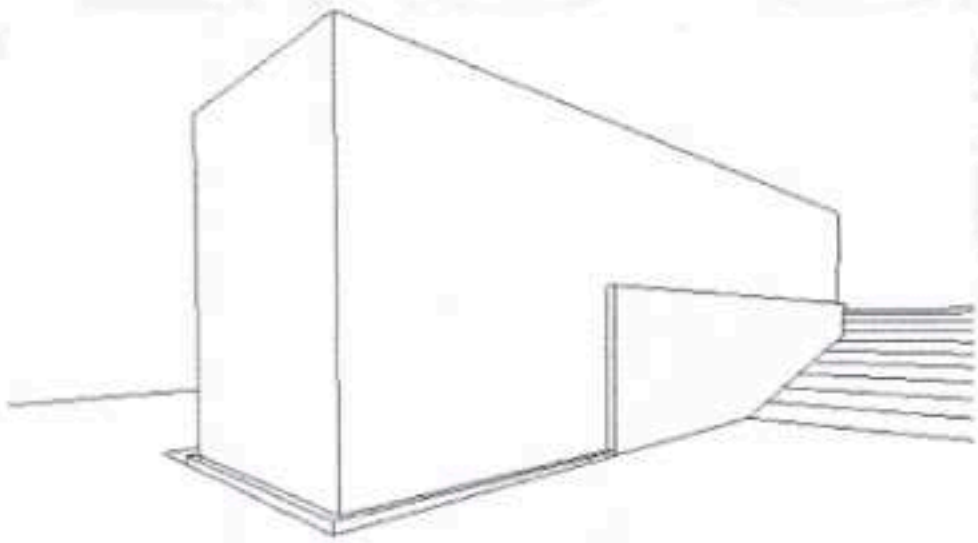
7) Open the *To Building* 3D view to see the results.

8) Save the project file. In this exercise, you created a simple toposurface in Autodesk Revit by selecting points.

However, for most projects, complex site models created by civil engineering professionals will be provided to you in DWG, DXF, DGN, or point files. You can import these files into your Revit project where you can automatically generate a terrain using the Toposurface tool.

Adding Exterior Walls

In this exercise, you build upon the foundation walls. You use the Draw option to create exterior walls that extend to the roof level.



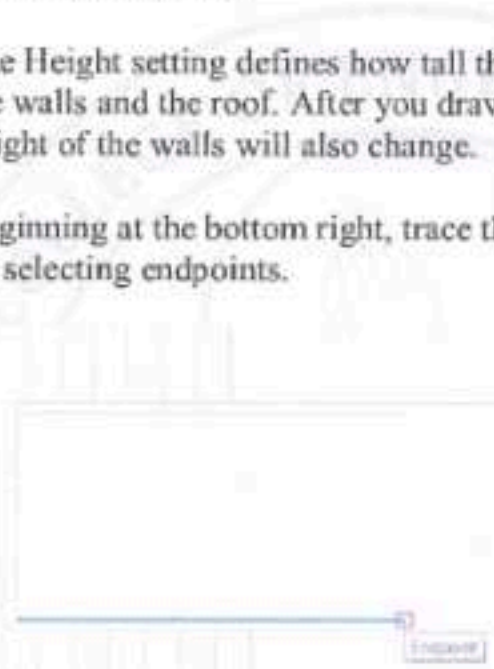
The completed exercise

08 Adding exterior walls

1) Add walls to the entry level:

- In Project Browser, under Floor Plans, double-click *02 Entry Level*.
- Click Architecture tab ► Build panel ► WALL.
- In Properties palette ► Change Element Type drop-down and select *Basic Wall: Generic - 6"* [Basic Wall : Generic - 200mm].
- On the Options Bar: for Height, select *03 Roof*, and for Location Line, select *Core Face: Interior*.

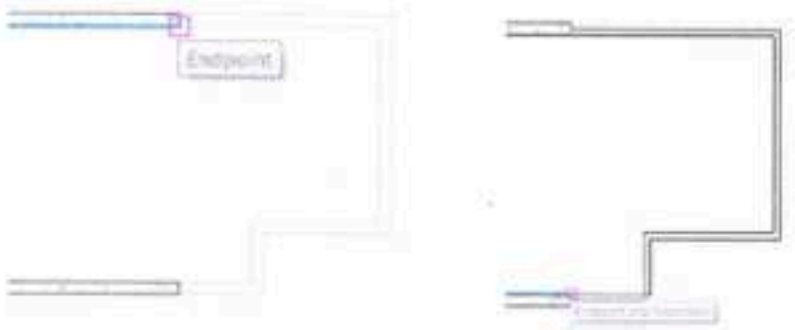
  The Height setting defines how tall the wall is and establishes a relationship between the walls and the roof. After you draw the walls, if you change the roof height, the height of the walls will also change.
- Beginning at the bottom right, trace the interior of the three existing retaining walls by selecting endpoints.



- On the Place Wall tab, click MODIFY.

2) Add walls to the lower level:

- Open the *01 Lower Level* floor plan. Notice that the foundation walls are now visible at the right of the plan, so that you can trace them.
- Click Architecture tab ► Build panel ► WALL
- In Properties palette ► Change Element Type drop-down and select *Basic Wall: Generic - 6"* [Basic Wall : Generic - 200mm].
- On the Options Bar, for Height, select *03 Roof*.
- Beginning at the left endpoint of the north foundation wall, trace the interior of the foundation walls by selecting endpoints.



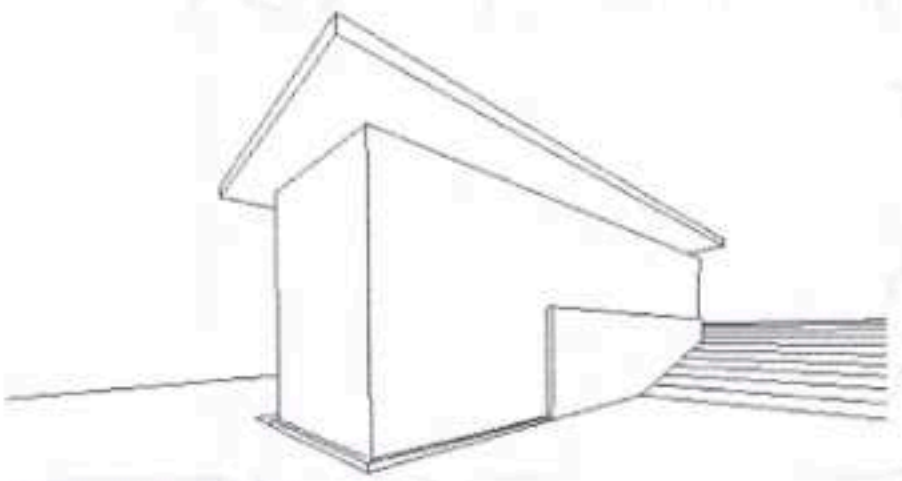
- On the Place Wall tab, click MODIFY.

3) Open the *To Building* 3D view.

4) Save the project file.

Adding a Roof

In this exercise, you create a roof using the footprint of the exterior walls. You specify an offset as you create the roof so that the roof has an overhang.



The completed exercise

09 Adding a roof

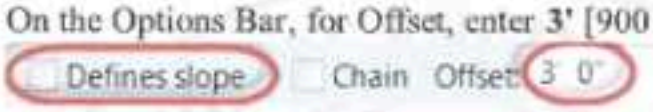
1) Open the *03 Roof* floor plan.

2) Draw a roof line:

- Click Architecture tab ▶ Roof drop-down ▶ ROOF BY FOOTPRINT.
- On the Draw panel, click LINE.
- In the Options Bar, verify that Defines slope is selected.
- To draw the first roof segment, begin at the bottom left and trace the exterior edge of the South wall by selecting the left wall endpoint and the intersection of the South and far-east wall.

3) Create offset roof lines:

- On the Draw panel, verify PICK WALLS is selected.
- On the Options Bar, for Offset, enter **3'** [900 mm], and clear Defines slope.



- In the drawing area, highlight the West wall; when a dashed line is displayed on the exterior of the wall, click to place the roof line. Repeat for the North and East walls.

4) Use the Trim/Extend tool to close the roof sketch:

- On the Edit panel, click TRIM.
- Select the east roof line, and then select the South roof line. Repeat for the West and South roof lines.

- On the Create Roof Footprint panel, click FINISH EDIT MODE. The resulting roof has an odd slope, which you correct in the next step.

5) Modify the roof slope:

   - Select the roof.
   - In the Properties palette, under Dimensions, for Slope, enter **1"/12"** [5°], and click APPLY.
   - Click in the Drawing area to deselect the roof.

6) Open the *To Building* 3D view. Select and modify the crop region as necessary to see the roof. The walls are not attached to the roof; you will attach them in a later exercise.

7) Save the project file.

Adding Floors

In this exercise, you create floors in the building model.

To create floors in Autodesk Revit, you must sketch them first in a sketch editor. You use two different sketching options, Pick and Draw, to sketch the floors.

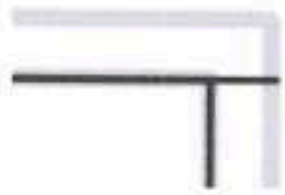
10 Adding floors

1) Open the *01 Lower Level* floor plan.

2) Create a floor using the Pick method:

   - Click Architecture tab ▶ Build panel ▶ FLOOR.
   - On the Draw panel, click PICK LINES.
   - On the Options Bar, verify that Offset is **0**.
   - Beginning with the North wall and moving counterclockwise, select the interior of the walls.
   - On the Modify | Create Floor Boundary tab, click MODIFY.

3) Enter **ZR**, and zoom in to the top-right corner of the model. If the floor lines do not create a closed sketch, the sketch is invalid and you need to clean the lines up. To be valid, the sketch must be a closed loop with no disconnected or crossing lines.



4) Create a closed sketch:

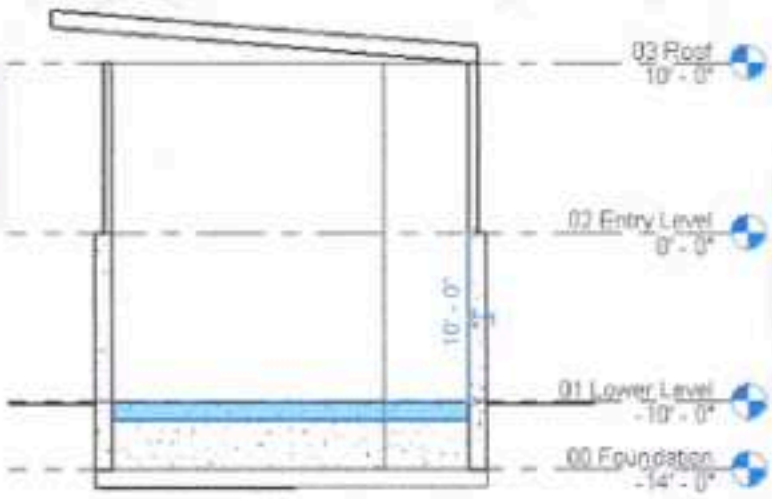
- On the Create Floor Boundary tab, click TRIM.
- Trim as necessary, selecting the portion of each line you want to retain.

- Enter **ZP** to zoom to the previous display.
- Click Modify | Create Floor Boundary tab ► Mode panel ► FINISH EDIT MODE.

5) In the Alert dialog box, click NO.

If you clicked Yes, the walls that finish on the lower level would be trimmed to the underside of the floor.

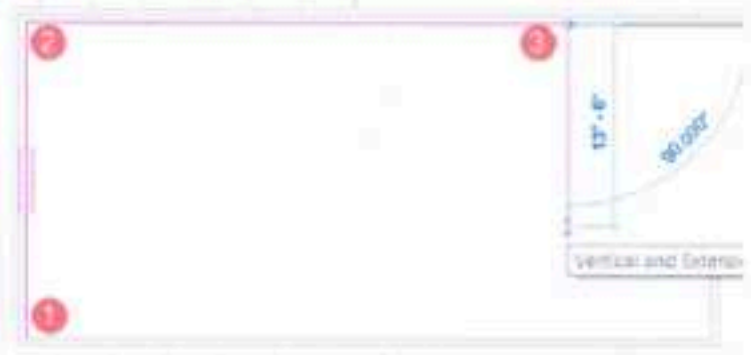
Lower level floor highlighted in blue below. (shown for reference only)



6) Create a floor using the Draw method:

- Open the *02 Entry Level* floor plan.
- Click Architecture tab ► Build panel ► FLOOR.
- On the Draw panel, click LINE.
- On the Options Bar, verify that Chain is selected.

- Beginning at the South end of the West wall, select the interior endpoint of the West wall, and then select the upper endpoint.

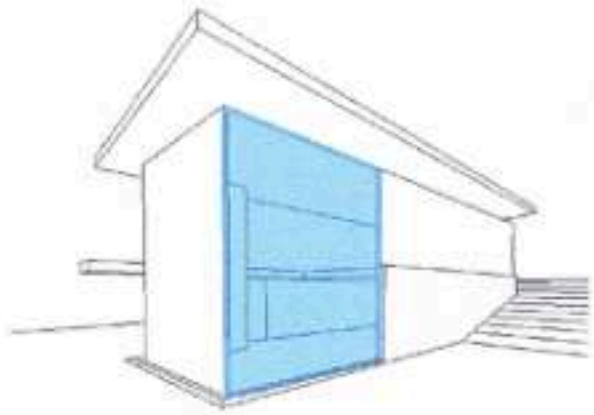


- Move the cursor to the right and enter **36'** [10000 mm], and hit ENTER to accept. This is known as the direct distance entry method.
- Move the cursor down and enter **16' 6"** [5300 mm] and hit ENTER to align with the outside of the wall, and click to specify the point.
- Move the cursor to the right and enter **25'** [9000 mm], and hit ENTER.
- Move the cursor down and enter **4' 6'** [1300 mm] and hit ENTER to align with the inside of the wall, and click.
- Move the cursor to the left, enter **SZ** to find the loop endpoint, and select the endpoint to complete the floor sketch.

- Click Modify | Create Floor Boundary tab ▶ Mode panel ▶ FINISH EDIT MODE.

7) In the Alert dialog box, click NO.

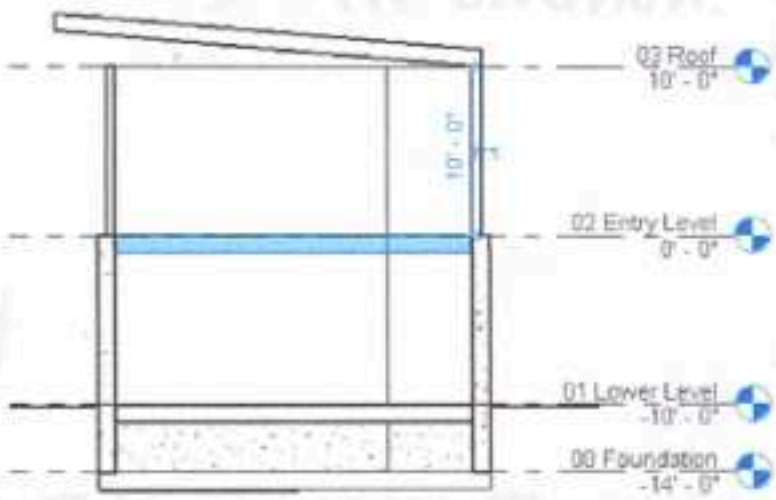
8) View the floors in 3D:
   - Open the *To Building* 3D view.
   - Select the wall as shown.



- On the View Control Bar, click Temporary Hide/Isolate ▶ HIDE ELEMENT. The selected wall is temporarily hidden so that you can see the interior floors.

- On the View Control Bar, click Visual Style ▶ SHADED.
- On the View Control Bar, click Temporary Hide/Isolate ▶ RESET TEMPORARY HIDE/ISOLATE.

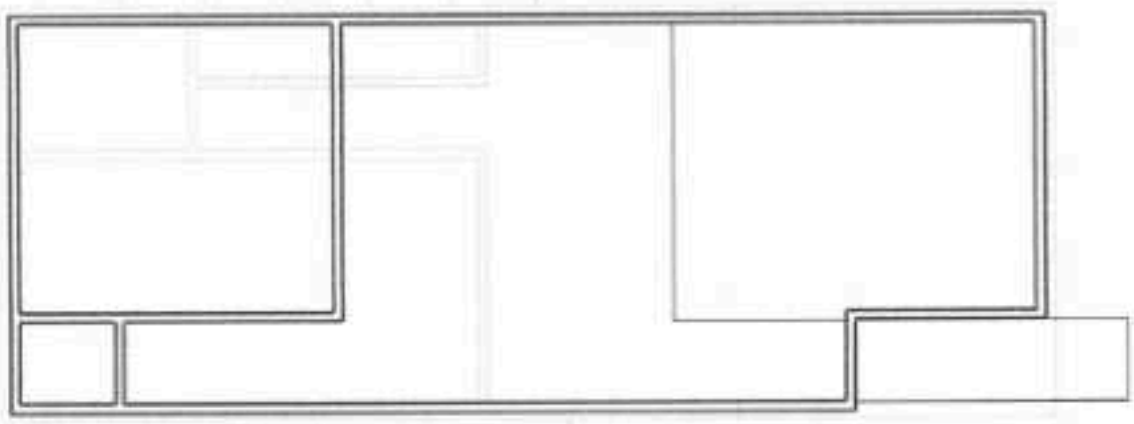
Entry Level floor highlighted in blue below. (shown for reference only)



9) Save the project file.

Adding Interior Walls

In this exercise, you add walls on the lower level and the entry level, and then modify the walls to create rooms in the building.



The completed exercise

11 Adding interior walls

1) Open the *01 Lower Level* floor plan.

2) Click Architecture tab ► Build panel ► WALL.

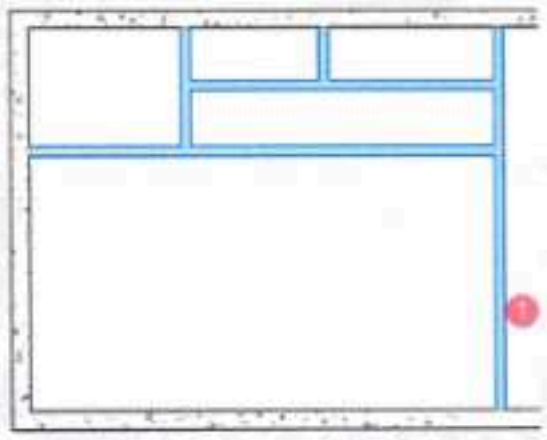
3) In Properties palette ► Change Element Type drop-down and select *Basic Wall : Generic - 6"* [Basic Wall : Generic - 200mm].

4) On the Options Bar:

   - For Height, select *02 Entry Level*.
   - For Location Line, select WALL CENTERLINE.
   - Clear Chain.

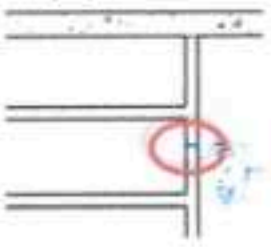
5) Add walls:

   - Zoom in to the West wall, move the cursor along the North wall centerline, enter **26'** [8000 mm], and press ENTER to specify the wall start point. Move the cursor down, and click on the South wall centerline to complete wall 1.
   - On the Modify | Place Wall tab, click MODIFY.
   - Right-click on the wall, and click CREATE SIMILAR.
   - Using the following illustration as a guide, place additional walls to create rooms.

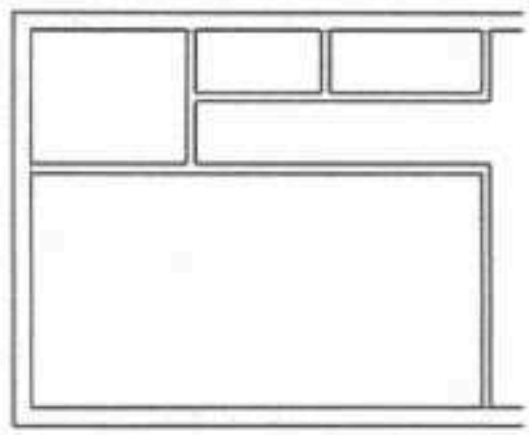


6) Modify walls to create a corridor:

   - Click Modify tab ► Edit panel ► SPLIT. Click on wall 1 in the area highlighted below.



   - On the Edit panel, click TRIM.
   - Trim the split wall to create a corridor, as shown.



7) On the Modify tab, click MODIFY.

8) Draw walls:

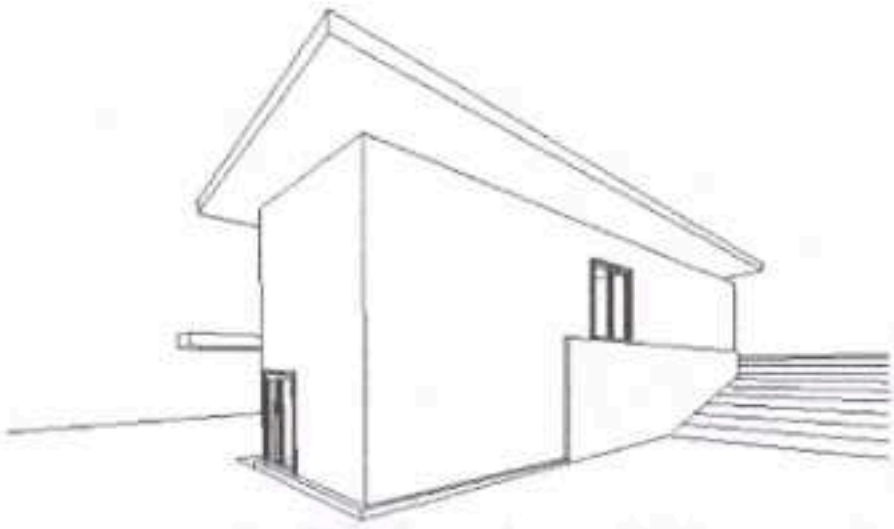
- Open the *02 Entry Level* floor plan.
- Right-click on one of the half-tone walls shown in the underlay of the lower level, and click CREATE SIMILAR.
- Using the following illustration as a guide, place additional walls to create rooms as highlighted in blue below.

9) On the Modify tab, click MODIFY. The walls defining the rooms on the lower level and the entry level are complete.

10) Save the project file.

Adding Doors

In this exercise, you load doors from the Revit Library folder into the project, and then add interior and exterior doors to the model.



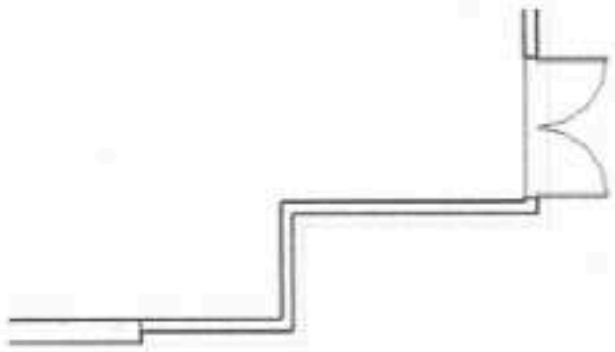
The completed exercise

12 Adding doors

1) Click ► Architecture tab ► Build panel ► DOOR.

There are a limited number of door types in the project because there were few in the default template. You can load additional door types from the Revit Library folder.

2) Load doors from the Training Files folder:
   - On the Model panel, click LOAD FAMILY.
   - In the left pane of the Load Family dialog box, click IMPERIAL LIBRARY [Metric Library], and double-click on the DOORS folder.
   - While pressing CTRL, select the door types: *Bifold-4 Panel.rfa, Double-Glass 1.rfa, Single- Glass 1.rfa* [M_Bifold-4 Panel.rfa, M_Double-Glass 1.rfa, M_Single-Glass 1.rfa].
   - Click OPEN.
3) Add exterior doors:
   - Open the *01 Lower Level* floor plan.
   - Click Architecture tab ► Build panel ► DOOR.
   - On the Options Bar, clear Tag on Placement.
   - In Properties palette ► Change Element Type drop-down and select *Double-Glass 1 : 72" x 84"* [M_Double-Glass 1 : 1830 x 2134mm], add a door to the east wall as shown, and then click MODIFY.

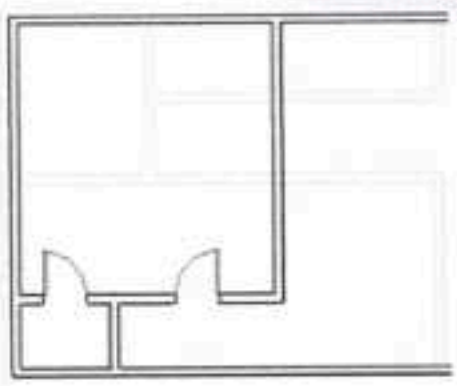


- Open the *02 Entry Level* floor plan.
- Click Architecture tab ▶ Build panel ▶ DOOR.
- In Properties palette ▶ Change Element Type drop-down and select *Double-Glass 1 : 72" x 84"* [M_Double-Glass 1 : 1830 x 2134mm].
- Place the door in the North wall 7' [2100 mm] from the end of the retaining wall, as shown.
- In Properties palette ▶ Change Element Type drop-down and select *Single-Glass 1 : 36" x 84"* [M_Single-Glass 1 : 0915 x 2134mm].
- Place the door in the short vertical wall, as shown.

NOTE: To change the swing direction as you place a door, press the SPACEBAR. To change the swing after a door is placed, click the flip arrows.

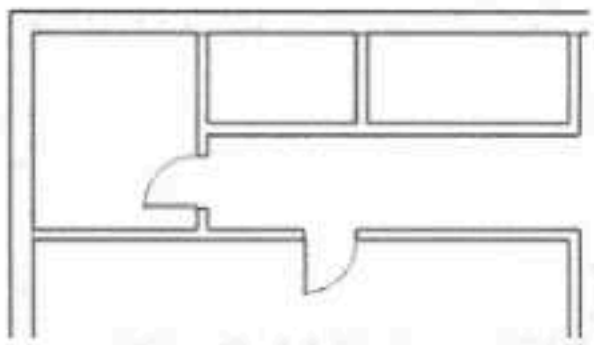
4) Add interior doors:

- In Properties palette ▶ Change Element Type drop-down and select *Single-Flush : 32" x 84"* [M_Single-Flush : 0813 x 2134mm], and add two doors, as shown.

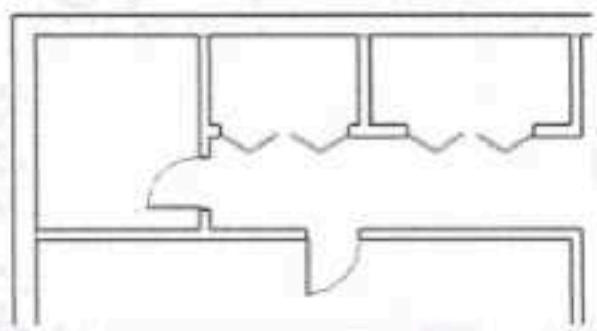


5) Open the *01 Lower Level* floor plan.

- Click Architecture tab ► Build panel ► DOOR.
- In Properties palette ► Change Element Type drop-down and select *Single-Flush : 30" x 84"* [M_Single-Flush : 0762 x 2134mm], and place two doors, as shown.



- In Properties palette ► Change Element Type drop-down and select *Bifold-4 Panel : 72" x 84"* [M_Bifold-4 Panel : 1830 x 2134mm], and place two doors, as shown.



6) Open the *To Building* 3D view.

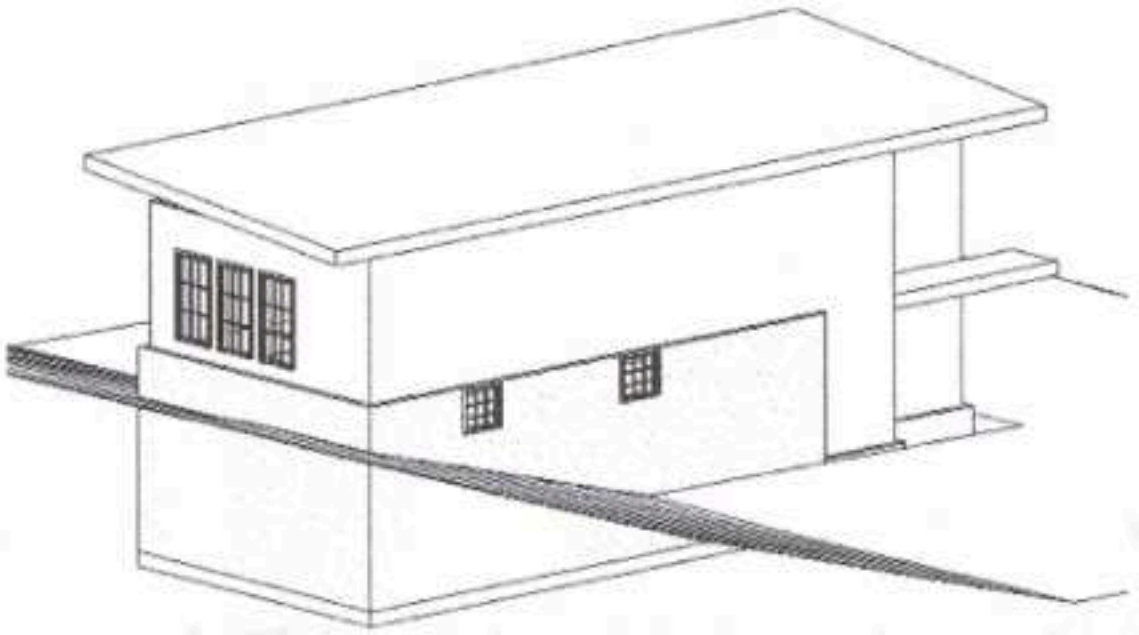
7) For an unobstructed view of the doors, select a wall, and on the View Control Bar, click Temporary Hide/Isolate ► HIDE CATEGORY. All the walls in the view are hidden.

8) On the View Control Bar, click Temporary Hide/Isolate ► RESET TEMPORARY HIDE/ISOLATE.

9) Save the project file.

Adding Windows

In this exercise, you work in elevation and plan views to add windows to the model. You use alignment and dimension tools to more precisely position the windows.



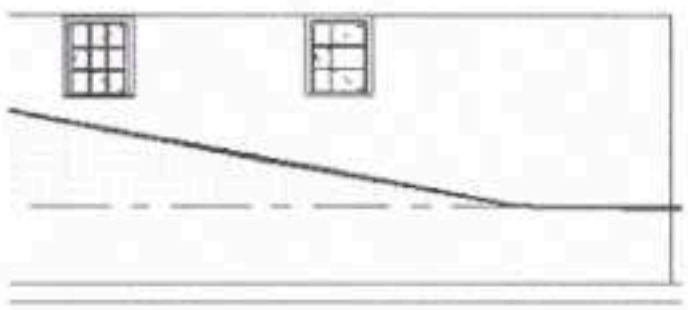
The completed exercise

13 Adding windows

1) Add windows in an elevation view:

- Open the South elevation view, and zoom in to the building.
- Click Architecture tab ▶ Build panel ▶ WINDOW.
- On the Options Bar, clear Tag on Placement. (white background)

- On the Model panel, click LOAD FAMILY.
- In the left pane of the Load Family dialog box, click Imperial Library [Metric Library], and double-click on the WINDOWS folder to open it.
- Select *Casement 3x3 with Trim.rfa* [M_Casement 3x3 with Trim.rfa], and click Open.
- Add two windows, approximately as shown. You will position them and align them with the top of the retaining wall later. If either of the windows spans an internal wall, a warning about the conflict is displayed; close the warning. You will resolve any conflict by moving the windows while in a floor plan view.



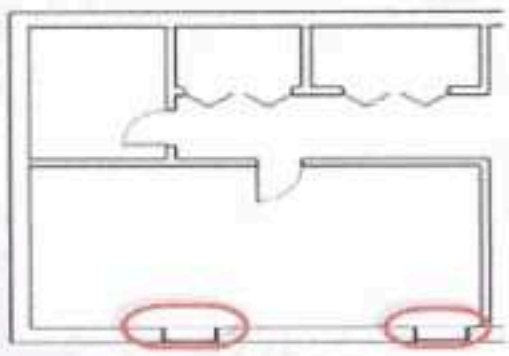
2) Open the *01 Lower Level* floor plan. Because the windows are at the top of the wall, they are above the current view range for the plan.

3) Modify the view range:

- In the Properties palette, under Extents, for View Range, click EDIT.
- In the View Range dialog box, for Cut plane Offset, enter **7'** [2160 mm].
- Click OK. The windows are now visible in the South wall.

4) If necessary, move the windows to resolve the conflict with the wall:

- Select the right window, and drag it **2' 6"** [200 mm] to the left side of the interior wall. Select the window and edit the temporary dimensions, as needed.
- Select the left window, and drag it **9' 6"** [2775 mm] to the right of the West wall.



5) Create a window type:

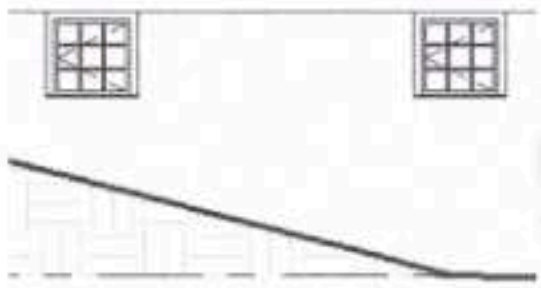
- Open the South elevation view and select the window on the left.
- In Properties palette ► click Edit Type EDIT TYPE.
- In the Type Properties dialog box, click DUPLICATE.
- In the Name dialog box, for Name, enter **36" x 36"** [0915 x 0915 mm], and click OK.
- In the Type Properties dialog box, under Dimensions, for Height, enter **3'** [915 mm].
- Click OK.

6) Modify a window:

- Select the window on the right.
- In Properties palette ► Change Element Type drop-down and select *Casement 3x3 with Trim : 36" x 36"* [M_Casement 3x3 with Trim : 0915 x 0915mm].

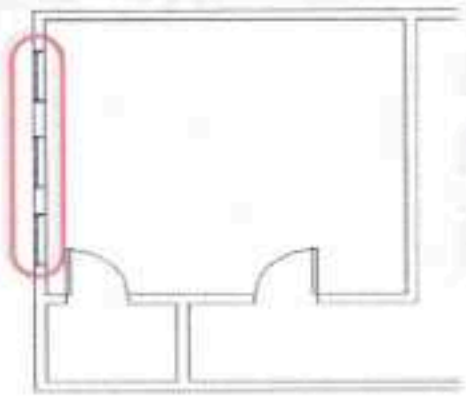
7) Align the windows to the top of the retaining wall:

- Click Modify tab ▶ Edit panel ▶ ALIGN.
- Select the top of the wall, and then select the top edge of the trim of one of the windows. Be careful to select the top of the wall, and not the 02 Entry Level line.
- Repeat for the second window.



8) Add windows in plan view:

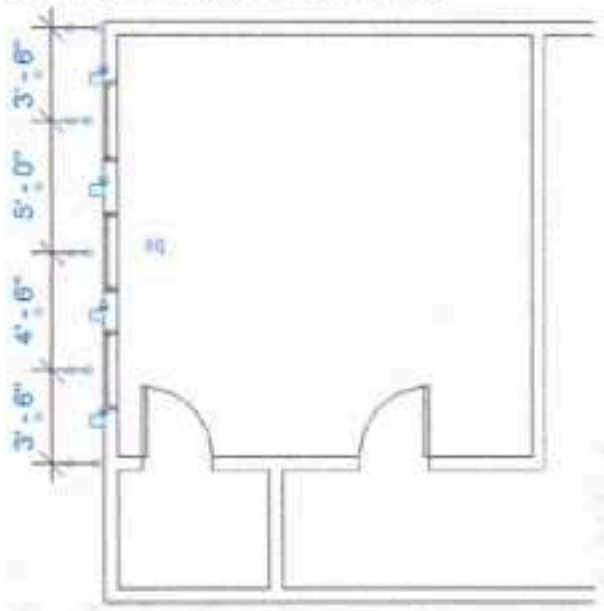
- Open the *02 Entry Level* floor plan, and zoom in to the West side of the model.
- In the Properties palette, under Graphics, for Underlay, select NONE, and click APPLY.
- Click View tab ▶ Graphics panel ▶ THIN LINES so that element lines maintain their true thickness in the zoomed view.
- Click Architecture tab ▶ Build panel ▶ Window.
- On the Options Bar, verify that Tag on Placement is cleared.
- In Properties palette ▶ Change Element Type drop-down and select *Casement 3x3 with Trim : 36" x 72"* [M_Casement 3x3 with Trim : 0915 x 1830mm], and place three windows on the outside edge of the west wall, as shown.



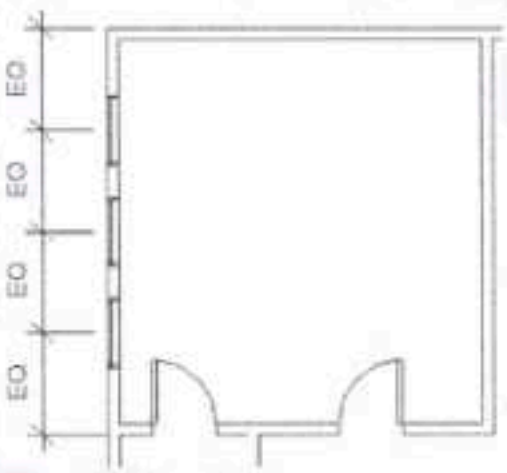
9) Reposition the windows to be equidistant from each other:

- Click Annotate tab ▶ Dimension panel ▶ ALIGNED.
- Select the North wall, select each of the window centerlines, and then select the horizontal interior wall.

- Click to the left of the West wall to place the dimension line. Note that each of the four dimensions is different.



- Click EQ, and then press ESC twice. The windows are moved so that all of the dimensions are equal.



- Select the interior wall that contains the doors; move it up or down to see how the design intent is maintained.
- Select the top wall, move it up **3'** [1000 mm], and see how the walls resize and the windows redistribute equally within the wall.
- On the Quick Access toolbar, click UNDO once to restore the top wall to the original dimension.

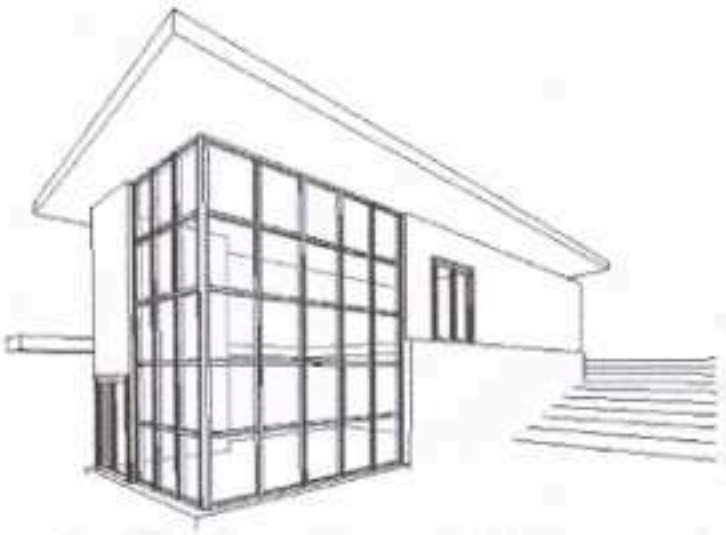
10) Select the dimension line, and press DELETE key. In the Warning dialog box, click OK to delete the line but maintain the constraints.

11) Zoom as desired, and open various plan, elevation, and 3D views to display the model results thus far.

12) Save the project file.

Adding a Curtain Wall

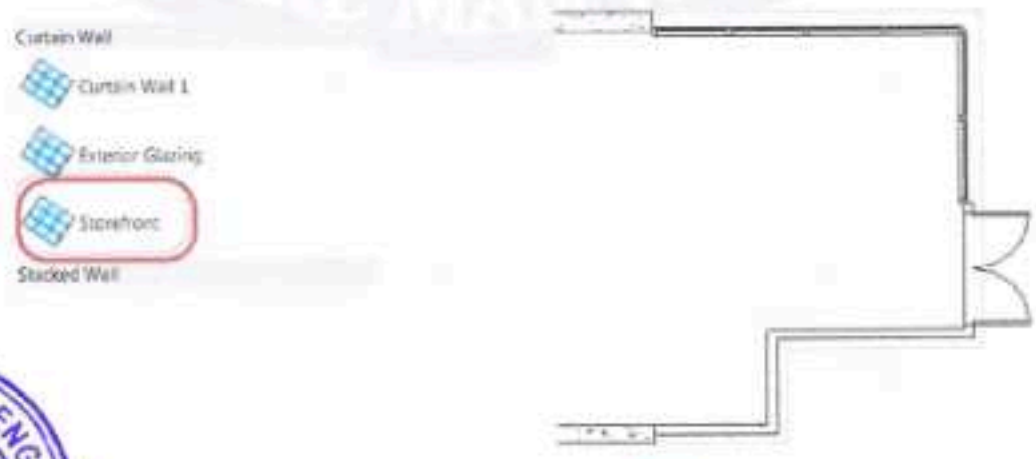
In this exercise, you change existing exterior walls to curtain walls. You then create a curtain wall type that you can apply to other walls using the Match Type tool.



The completed exercise

14 Adding a curtain wall

1) Open the *01 Lower Level* floor plan.
2) Create a curtain wall at the northeast corner of the building:
   - Zoom to the East wall.
   - Click Modify tab ▶ Edit panel ▶ SPLIT, and split the East wall just above the door.
   - On the Modify tab, click MODIFY.
   - While pressing CTRL, select the upper portion of the East wall and the adjacent portion of the North wall.
   - In Properties palette ▶ Change Element Type drop-down and select *Curtain Wall : Storefront*. If a warning displays, click to close it.



3) Create a curtain wall type:

- Select the North curtain wall at an end so the whole curtain wall is selected. The tooltip and the status bar will confirm the selection.
- In Properties palette, click EDIT TYPE.

- In the Type Properties dialog box, click DUPLICATE.
- In the Name dialog box, for Name, enter **House 4' x 4'** [House 1200 x 1200 mm], and click OK.
- In the Type Properties dialog box, under Vertical Grid Pattern, for Spacing, enter **4'** [1200 mm].
- Under Horizontal Grid Pattern, for Spacing, enter **4'** [1200 mm].
- Click OK twice.

4) Match the type of the north curtain wall to the east curtain wall:

- Click Modify tab ► Clipboard panel ► (Match Type Properties).
- Select the North curtain wall, and then select the East curtain wall.

5) Open the *To Building* 3D view. The new spacing is applied to both curtain walls.

6) Save the project file.

Attaching Walls to the Roof

In this exercise, you attach interior and exterior walls to the roof. When you attach the curtain walls, Autodesk Revit warns you of consequences and modifies the placement of mullions.

The completed exercise

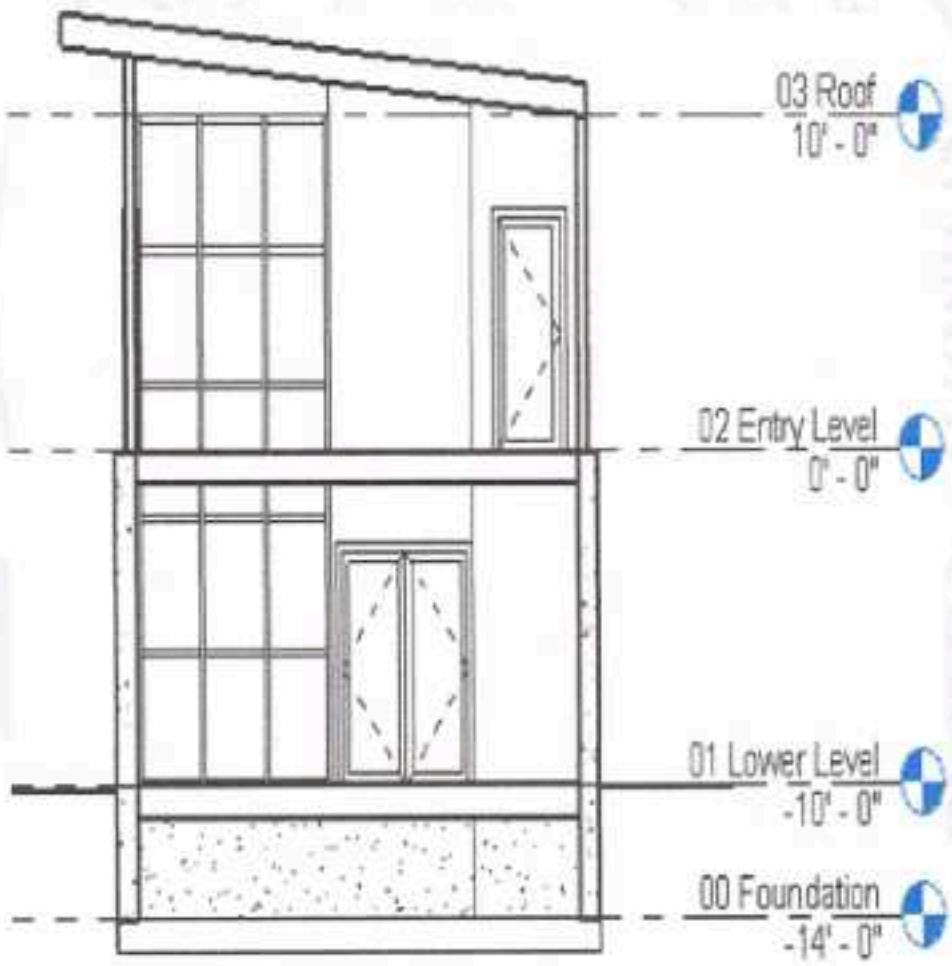
15 Attaching walls to the roof

1) Open the *03 Roof* floor plan.

2) Attach the basic walls:

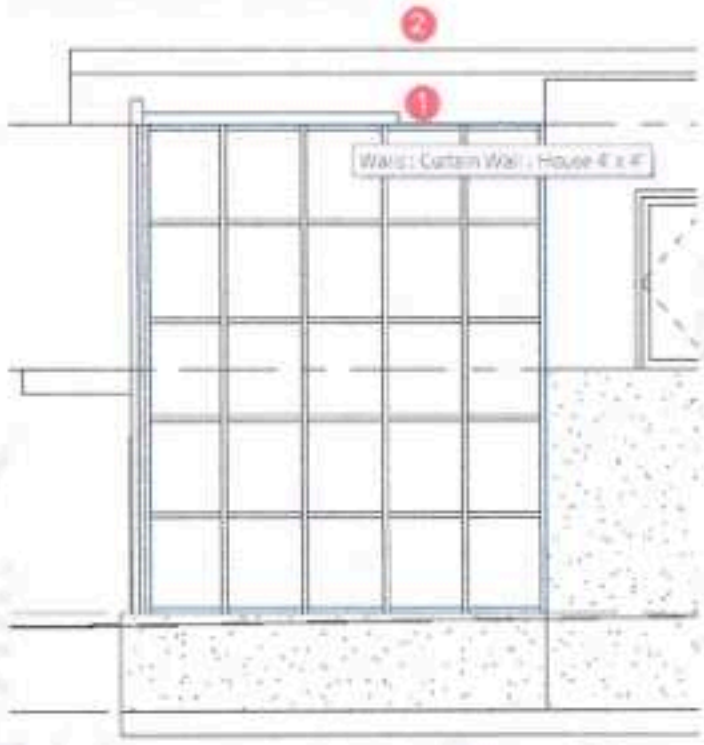
   - While pressing CTRL, select all the interior walls and exterior walls, except the curtain walls.
   - Click Modify Walls tab ► Modify Wall panel ► click ATTACH TOP / BASE.
   - In the Options Bar, for Attach Wall, verify Top is selected.
   - In the drawing area, select the roof.
   - Press ESC to end the command.

   Section view shown for reference only



3) Attach the curtain walls:

- Open the North elevation view.
- Move the cursor over the curtain wall indicated by Mark 1, and press TAB until the status bar indicates that the curtain wall is selected, select the outside edge of the curtain wall, and then on the Modify Walls tab, at the Modify panel, click ATTACH TOP / BASE.



- Select the roof indicated by Mark 2.
- In the Error dialog box about curtain wall mullions, click DELETE ELEMENTS.
- Open the East elevation view, and attach the East curtain wall to the roof.

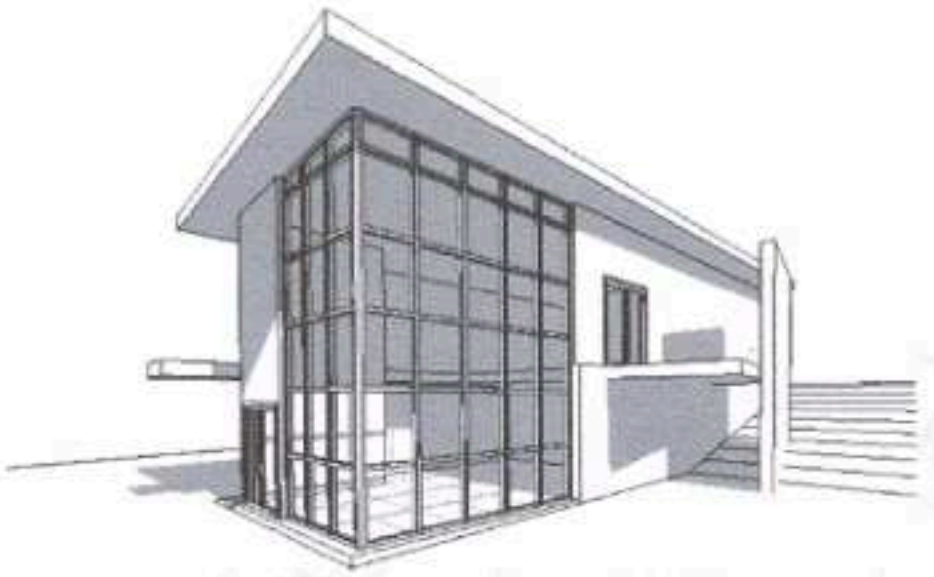
4) Open the *To Building* 3D view.

5) On the View Control Bar, click Shadows Off ▶ SHADOWS ON. All walls extend up to the roof. Note the spacing of the top row of mullions/panels; because the spacing parameter cannot be satisfied, mullions are created where the walls and roof attach.

6) Save the project file.

Modifying the Entry Deck

In this exercise, modify the floor profile on the entry level to include a deck on the North side of the model.



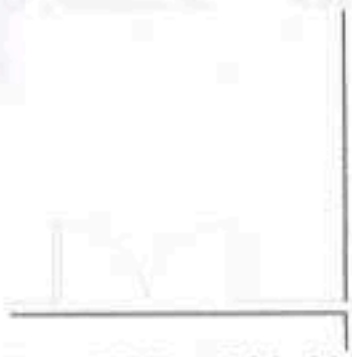
The completed exercise

16 Modifying the entry deck

1) Open the *02 Entry Level* floor plan.

2) Edit the profile of the floor:

- Select the floor. Hover over the wall and use press TAB two times to select the floor.
- Click EDIT BOUNDARY from Mode panel.
- On the Draw Panel, click BOUNDARY LINE. On the North side of the model, click on the North wall in line with the right vertical sketch line, move the cursor up **11'** [3300 mm], and click to place the endpoint of the line.



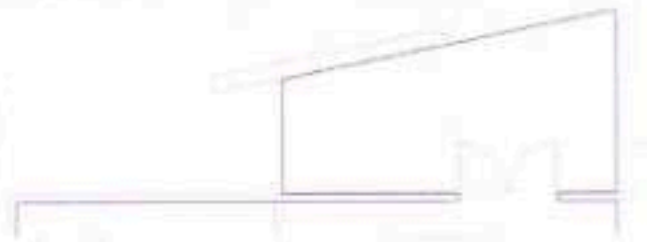
- Press ESC to finish this line.
- On the Options Bar, select CHAIN.
- At the intersection of the double door and the North wall draw a sketch line from the interior intersection up **6"** [200 mm] North and then West to the end of the Northern wall along the exterior side.

- Draw a wall from left to right on the slanted floor line, as shown and press ESC to exit the command.

- Select the wall previously created.
- In Properties palette, under Constraints, for Base Constraint, select 00 FOUNDATION, and click APPLY.

4) Modify the floor:

- In the drawing area, select the floor.
- Click EDIT BOUNDARY from Mode panel.
- Select the short vertical line above the West wall, and drag it to the right, as shown.



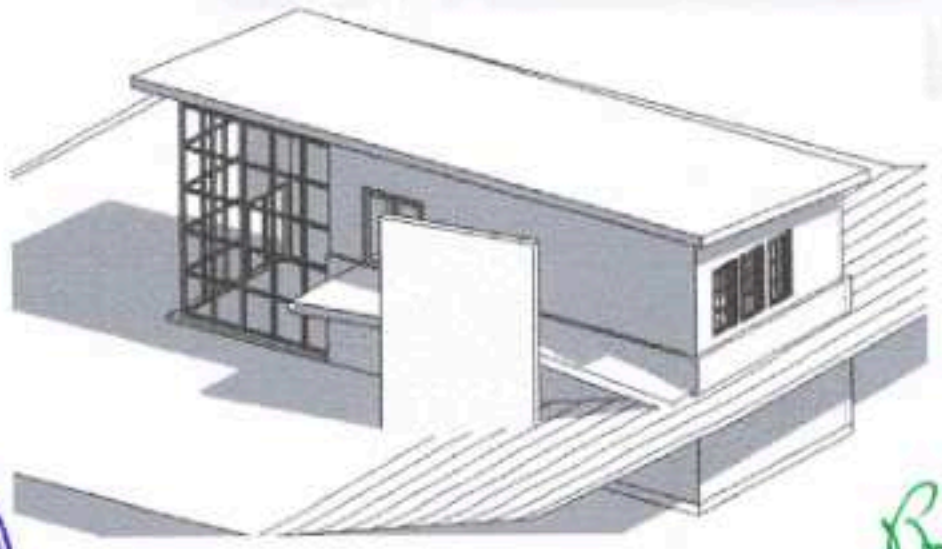
- On the Mode panel, click FINISH EDIT MODE.
- In the Alert dialog, click NO.

5) Open the *To Building* 3D view.

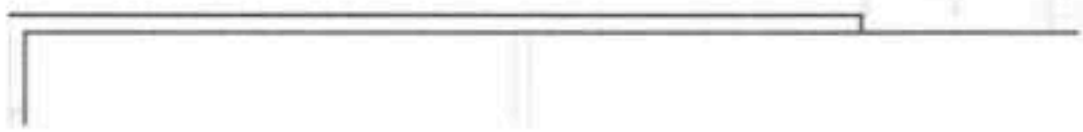
6) Save the project file.

Adding a Sloped Floor

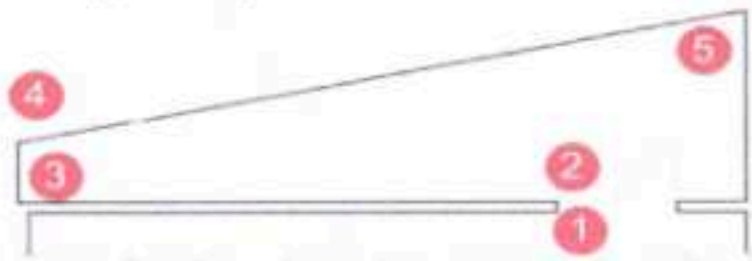
In this exercise, you add a sloped floor to the entry deck to create a ramp up to the entry door.



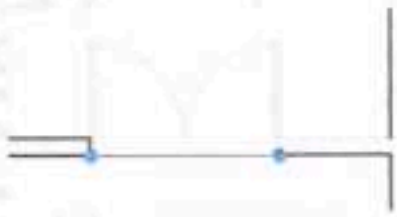
The completed exercise



- Continue drawing a line from the left endpoint of the North wall and extending up **3' 6"** [1000 mm].
- Connect the line with the upper endpoint of the **11'** [3000 mm] vertical line drawn previously.



- From Modify panel, click SPLIT, and split the North model line at both sides of the door opening.



- On the Modify | Floors ribbon, click MODIFY.
- Select the segment at the door opening, and press DELETE.
- Click Edit Boundary tab ► Draw panel ► BOUNDARY LINE, and complete the profile to the right of the door, as shown. Press Esc to exit the command.

- On the Mode panel, click FINISH EDIT MODE.
- In the Alert dialog box, click NO.

3) Add a wall to the entry deck:

- Click Architecture tab ► Build panel ► WALL.
- In Properties palette ► Change Element Type drop-down and select *Basic Wall : Retaining - 12" Concrete* [Basic Wall : Retaining 300mm Concrete].
- On the Options Bar, for Location Line, select CORE FACE: INTERIOR.

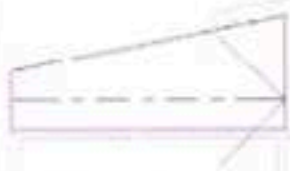
17 Adding a sloped floor

1) Open the *02 Entry Level* floor plan.

2) Sketch the floor:

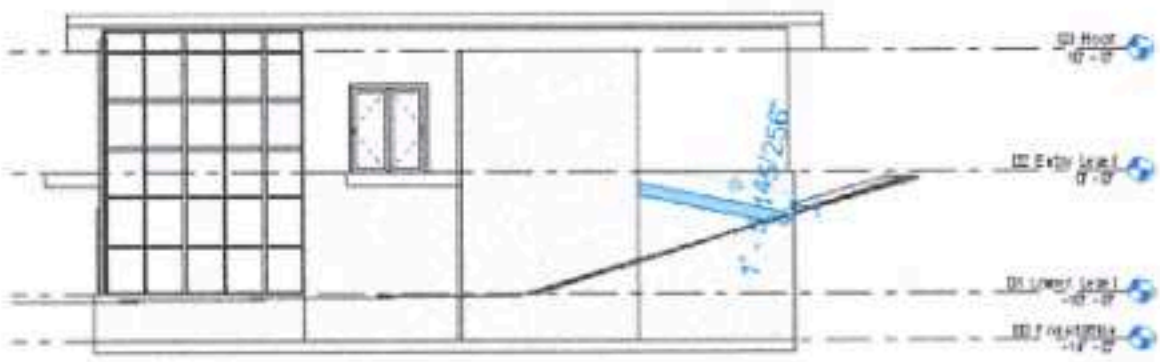
- Click Architecture tab ▶ Build panel ▶ FLOOR.
- On the Draw panel, click LINE.
- On the Options Bar, verify that Chain is selected.
- Beginning at the left endpoint of the **6"** [200 mm] north wall and moving counterclockwise, sketch the floor to complete the deck previously drawn, as shown.

- Click Create Floor Boundary tab ▶ Draw panel ▶ SLOPE ARROW.
- Select the midpoint of the West model line, and then select the East model line.



- On the Create Floor Boundary tab, select MODIFY.
- Select the slope arrow.
- In Properties palette, under Constraints, for Height Offset at Tail, enter **-1'** [-300 mm], and click OK.
- On the Floor panel, click FINISH EDIT MODE.
- In the Alert dialog box, click NO.

3) Open the North elevation view. The sloped floor begins at the lower level and extends to the entry level.



4) If the sloped floor does not meet the slope of the terrain, edit the floor sketch, and change the Height Offset at Tail property of the slope arrow.

5) Save the project file.

Adding Stairs and Railings

In this exercise, you complete the interior of the model by adding a staircase on the lower level, and then adding and modifying railings on the lower level and the entry level.

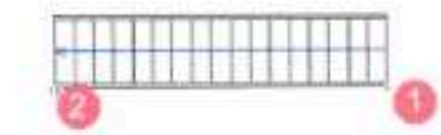
The completed exercise

18 Adding stairs and railings

1) Open the *01 Lower Level* floor plan.

2) Add stairs:

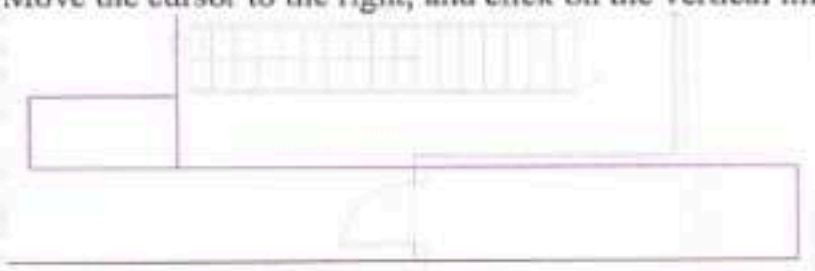
- Zoom in to the East side of the model.
- Click Architecture tab ▶ Circulation panel ▶ Stair STAIR.
- Click near the double doors to start the stair run at Mark 1.
- Move the cursor to the left until the tooltip indicates that no risers remain at Mark 2, and click to specify the stair endpoint.



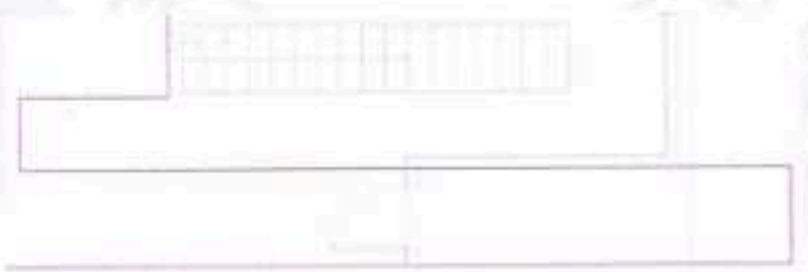
- The stairs and railings are created automatically.
- In the Mode panel ► click FINISH EDIT MODE.

3) Edit the floor profile:

- Open the *02 Entry Level* floor plan.
- Zoom in to the East side of the model.
- Select the floor.
- In the Mode panel ► click EDIT BOUNDARY.
- On the Draw panel, click LINE.
- On the Options Bar, verify that Chain is selected.
- Click at the corner of the model lines below the stairs to specify the start point.
- Move the cursor to the left, enter **6'** [1800 mm], and press ENTER.
- Move the cursor up, enter **3' 4"** [1100 mm], and press ENTER. This distance is the width of the stair and its stringers.
- Move the cursor to the right, and click on the vertical line to complete the sketch.



- On the Modify | Floors ► Edit Boundary tab, click MODIFY.
- Select the vertical model line closest to the stairs, and drag the bottom endpoint up to the endpoint of the short horizontal line drawn previously.

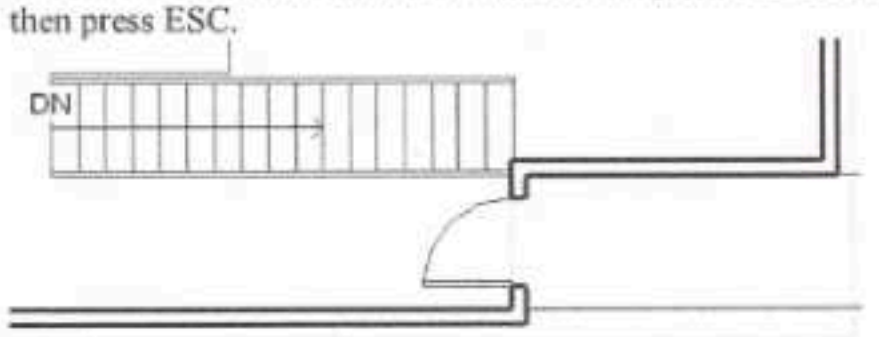


- From the Modify | Floors ► Edit Boundary tab ►click FINISH EDIT MODE.
- In the Alert dialog box, click NO.

4) Move the stairs and railings:

- Using a selection window, select the stairs and railings. To select only elements completely within the boundary of the window, drag the cursor from left to right.
- From the Modify panel ► click MOVE.

- Click the lower-left corner of the stairs as the move start point.
- Click the lower corner of the modified floor profile as the move end point, and then press ESC.

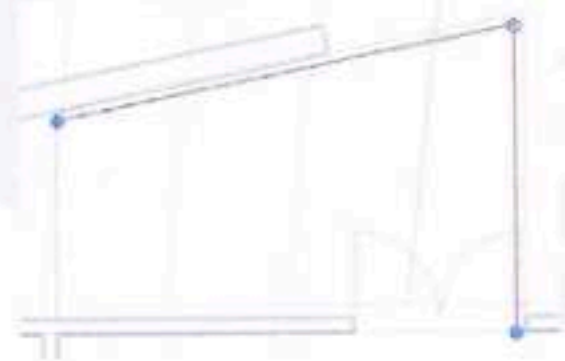


5) Modify the railing type:

- Open the *To Building* 3D view.
- While pressing CTRL, select both railings (zoom in as necessary).
- In Properties palette ▶ Change Element Type drop-down and select *Railing : Guardrail - Pipe* [Railing : 900mm Pipe].

6) Add a railing to the entry deck:

- Open the *02 Entry Level* floor plan.
- Click Architecture tab ▶ Circulation panel ▶ RAILING.
- On the Draw panel, click PICK LINES.
- On the Options Bar, for Offset enter **4"** [150 mm].
- Zoom to the entry deck on the North side of the model.
- Click the interior of the angled floor on the right, and then click the interior of the adjacent vertical floor line, as shown.

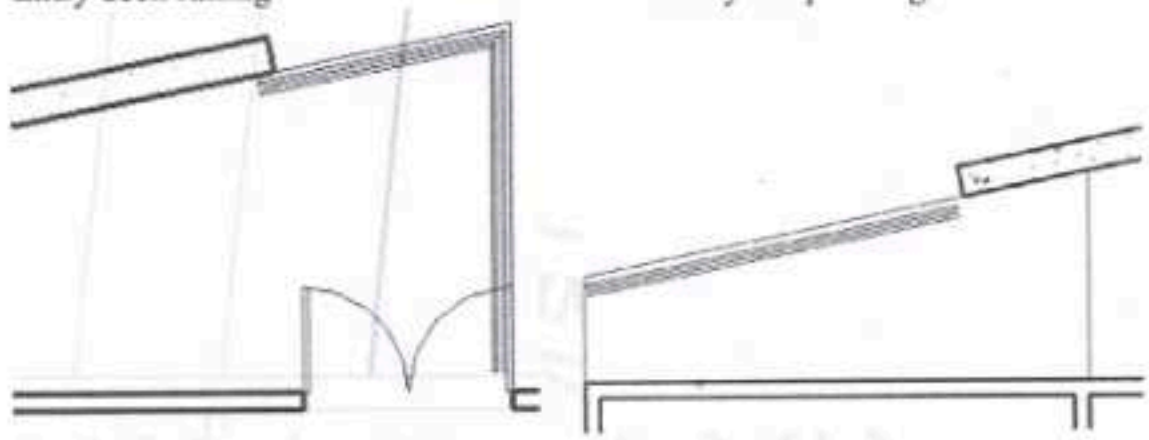


- Click MODIFY, and then select the angled railing.
- Drag the left endpoint to the right, so that the resulting railing extends just past the retaining wall.
- Select the vertical railing, and drag the lower endpoint up until the resulting railing is **10'** [3000 mm].
- In Properties palette, for Type, select *Railing: Guardrail - Pipe* [900mm Pipe], and click OK.

- On the Modify | Create Railing Path tab ▶ click FINISH EDIT MODE. Press ESC to exit the command.
- Add railing to the North side of the entry ramp as shown below.

Entry deck railing

Entry ramp railing



7) Add a railing on the North side of the interior stairs:

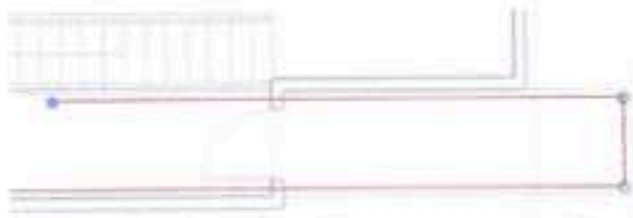
- Click Architecture tab ▶ Circulation panel ▶ Railing RAILING.
- On the Draw panel, click PICK LINES.
- On the Options Bar, for Offset enter **4"** [150 mm].
- Click to the left of the vertical floor line above the stairs, and then click above the left north edge of the stairs.
- From the Modify panel ▶ click TRIM.
- Select the left side of the horizontal railing, and then select the vertical railing.
- From the Mode panel ▶ click FINISH EDIT MODE.
- Add railing to the South side of the Stair

North stair railing

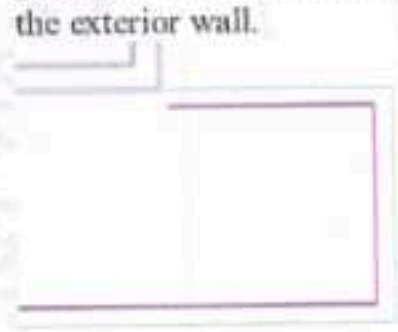
South stair railing

8) Add a railing to the balcony:

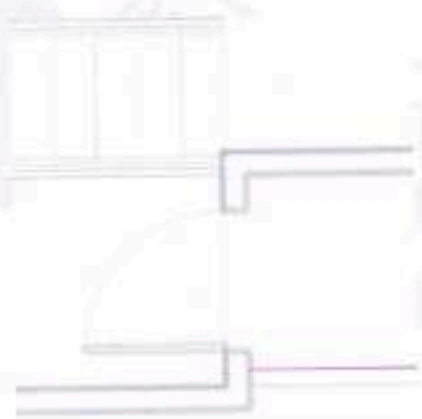
- Zoom to the lower-right corner of the model.
- Click Architecture tab ▶ Circulation panel ▶ RAILING.
- On the Draw panel, click PICK LINES.
- On the Options Bar, for Offset enter **4"** [150 mm].
- Click above the South floor line, and, continuing in a counterclockwise direction, click the interior of the remaining two floor lines that define the balcony.



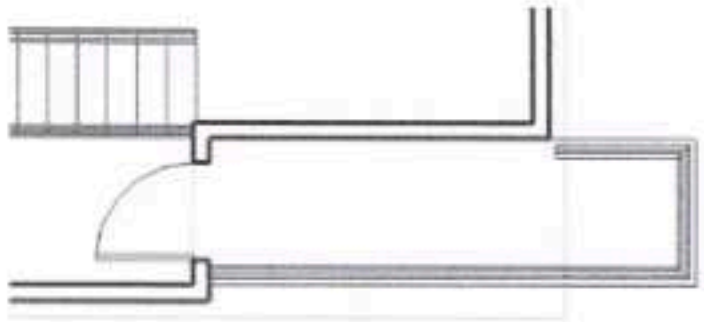
- On the Modify | Create Railing Path tab, click MODIFY.
- Select the last line drawn, and drag the left endpoint to the right, just to the East of the exterior wall.



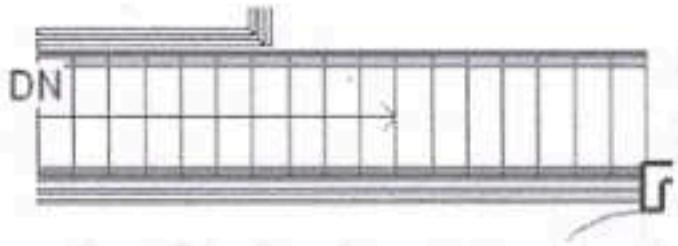
- Select the South railing line, and drag the left endpoint to the right until it touches the exterior wall near the door.



- From the Mode panel ▶ click FINISH EDIT MODE.

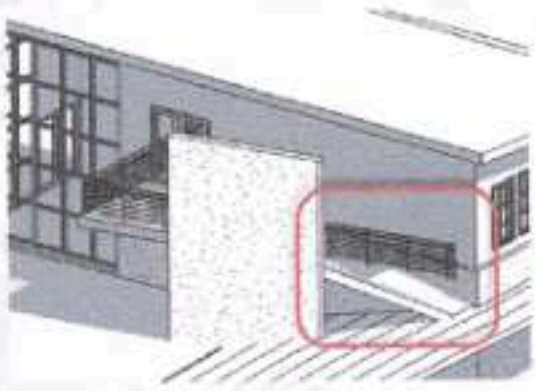


9) Zoom in to the stairs, and use the same technique to add a railing below the stairs. If necessary, drag the right endpoint of the railing to the wall on the right.

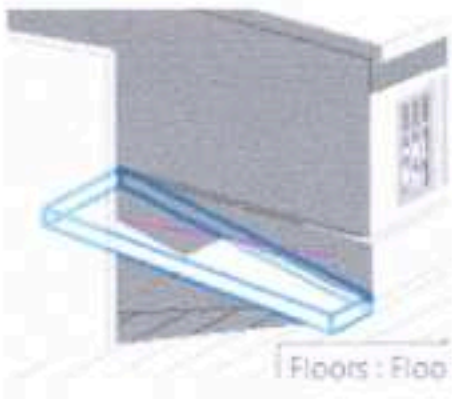


10) Fix Entry Level ramp railing

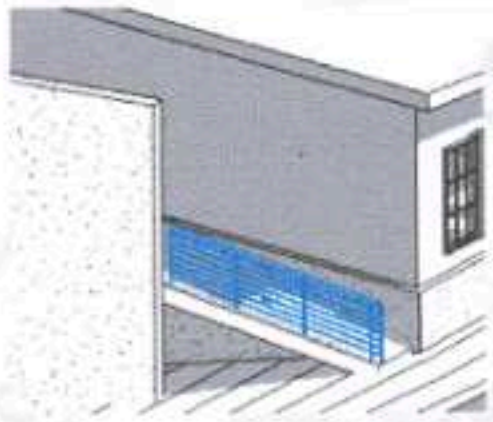
- Open *{3D}* 3D Views if existing, otherwise from the Quick Access toolbar click DEFAULT 3D VIEW.
- Orient the View Cube such that the North side of the house is facing you. Currently, the railing is floating in the air as shown below.



- Select the railing on-screen
- From the Mode panel, click EDIT PATH.
- From the Tools panel, click PICK NEW HOST.
- Select the ramp element highlighted in blue.



- From the Mode panel ▶ click ✔ FINISH EDIT MODE.

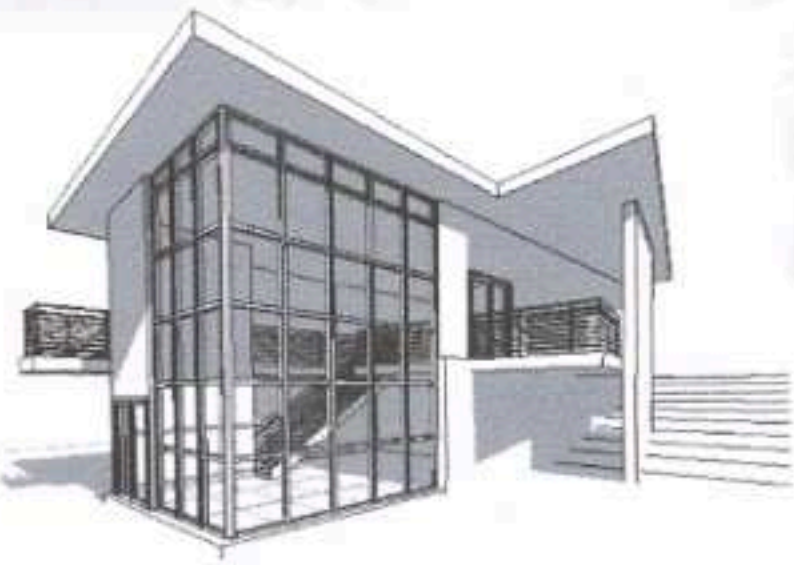


11) Open the *To Building* 3D view.

12) Save the project file.

Modifying the Roof

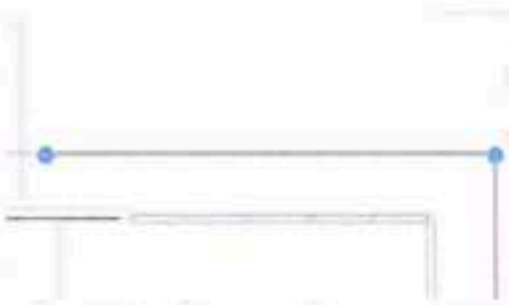
In this exercise, you modify the profile of the roof in order to extend the roof over the entry deck.



The completed exercise

19 Modifying the Roof

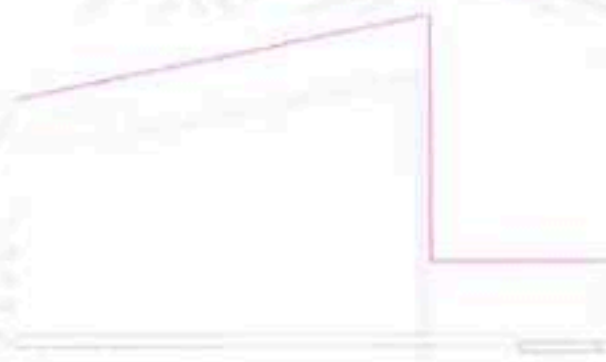
1) Open the *03 Roof* floor plan.
2) In the drawing area, select the roof.
3) From the Mode panel ► click EDIT FOOTPRINT.
4) Modify the roof profile:
   - On the Tools toolbar, click SPLIT, and split the top edge of the roof profile by clicking to the right of the entry deck.



   - On the Modify | Roofs tab ► Edit Footprint tab, click MODIFY.
   - Select the left segment of the split roof line, and press DELETE.
   - From the Draw panel ► click LINE. Draw a line parallel to the edge of the entry deck. Press Esc to exit the command.

   - Select the Roof Boundary line that was just created.
   - On the Modify Roofs ► Edit Footprint tab, click MOVE. Move the line **2'** [610 mm] to the North.
   - Select the right segment of the roof line, and drag the left endpoint to the intersection with the vertical floor line.

- On the Draw panel, click LINE.
- Draw a line from the end of the right segment up to the end of the left segment.



- From the Mode panel ► click FINISH EDIT MODE.

5) Modify the Retaining Wall:

- Select the 12" concrete retaining wall.
- Click Modify Walls tab ► Modify Wall panel ► click ATTACH TOP / BASE.
- In the Options Bar, for Attach Walls, select TOP.
- Select the roof to attach the wall to the roof. Press ESC to exit the command.

6) Open the *To Building* 3D view. Right-click in the drawing area and select View Properties. In the Instance Properties dialog box, under Graphics, click EDIT next to Graphic Display Options. In the Graphic Display Options, under the Background category, select *Gradient Background*. Select OK twice.

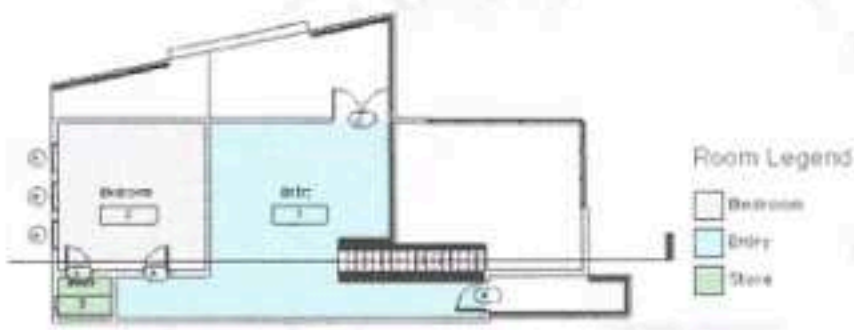
7) Save the project file.

Documenting the Project

In this exercise, you add tags to the project and schedule doors and rooms. You change an element in the door schedule and see that the change is automatically made in the associated plan. You also add color fill to rooms and modify crop regions for several views that you later add to a presentation sheet view.

<Door Schedule>

A	B	C	D
Mark	Family and Type	Width	Height
1	Double-Glass 1: 72" x 84"	6' - 0"	7' - 0"
2	Double-Glass 1: 72" x 84"	6' - 0"	7' - 0"
3	Single-Glass 1: 36" x 84"	3' - 0"	7' - 0"
4	Single-Flush: 32" x 84"	2' - 8"	7' - 0"
5	Single-Flush: 32" x 84"	2' - 8"	7' - 0"
6	Single-Flush: 30" x 84"	2' - 6"	7' - 0"
7	Single-Flush: 30" x 84"	2' - 6"	7' - 0"
8	Bifold-4 Panel: 72" x 84"	6' - 0"	7' - 0"
9	Bifold-4 Panel: 72" x 84"	6' - 0"	7' - 0"

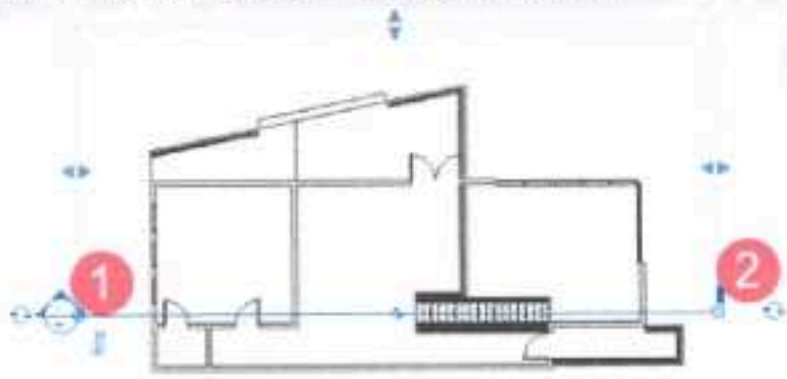


The completed exercise

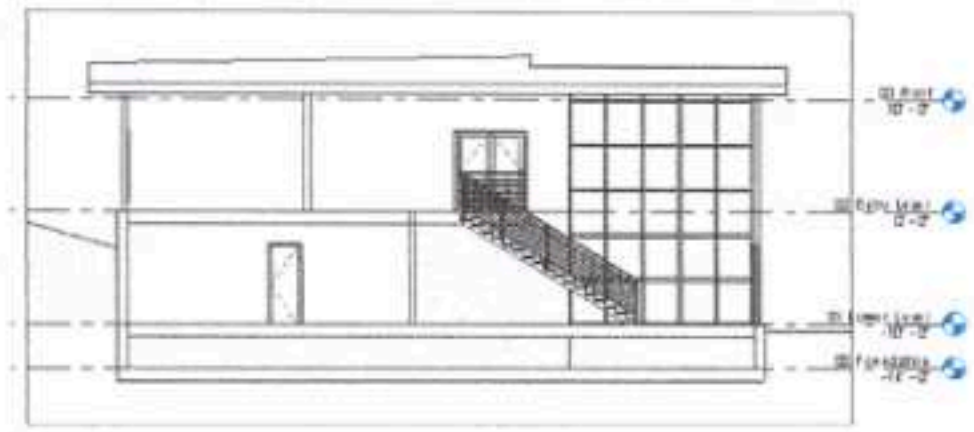
20 Documenting the project

1) Create a section view.

- Open the *02 Entry Level* floor plan.
- Click View tab ▶ Create panel ▶ SECTION.
- Click on the left side of the model to begin the section and end it on the right side, making sure it cuts through the stairs.

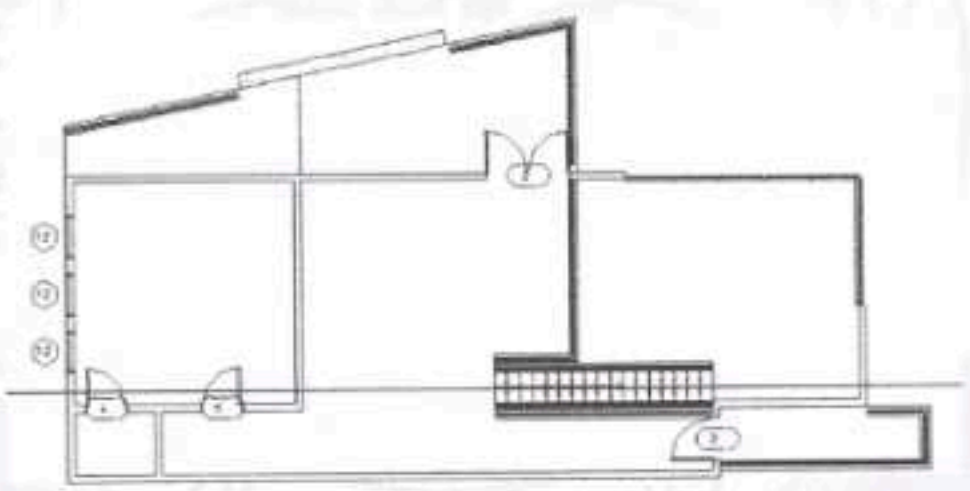


- Press ESC to exit the command.
- Double-click the middle of the section head circle to display the section view. Alternatively, in the Project Browser under Views, expand Sections (Building Sections), and double-click *Section 1*.



2) Add door and window tags:

- Open the *02 Entry Level* floor plan.
- Click Annotate tab ▶ Tag panel ▶ TAG ALL.
- In the Tag All Not Tagged dialog box, press CTRL, and under Category, select WINDOW TAGS.
- Click OK.

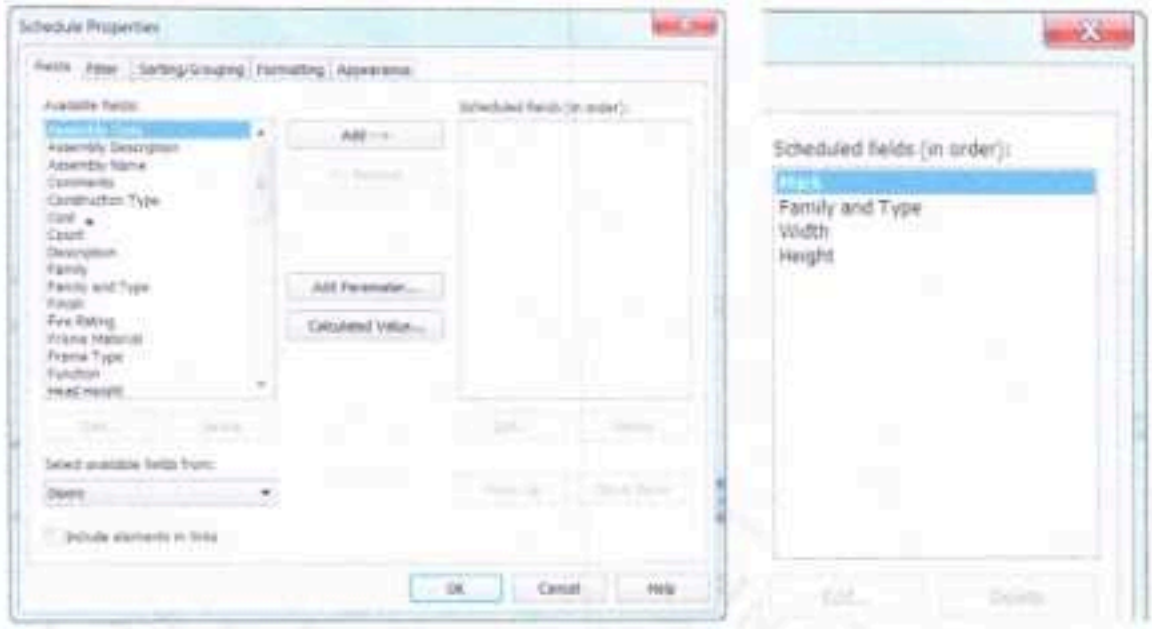


- Open the *01 Lower Level* floor plan, and use the same procedure to tag all doors and windows in the view

3) Create a door schedule:

- Click View tab ▶ Create panel ▶ Schedules drop-down ▶ SCHEDULE/QUANTITIES.

- In the New Schedule dialog box, for Category, select DOORS, and click OK.



- In the Schedule Properties dialog box, for Available fields, select FAMILY AND TYPE, and click ADD.
- Add the following fields: *Width*, *Height*, and *Mark*.
- Using the Move Up button, move *Mark* to the top of the list so that it displays first in the schedule.
- Click the Sorting/Grouping tab, for Sort by, select *Mark*, and click OK.
- Drag the right column boundary of the *Family and Type* column to expand it to its full width.

<Door Schedule>

A	B	C	D
Mark	Family and Type	Width	Height
1	Double-Glass 1: 72" x 84"	6' - 0"	7' - 0"
2	Double-Glass 1: 72" x 84"	6' - 0"	7' - 0"
3	Single-Glass 1: 36" x 84"	3' - 0"	7' - 0"
4	Single-Flush: 32" x 84"	2' - 8"	7' - 0"
5	Single-Flush: 32" x 84"	2' - 8"	7' - 0"
6	Single-Flush: 30" x 84"	2' - 6"	7' - 0"
7	Single-Flush: 30" x 84"	2' - 6"	7' - 0"
8	Bifold-4 Panel: 72" x 84"	6' - 0"	7' - 0"
9	Bifold-4 Panel: 72" x 84"	6' - 0"	7' - 0"

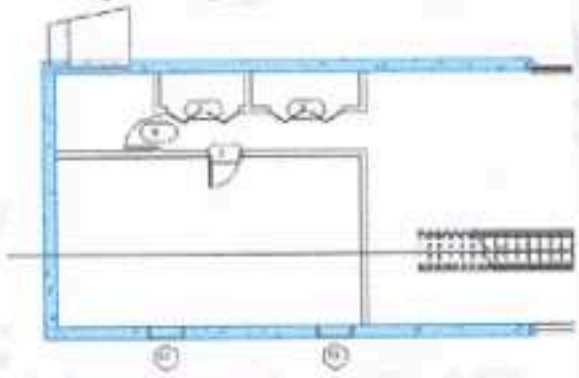
4) Change a door schedule:

- For the Mark 7 door, click the *Family and Type* field, and select *Bifold-4 Panel : 60" x 84"* [M_Bifold-4 Panel : 1525 x 2134mm].
- Open the *01 Lower Level* floor plan. Notice that the bedroom door tagged 7 is now a bi-fold door. Changes made in the schedule are automatically synchronized in the associated plan.
- In Properties palette, select *Single-Flush: 30" x 84"* [M_Single-Flush: 0762 x 2134mm] to return the door to the original family and type.

- In the Project Browser, under Schedules/Quantities, double-click Door Schedule. The Mark 7 door is also restored to the original type in the schedule. This bi-directional associativity in Autodesk Revit ensures that changes made to any part of the design are coordinated in all associated views, including schedules.

5) Modify the properties of the three retaining walls to specify them as bounding elements for room area calculation:

- Open the *01 Lower Level* floor plan.
- On the Modify tab, click MODIFY.
- While pressing CTRL, select the three retaining walls, and click



- From the Properties palette, under Constraints, select Room Bounding, and click APPLY.
- Press ESC to deselect retaining walls.

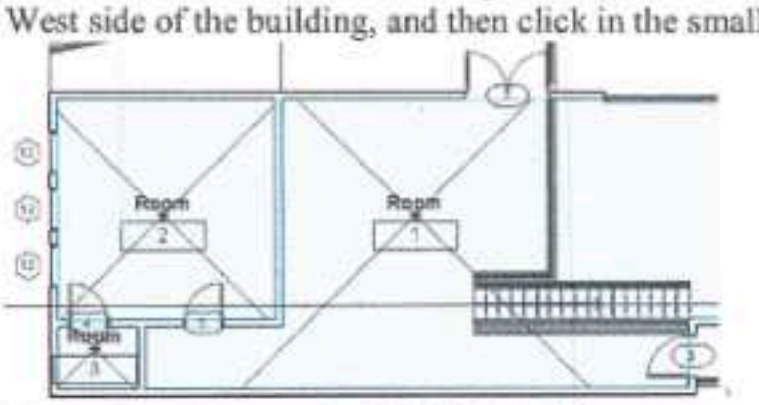
6) Create a Room schedule:

- Click View tab ▶ Create panel ▶ Schedules drop-down ▶ SCHEDULES/QUANTITIES.
- In the New Schedule dialog box, for Category, select ROOMS, and click OK.
- Add the following fields: *Number*, *Name*, *Area*, and click OK. The schedule is empty but is updated when you add rooms and room tags to the building.

7) Add rooms and room tags on the entry level:

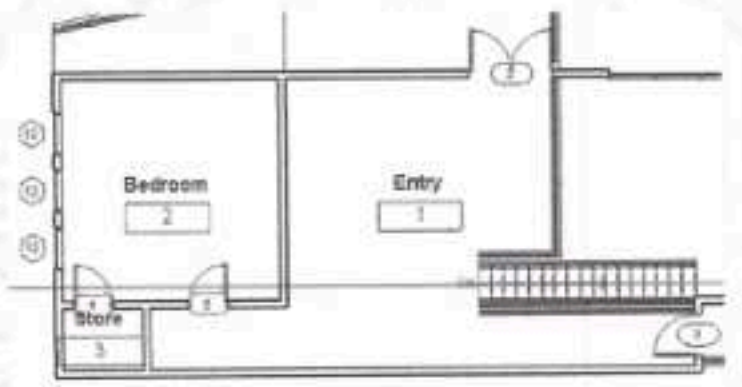
- Open the *02 Entry Level* floor plan.
- Click Architecture tab ▶ Room & Area panel ▶  ROOM.

- Click to the left of the stairs to tag the large room, click in the upper room on the West side of the building, and then click in the small room on the West side.



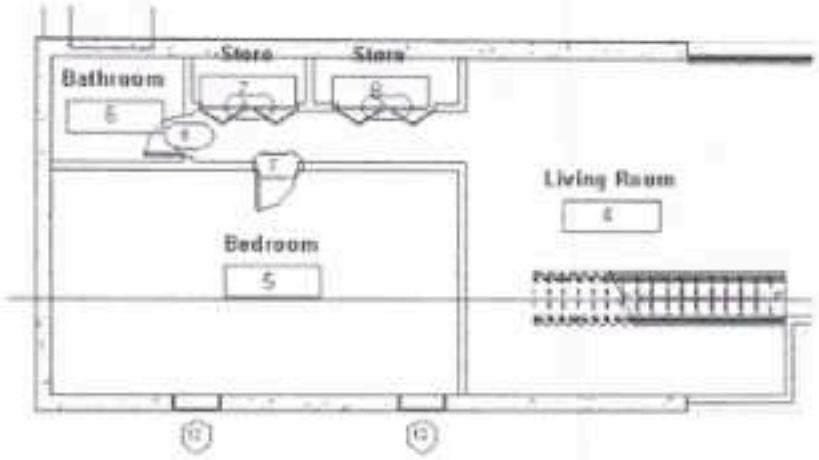
- On the Place Room tab, click MODIFY.

- Double-click the tag text in the large room, change it to **Entry**, and press ENTER. Change the tag text in room 2 to **Bedroom**, and the text in room 3 to **Store**.



8) Add rooms and room tags on the lower level:

- Open the *01 Lower Level* floor plan.
- Click Architecture tab ▶ Room & Area panel ▶ ROOM.
- Beginning in the large room on the right and moving clockwise, click in each room to add the tags.
- On the Place Room tab, click MODIFY.
- Double-click the tag text in the large room, change it to **Living Room**, and then press ENTER.
- Change the tag text in room 5 to **Bedroom**, the text in room 6 to **Bathroom**, and the text in rooms 7 and 8 to **Store**.

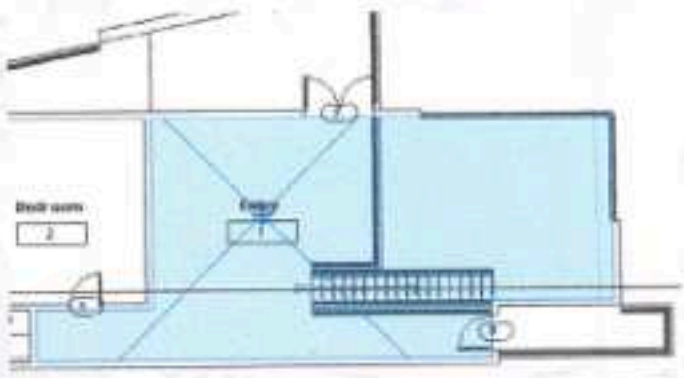


9) Open the *Room Schedule* view to see that it includes data for the specified fields.

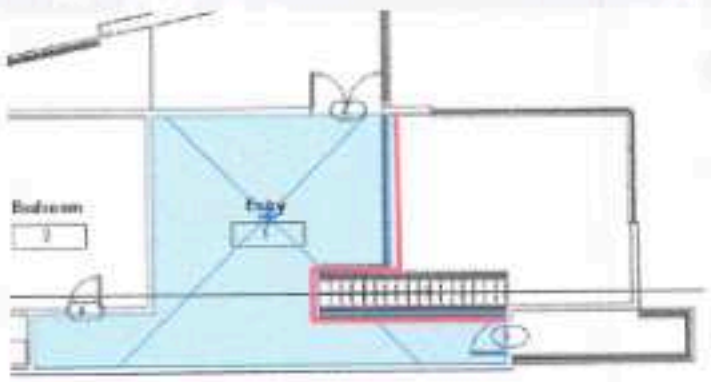
10) Define the floor in the Entry:

- Open the *02 Entry Level* floor plan.
- Click Architecture tab ▶ Room and Area panel ▶ ROOM SEPARATOR LINE.
- Trace the floor line from the North wall down to and around the stairs to define the Entry room and create a separate floor profile for that room.

Before room separation line



After room separation line



The area for the entry room is updated in the room schedule.

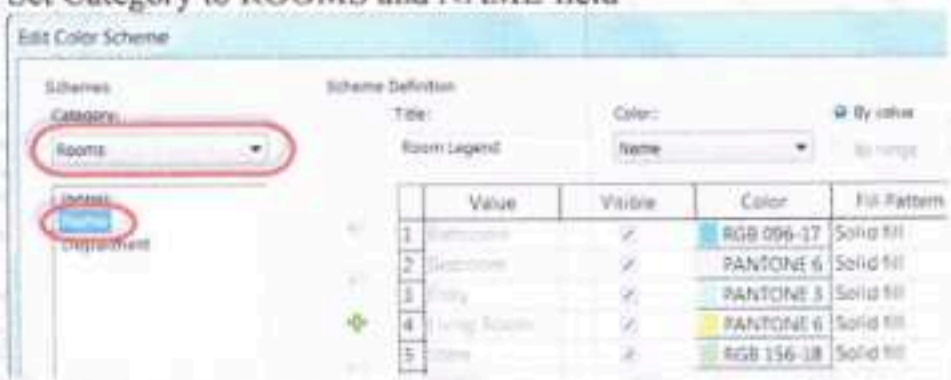
11) On the Design Bar, click MODIFY.

12) Modify tags:

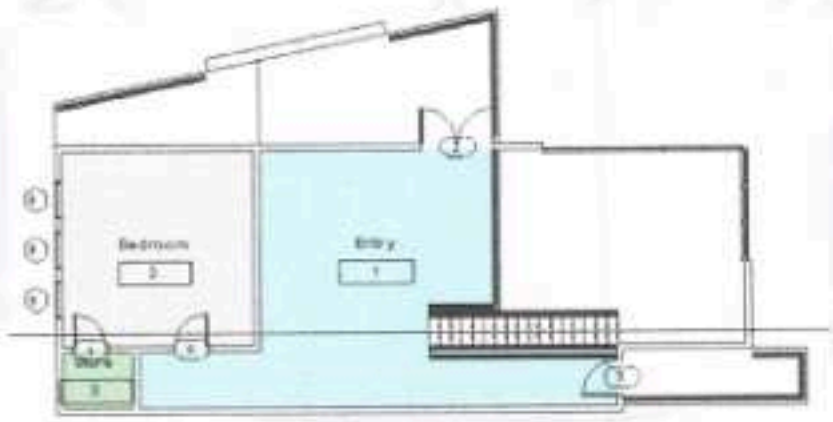
- Open the *01 Lower Level* floor plan.
- Double-click the tag for one of the windows in the South wall, enter **A**, and press ENTER.
- In the Alert dialog box about changing a type parameter, click YES.
- Open the *02 Entry Level* floor plan.
- Double-click the tag for one of the windows in the west wall, enter **B**, and press ENTER.
- In the Alert dialog box, click YES.

13) Add color fill to the rooms:

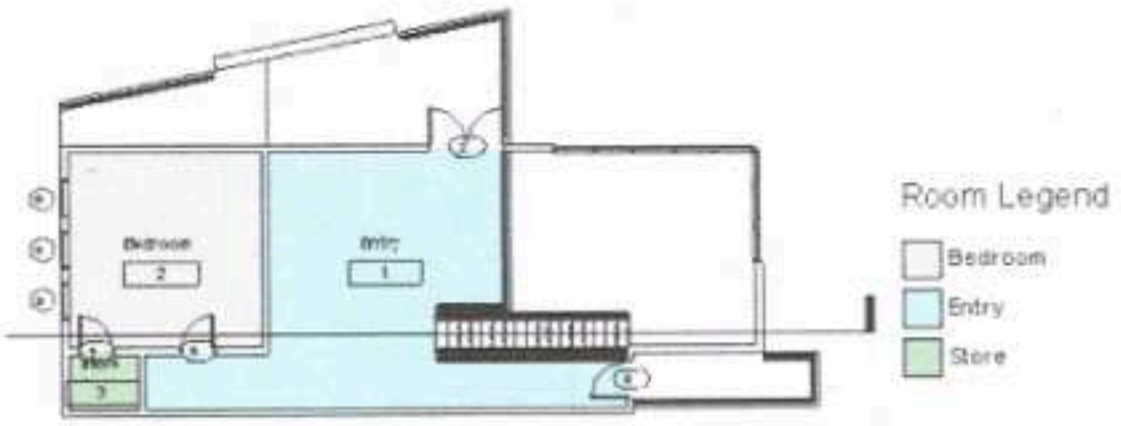
- In the Properties palette, Graphics section, click NONE value for Color Scheme.
- Set Category to ROOMS and NAME field



- Click OK.

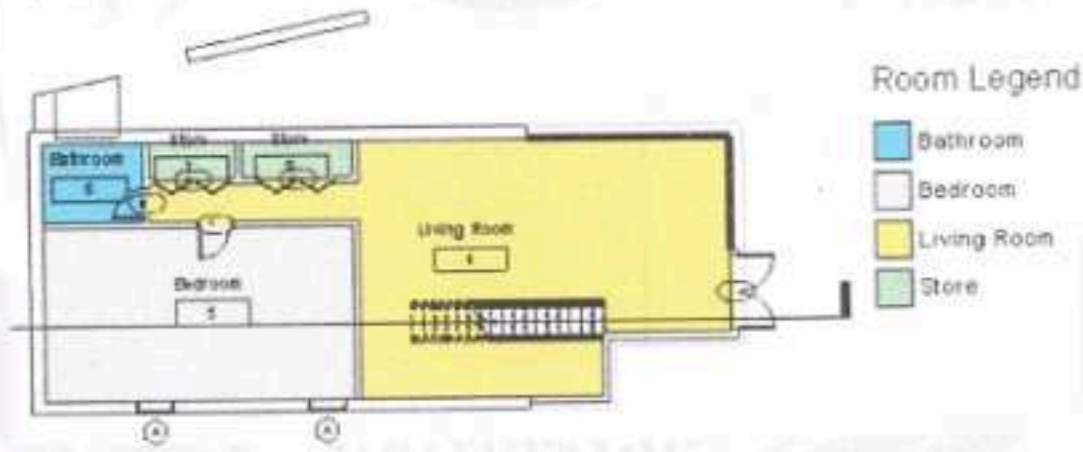


- Click Annotate tab ▶ Color Fill panel ▶ Color Fill Legend.
- Left click just to the right of the model to locate the Room Legend.

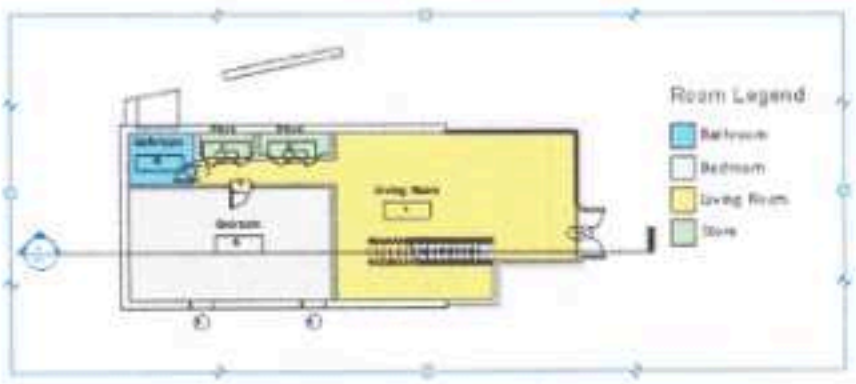


- Select the left vertical wall, and move it slightly to the left. All of the walls resize to accommodate the new wall dimension. The color fill in the bedroom and storage room readjusts and the room areas are automatically updated.
- Open the *Room Schedule* view to see that the bedroom and storage room areas have changed.
- On the Standard toolbar, click UNDO to restore the wall to its original dimension.
- Reopen the *02 Entry Level* floor plan and verify the wall has changed.

14) Open the *01 Lower Level* floor plan and repeat the previous procedure in that view.



15) Modify a crop region to create a view for a sheet:
- Open the *01 Lower Level* floor plan.
- On the View Control Bar, click SHOW CROP REGION.
- Enter **ZF** to zoom to fit the entire view in the drawing window.
- Select the crop region, and drag the triangular blue controls to shrink the region around the model.



- On the View Control Bar, click HIDE CROP REGION.

16) Using the same method, modify the following views:

- *02 Entry Level* floor plan
- *East* elevation view
- *North* elevation view

17) Save the project file

Creating a Solar Study

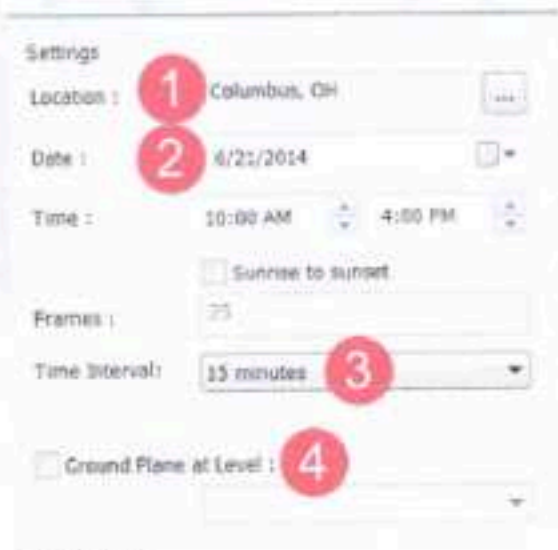
In this exercise, you create an animation of the solar activity at a particular place and time in order to study the light and shadows that affect the building site.

The completed exercise

21 Creating a solar study

1) Open the *To Building* 3D view.
2) On the View Control Bar, verify Shadows is turned ON.
3) On the View Control Bar, click Sun Path icon
   - Click Sun Settings...
4) In the Sun Settings dialog box, click SINGLE-DAY.
5) On the Single-Day tab, select any one of the solar studies in the list, and click RENAME.
6) In the Rename dialog box, for New, enter **One Day Solar Study - Your Location - Summer Solstice** (Winter Solstice if you are in the southern hemisphere), and click OK.
7) In the Sun Settings dialog box:
   - Under Settings, for Place, click ..., select Default City List, select a city near your location, and click OK. Refer to Mark 1.

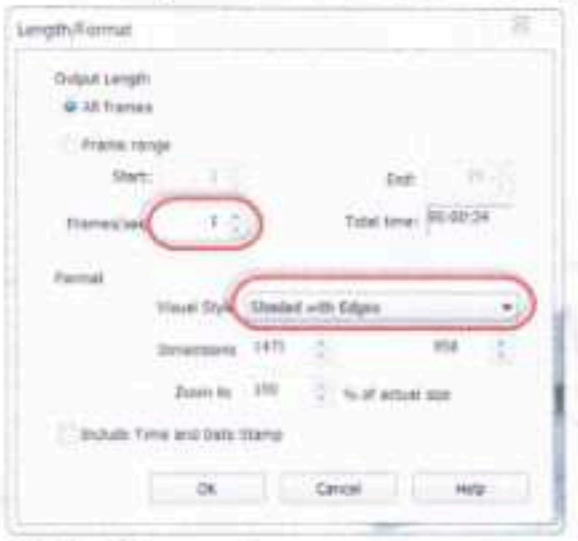
   - Mark 2: For Date, enter **6/21/2014**.
   - Mark 3: For Time Interval, select **15** minutes.
   - Mark 4: Clear Ground Plane at Level so that the shadows fall on the terrain.



   - Click OK.
8) On the View Control Bar, click Sun Path icon ▶ PREVIEW SOLAR STUDY.
9) On the Options Bar, click PLAY. The solar study animation is displayed, showing the progression at 15-minute intervals for the location and date specified.

10) Export the animation:

- Click  ▶ Export ▶ Images and Animations ▶ Solar Study SOLAR STUDY.
- In the Length/Format dialog box, change Frames/sec to **1**
- In the Length/Format dialog box, change Visual Style to SHADED WITH EDGES



- Click OK.
- In the Export Animated Solar Study dialog box, click the DESKTOP icon, and click SAVE.
- In the Video Compression dialog box, for Compressor, select FULL FRAMES. (Uncompressed), and click OK. The animation is played again as the AVI file is saved to your desktop.
- On your desktop, double-clicking on the AVI file displays the animation. Move the scroll bar to change the time.

11) Save the project file

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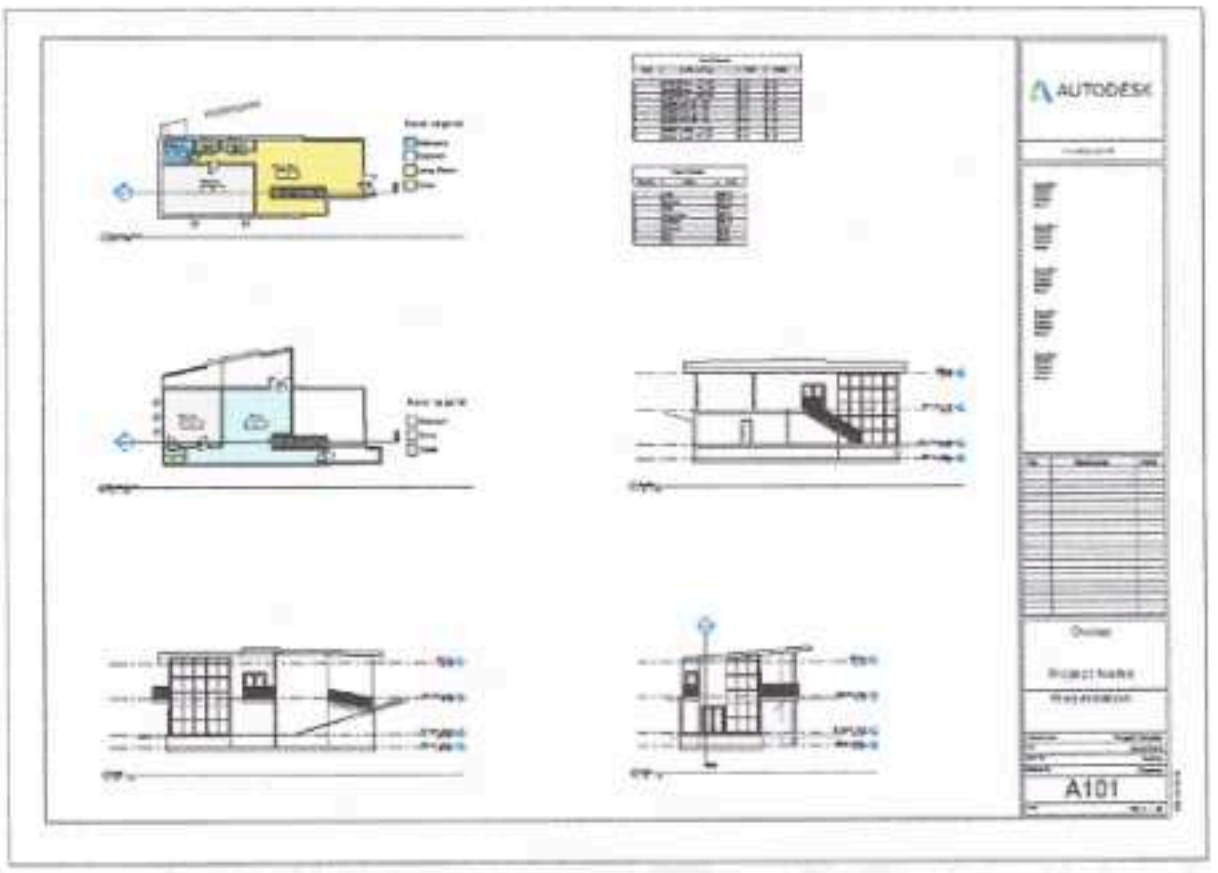
Lenavilakku, Pilivalam (Po),
Thirumayam (Tk), Pudukkottai - 622 507

Creating a Sheet

In this exercise, you add multiple views to a sheet. You also change the roof slope parameter to test the parametric capabilities of Autodesk Revit. The walls that are attached to the roof are updated to maintain constraints with the modified roof.



The completed exercise

22 Creating a sheet

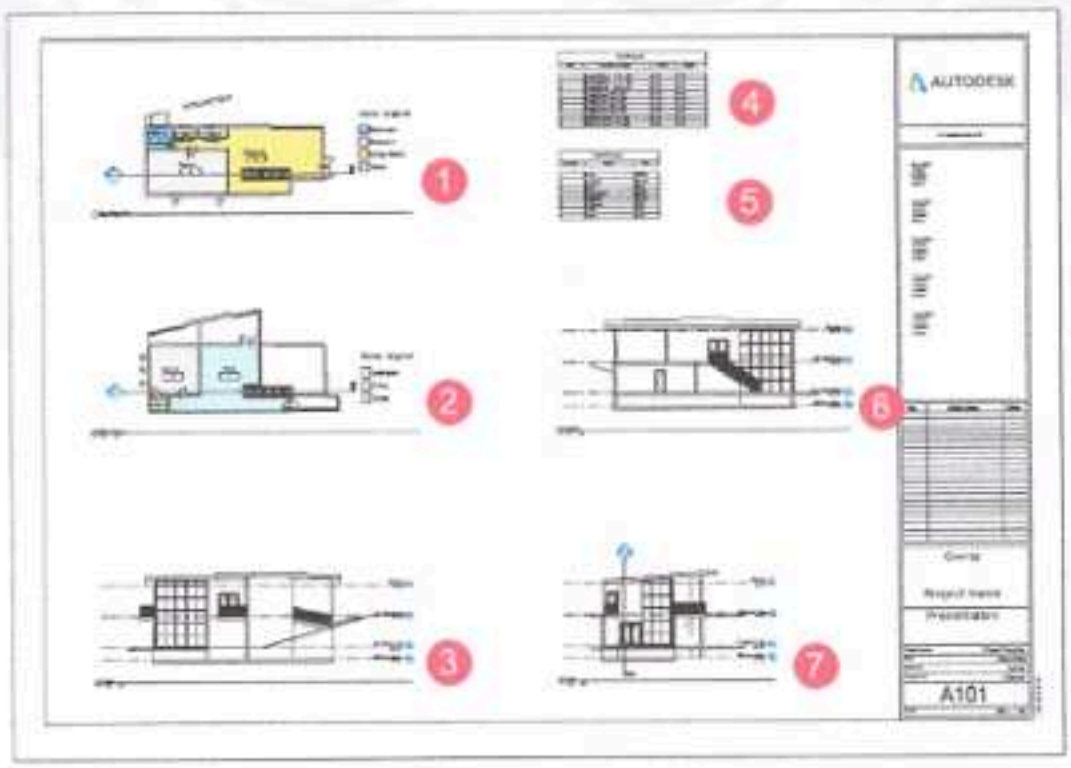
1) Create a sheet:
   - In Project Browser, right-click Sheets (all), and click NEW SHEET.
   - In the Select a Title block dialog box, click OK. (*E1 30 x 42 Horizontal* should be the default)
   - In the Project Browser, expand Sheets (all), right-click *A101 - Unnamed*, and click RENAME.
   - In the Sheet Title dialog box, for Name, enter **Presentation**, and click OK.

2) Turn off elevation markers in plan views:
   - In Project Browser, open *01 Lower Level* floor plan
   - Window select one of the elevation markers, right-click in canvas window, select HIDE IN VIEW, and click CATEGORY

- Open *02 Entry Level* floor plan view and repeat the above steps

3) Drag the *01 Lower Level* floor plan from the Project Browser onto the upper-left corner of the sheet, and click to place it as indicated by Mark 1 below.

4) Add the following views to the sheet:
   - Mark 2: *02 Entry Level floor plan*
   - Mark 3: *North elevation*
   - Mark 7: *East elevation*
   - Mark 4: *Door Schedule*
   - Mark 5: *Room Schedule*
   - Mark 6: *Section 1*
   - Mark 7: *East elevation*



Note: If a view is too large to fit on the sheet, place it in the drawing, right-click, and click Activate View. In the Properties dialog box, for View Scale, select a different scale. Click OK, right-click the view again, select Deactivate View, and reposition it on the sheet.

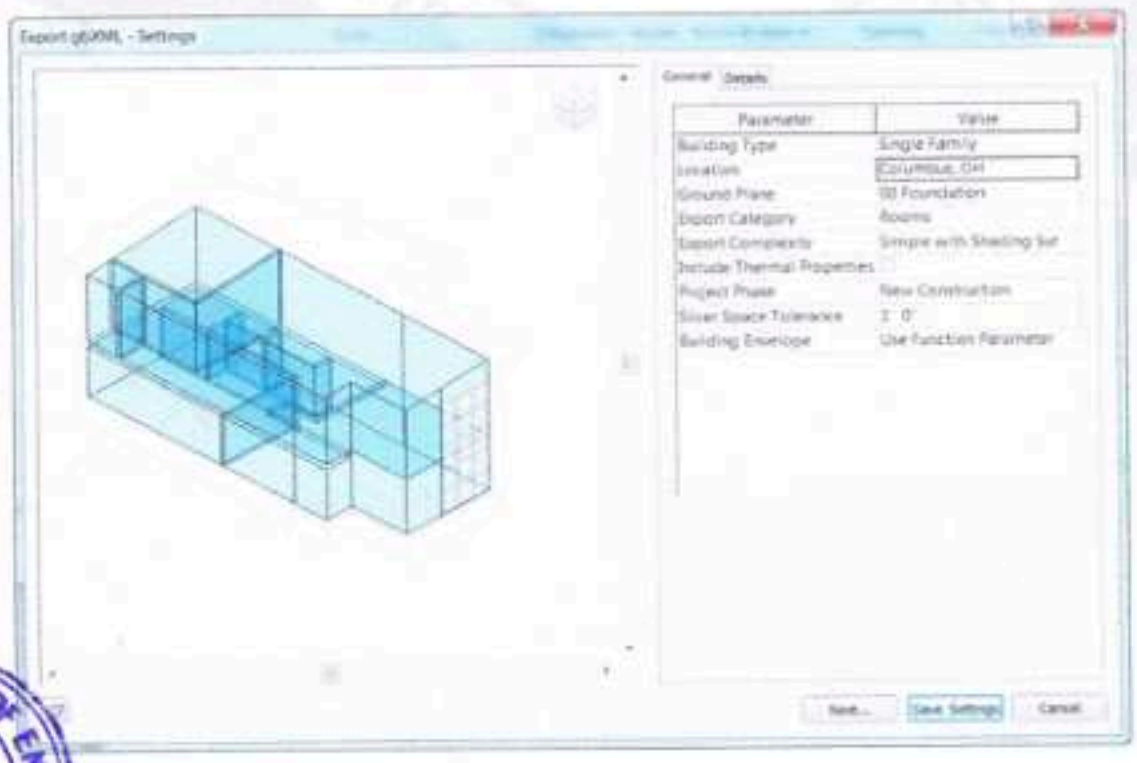
5) Modify the roof slope:

- In the drawing area, right-click the East elevation view, and click ACTIVATE VIEW.
- Select the roof.
- In Properties palette, under Dimensions, for Slope, enter **4"/12"** [15°], and click APPLY. In all views, the walls and curtain walls that attach to the roof are extended and maintain the connection to the modified roof.
- Change the slope parameter back to **1" /12"** [5°]. The walls and curtain walls are updated with the roof.
- In the East elevation view, double-click the height value for the *03 Roof Level*, and enter a value of **12'**. In all views, the walls and curtain walls that attach to the roof maintain the connection to the modified roof.
- Right-click, and click DEACTIVATE VIEW.

Any modification to the model is updated in the project drawings so that they are always coordinated. Try deleting or moving interior walls and doors; the changes will be made in all drawing views and schedules.

Create a gbXML Export

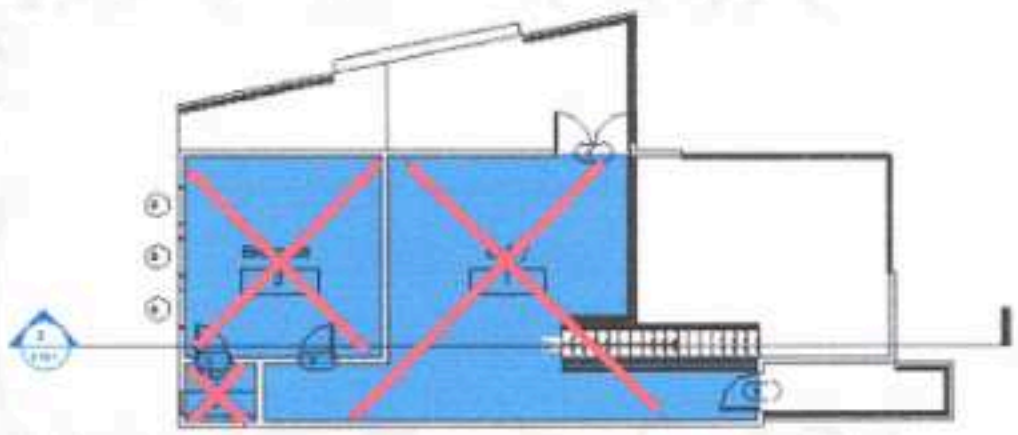
In this exercise, you will export the model to the gbXML format for use in analytical programs such as Autodesk® Green Building Studio software.



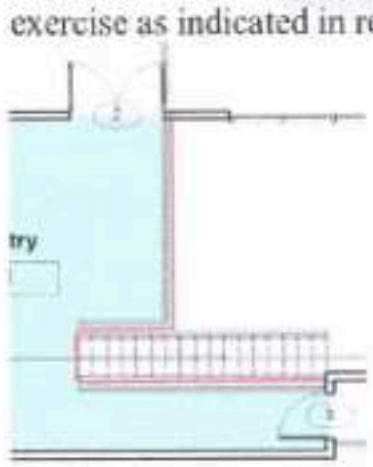
The completed exercise

23 Creating a gbXML export

1) Open *Section 1* view.
2) Change Visibility/Graphics:
   - Enter VG for the Visibility/Graphics Overrides for *Section: Section 1* dialog box.
   - In the Visibility/Graphics dialog box, expand the Rooms category in the Visibility column, select INTERIOR FILL and click OK. Notice that the blue fill representing the Room volume does not extend beyond the *03 Roof level.*
3) Change the Room offset:
   - Open *02 Entry Level*
   - Press and hold CTRL and select the Room Element in the Entry, Bedroom, and Store areas, by selecting the -Xl in each space indicated in red as shown in the image below:



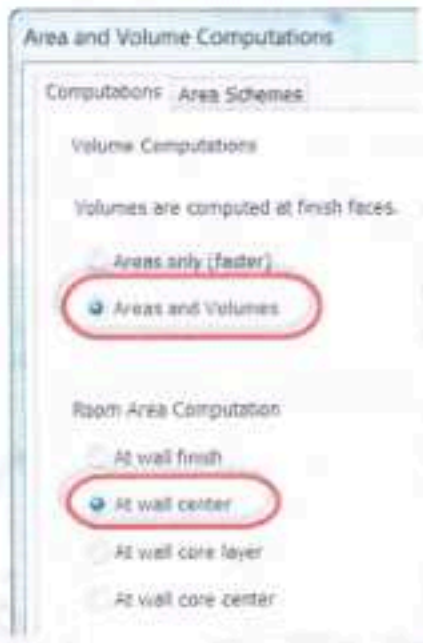
   - In the Instance Properties dialog box, under Constraints section, set Limit Offset to **14'**. The entire Room must extend beyond the roof.
   - Open *Section 1* view to verify Room extends beyond the roof.
4) Delete Area Separation Line:
   - Open 02 Entry Level floor plan.
   - Press and hold CTRL to select (4) Area Separation Lines created in a previous exercise as indicated in red below.



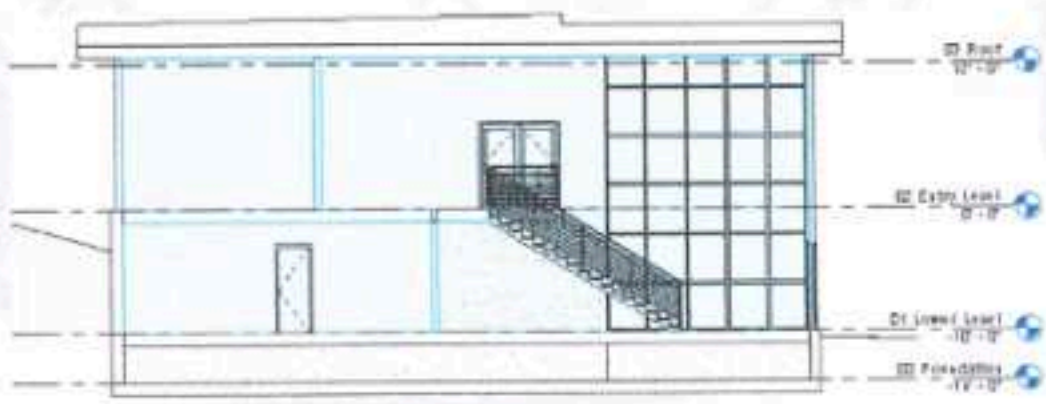
   - Click DELETE key.

5) Manage Area and Volume Settings:

- Click Architecture tab ▶ Room & Area panel drop-launcher arrow ▶ AREA AND VOLUME COMPUTATIONS.
- In the Area and Volume Computations dialog box select AREAS AND VOLUMES and select AT WALL CENTER.

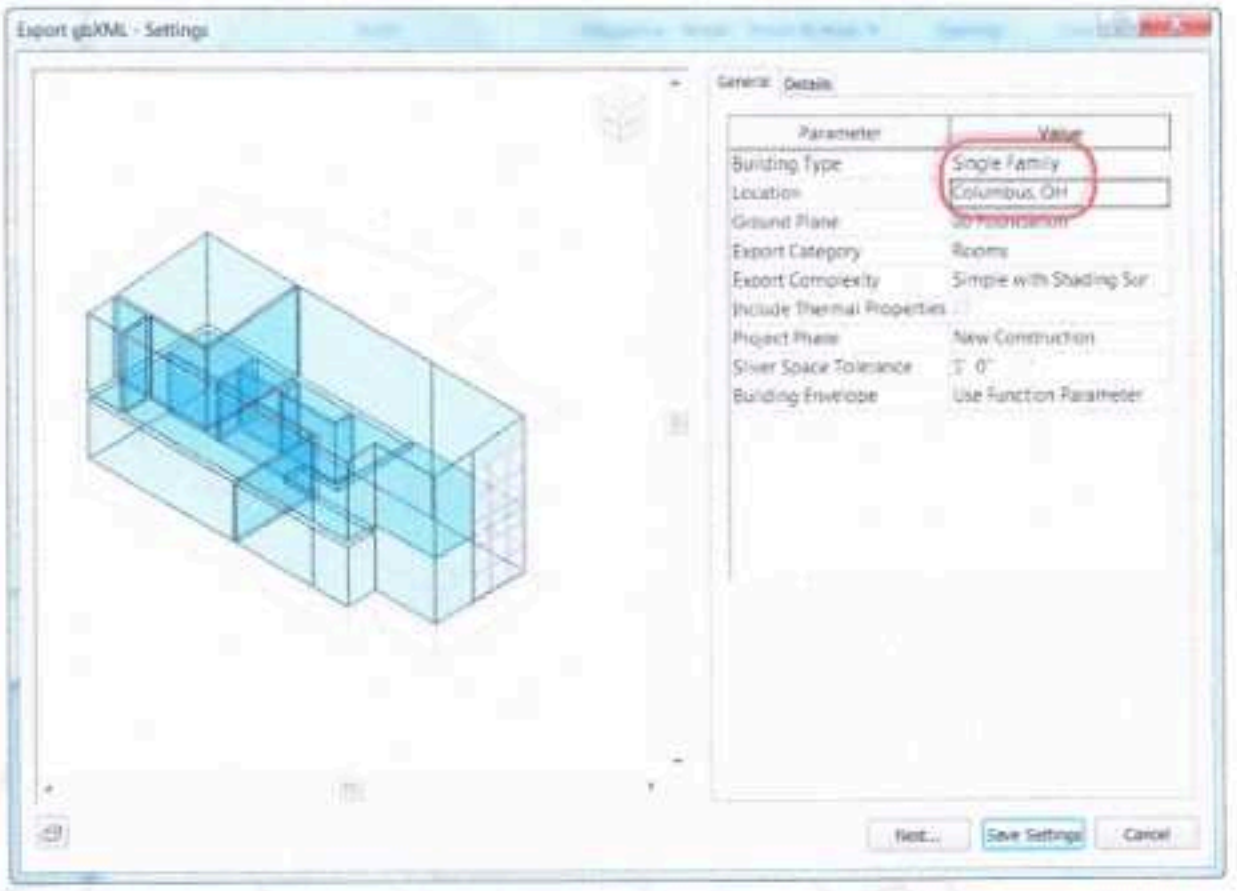


- Click OK.
- In the *Section 1* view, confirm that the blue room boundaries are now touching the inside face of the roof element.



6) Export to gbXML:

- Open *To Building* 3D View.
- Click ▶ Export ▶ gbXML
- In the Export gbXML dialog box, change Building Type to SINGLE FAMILY.
- Enter the PROJECT ADDRESS for your location.



- Use the View Cube in the viewing window to navigate around the model and identify that all interior spaces are represented with a blue volume.
- Click NEXT… to create the gbXML file. By default, the XML file name takes on the same name as the RVT file in the same directory location.
- Click SAVE to create the XML file.
- SAVE the RVT file when done.

APPENDIX

Mouse Interface and Keyboard Shortcuts

Mouse Interface

Select Element = Left Click

Pop-Up Menu = Right Click

Zoom In = Scroll-Wheel forward

Zoom Out = Scroll-Wheel

backward

Pan = Hold Scroll-Wheel Down and Drag

Rotate View in 3D = Shift Key + Scroll-Wheel Down + Drag

View Control

HL	Hidden Line
SD	Shading with Edges
VG	Visibility / Graphics
VP	View Properties
WF	Wire Frame
ZA	Zoom All to Fit
ZC	Previous Scroll Zoom
ZX	Zoom to Fit
ZV	Zoom Out (2x)
ZZ	Zoom in Region
F5	Refresh Window

Edit

AR	Array
CO	Copy
DE	Delete
GP	Group
LO	Lock Objects
MD	Modify
MM	Mirror
MV	Move
PR	Properties
RO	Rotate

Drafting

DI	Dimension
DL	Detail Lines
EL	Spot Elevation
GR	Grid
LL	Level
RP	Reference Plane
RT	Room Tag
TX	Text
TG	Tag

Snap Overrides

SE	Endpoint
SC	Center
SH	Horizontal / Vertical
SI	Intersection
SM	Midpoint
SN	Nearest
SO	Snaps Off
SP	Perpendicular
SQ	Quadrants
SR	Snap To Remote
SS	Standard Snapping
ST	Tangent
SW	Work Plane Grid

Modeling

WA	Wall
WN	Window
DR	Door
CM	Component
LI	Modeling Lines

Tools

AL	Align
LW	Linework
OF	Offset
PT	Paint
SF	Split Face
SL	Split Walls and Lines
TR	Trim and Extend

SOLIDWORKS Fundamentals

This chapter includes the following topics:

- **Concepts**
- **Terminology**
- **User Interface**
- **Design Process**
- **Design Intent**
- **Design Method**
- **Sketches**
- **Features**
- **Assemblies**
- **Drawings**
- **Model Editing**

Concepts

Parts are the basic building blocks in the SOLIDWORKS software. Assemblies contain parts or other assemblies, called subassemblies.

A SOLIDWORKS model consists of 3D geometry that defines its edges, faces, and surfaces. The SOLIDWORKS software lets you design models quickly and precisely. SOLIDWORKS models are:

- Defined by 3D design
- Based on components

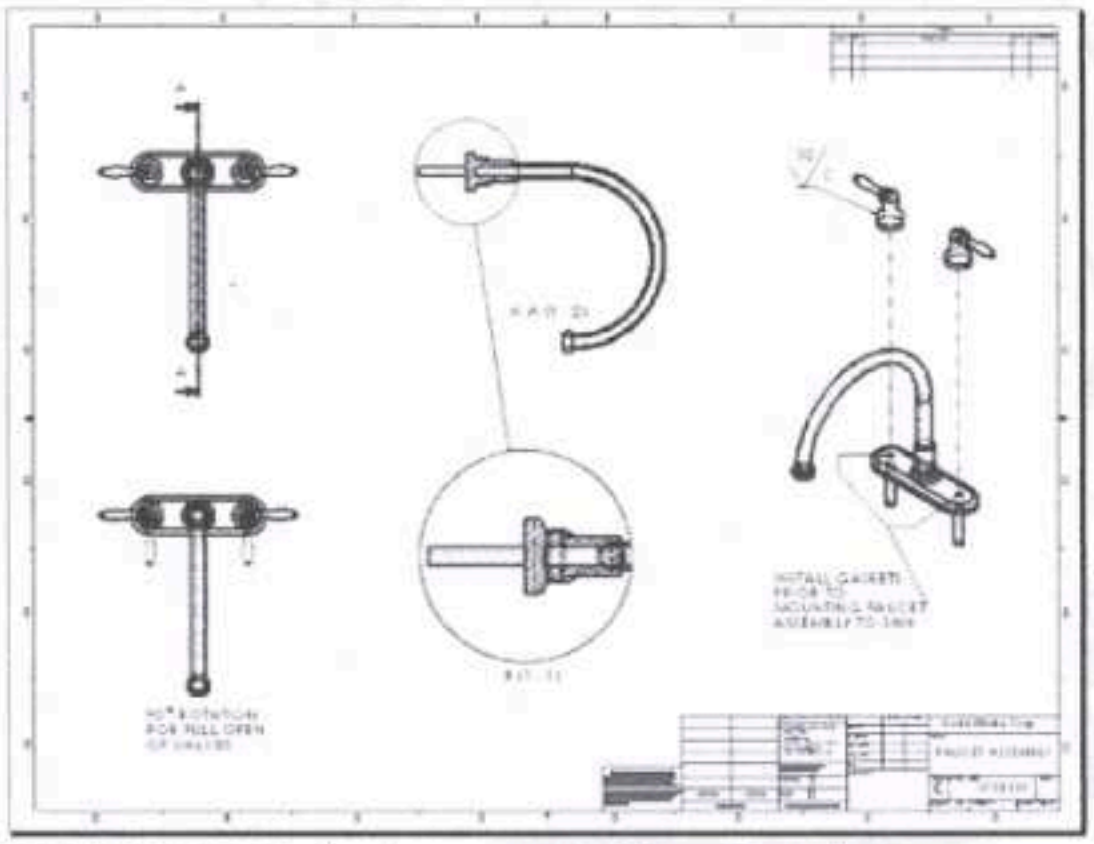
3D Design

SOLIDWORKS uses a 3D design approach. As you design a part, from the initial sketch to the final result, you create a 3D model. From this model, you can create 2D drawings or mate components consisting of parts or subassemblies to create 3D assemblies. You can also create 2D drawings of 3D assemblies.

When designing a model using SOLIDWORKS, you can visualize it in three dimensions, the way the model exists once it is manufactured.

SOLIDWORKS 3D part

SOLIDWORKS 3D assembly



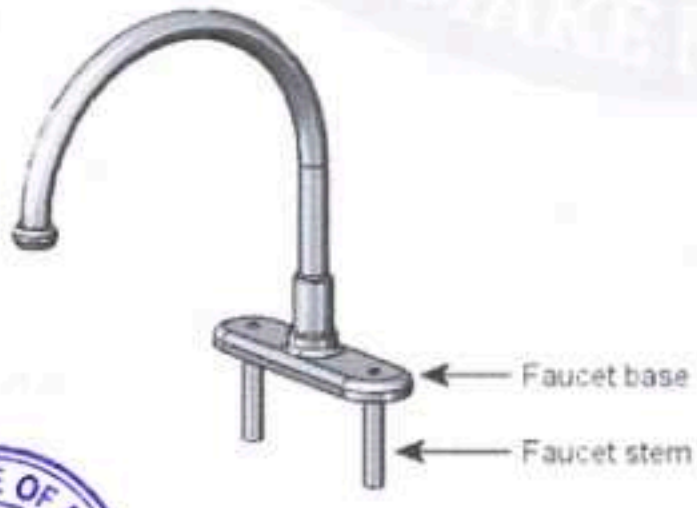
SOLIDWORKS 2D drawing generated from 3D model

Component Based

One of the most powerful features in the SOLIDWORKS application is that any change you make to a part is reflected in all associated drawings or assemblies.

This section uses the following terminology for the models:

Faucet:



Faucet handle:

Waste pipe:

Terminology

These terms appear throughout the SOLIDWORKS software and documentation.

Origin Appears as two blue arrows and represents the (0,0,0) coordinate of the model. When a sketch is active, a sketch origin appears in red and represents the (0,0,0) coordinate of the sketch. You can add dimensions and relations to a *model* origin, but not to a sketch origin.

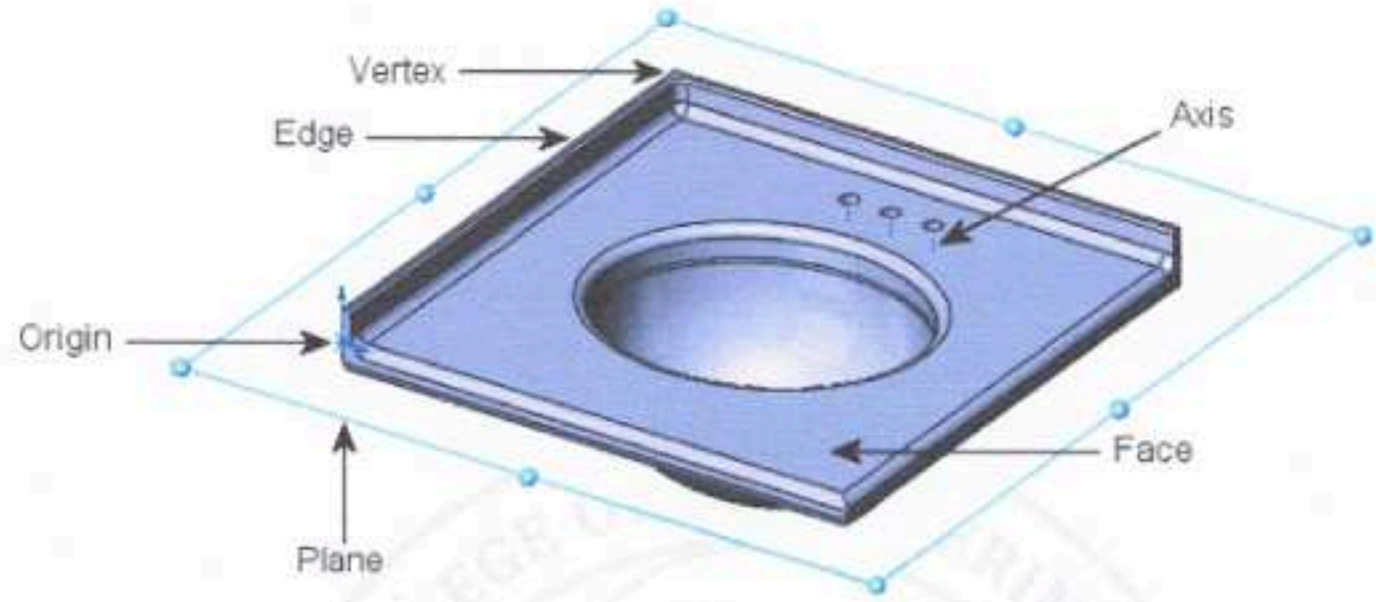
Plane Flat construction geometry. You can use planes for adding a 2D sketch, section view of a model, or a neutral plane in a draft feature, for example.

Axis Straight line used to create model geometry, features, or patterns. You can create an axis in different ways, including intersecting two planes. The SOLIDWORKS application creates temporary axes implicitly for every conical or cylindrical face in a model.

Face Boundaries that help define the shape of a model or a surface. A face is a selectable area (planar or nonplanar) of a model or surface. For example, a rectangular solid has six faces.

Edge Location where two or more faces intersect and are joined together. You can select edges for sketching and dimensioning, for example.

Vertex Point at which two or more lines or edges intersect. You can select vertices for sketching and dimensioning, for example.



User Interface

The SOLIDWORKS application includes user interface tools and capabilities to help you create and edit models efficiently, including:

Windows Functions

The SOLIDWORKS application includes familiar Windows functions, such as dragging and resizing windows. Many of the same icons, such as print, open, save, cut, and paste are also part of the SOLIDWORKS application.

SOLIDWORKS Document Windows

SOLIDWORKS document windows have two panels. The left panel, or Manager Pane, contains:

FeatureManager® design tree

Displays the structure of the part, assembly, or drawing. Select an item from the FeatureManager design tree to edit the underlying sketch, edit the feature, and suppress and unsuppress the feature or component, for example.

PropertyManager

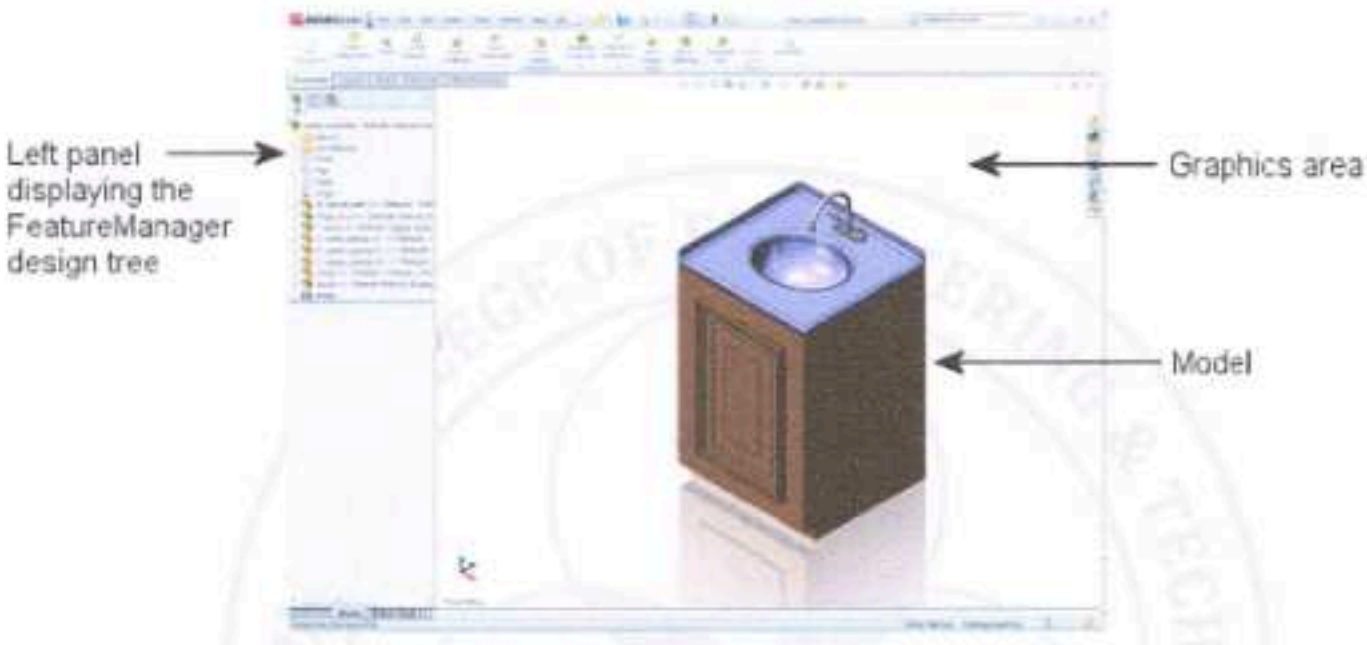
Provides settings for many functions such as sketches, fillet features, and assembly mates.

ConfigurationManager

Lets you create, select, and view multiple configurations of parts and assemblies in a document. Configurations are variations of a part or assembly within a single document. For example, you can use configurations of a bolt to specify different lengths and diameters.

You can split the left panel to display more than one tab at a time. For example, you can display the FeatureManager design tree on the top portion and the PropertyManager tab for a feature you want to implement on the bottom portion.

The right panel is the graphics area, where you create and manipulate a part, assembly, or drawing.

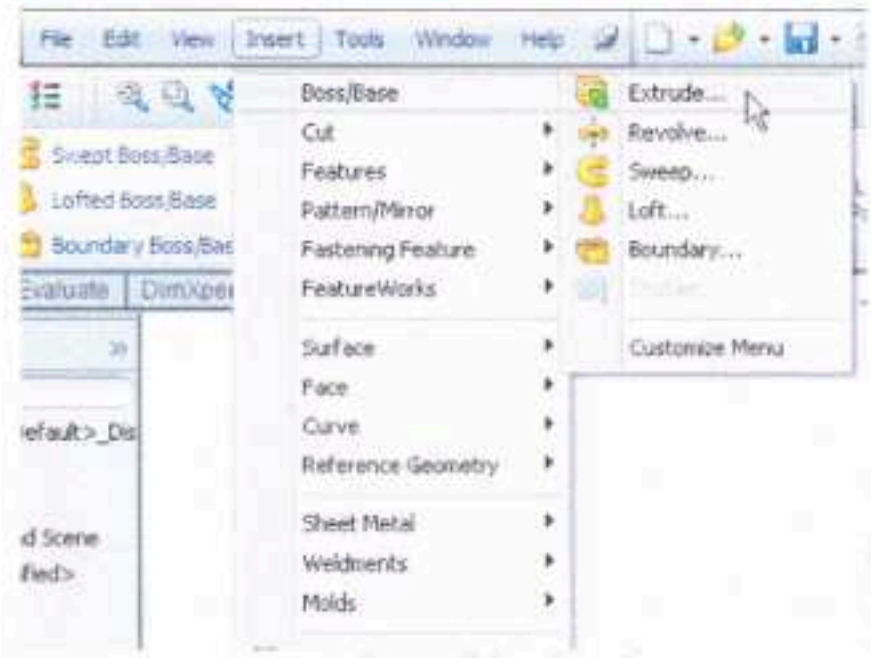


Function Selection and Feedback

The SOLIDWORKS application lets you perform tasks in different ways. It also provides feedback as you perform a task such as sketching an entity or applying a feature. Examples of feedback include pointers, inference lines, and previews.

Menus

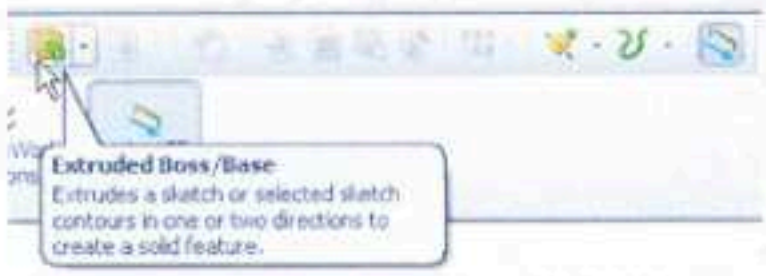
You can access all SOLIDWORKS commands using menus. SOLIDWORKS menus use Windows conventions, including submenus and checkmarks to indicate that an item is active. You can also use context-sensitive shortcut menus by clicking the right mouse button.



Toolbars

You can access SOLIDWORKS functions using toolbars. Toolbars are organized by function, for example, the Sketch or Assembly toolbar. Each toolbar comprises individual icons for specific tools, such as **Rotate View**, **Circular Pattern**, and **Circle**.

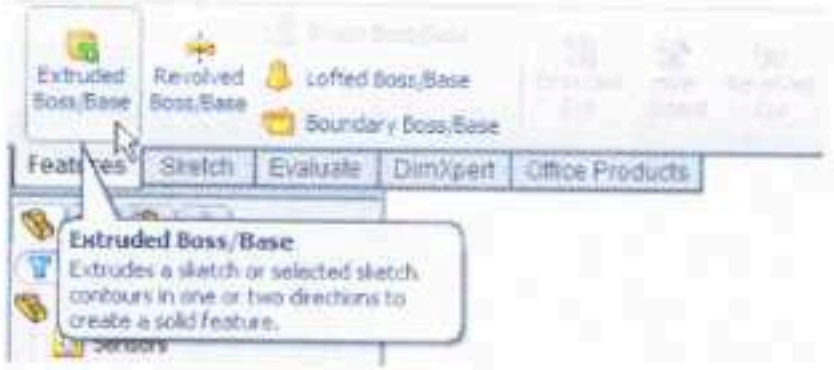
You can display or hide toolbars, dock them around the four borders of the SOLIDWORKS window, or float them anywhere on your screen. The SOLIDWORKS software remembers the state of the toolbars from session to session. You can also add or delete tools to customize the toolbars. Tooltips display when you hover over each icon.



CommandManager

The CommandManager is a context-sensitive toolbar that dynamically updates based on the active document type.

When you click a tab below the CommandManager, it updates to show the related tools. Each document type, such as part, assembly, or drawing, has different tabs defined for its tasks. The content of the tabs is customizable, similar to toolbars. For example, if you click the **Features** tab, tools related to features appear. You can also add or delete tools to customize the CommandManager. Tooltips display when you hover over each icon.

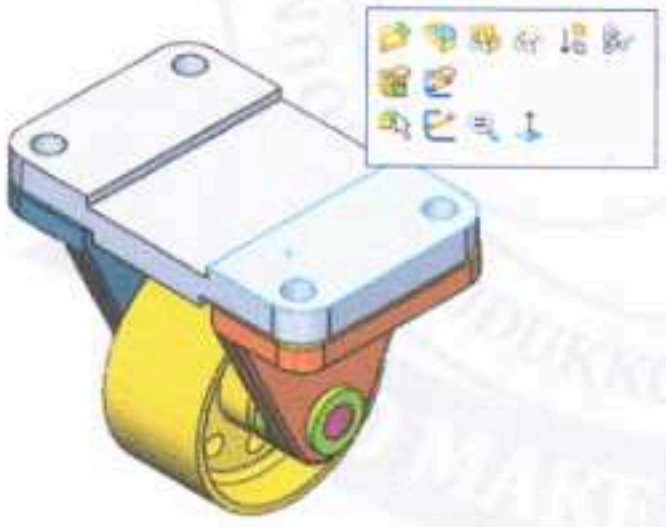


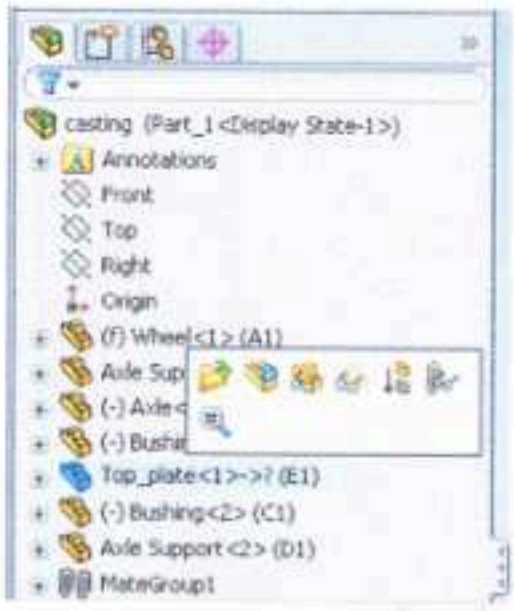
Shortcut Bars

Customizable shortcut bars let you create your own sets of commands for part, assembly, drawing, and sketch mode. To access the bars, you press a user-defined keyboard shortcut, by default, the **S** key.

Context Toolbars

Context toolbars appear when you select items in the graphics area or FeatureManager design tree. They provide access to frequently performed actions for that context. Context toolbars are available for parts, assemblies, and sketches.





Mouse Buttons

Mouse buttons operate in the following ways:

Left Selects menu items, entities in the graphics area, and objects in the FeatureManager design tree.

Right Displays the context-sensitive shortcut menus.

Middle Rotates, pans, and zooms a part or an assembly, and pans in a drawing.

Mouse gestures

You can use a mouse gesture as a shortcut to execute a command, similar to a keyboard shortcut. Once you learn command mappings, you can use mouse gestures to invoke mapped commands quickly.

To activate a mouse gesture, from the graphics area, right-drag in the gesture direction that corresponds to the command.

When you right-drag, a guide appears, showing the command mappings for the gesture directions.

Sketch guide with eight gestures

Drawings guide with eight gestures

The guide highlights the command you are about to select.

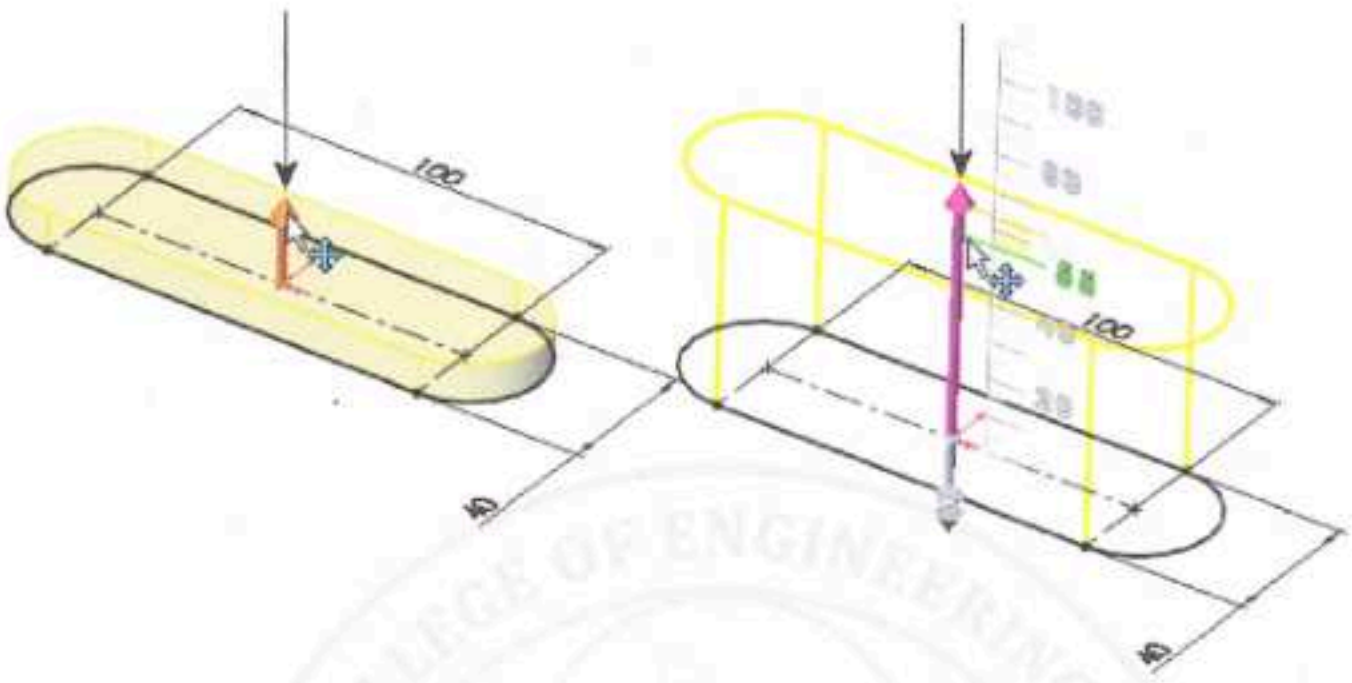
Customizing the User Interface

You can customize the toolbars, menus, keyboard shortcuts, and other elements of the user interface.

> For a lesson on customizing the SOLIDWORKS user interface, see the *Customizing SOLIDWORKS* tutorial.

Handles

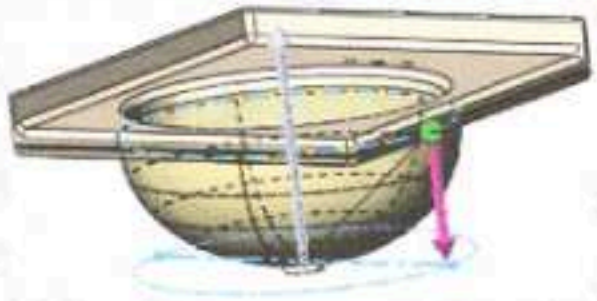
You can use the PropertyManager to set values such as the depth of an extrude. You can also use graphic handles to drag and set parameters dynamically without leaving the graphics area.



Previews

With most features, the graphics area displays a preview of the feature you want to create. Previews are displayed with features such as base or boss extrudes, cut extrudes, sweeps, lofts, patterns, and surfaces.

Loft preview



Pointer Feedback

In the SOLIDWORKS application, the pointer changes to show the type of object, for example, a vertex, an edge, or a face. In sketches, the pointer changes dynamically, providing data about the type of sketch entity and the position of the pointer relative to other sketch entities. For example:

Indicates a rectangular sketch.

Indicates the midpoint of a sketch line or edge. To select a midpoint, right-click the line or edge, then click **Select Midpoint**.

Selection Filters

Selection filters help you select a particular type of entity, thereby excluding selection of other entity types in the graphics area. For example, to select an edge in a complex part or assembly, select **Filter Edges** to exclude other entities.

Filters are not restricted to entities such as faces, surfaces, or axes. You can also use the selection filter to select specific drawing annotations, such as notes and balloons, weld symbols, and geometric tolerances.

Additionally, you can select multiple entities using selection filters. For example, to apply a fillet, a feature that rounds off edges, you can select a loop composed of multiple adjacent edges.

For more information on using filters, see *Selection Filter* in the Help.

Select Other

Use the **Select other** tool to select entities that are visually obscured by other entities. The tool hides the obscuring entities or lets you select from a list of obscured entities.

Design Process

The design process usually involves the following steps:

- Identify the model requirements.
- Conceptualize the model based on the identified needs.
- Develop the model based on the concepts.
- Analyze the model.
- Prototype the model.
- Construct the model.
- Edit the model, if needed.

Design Intent

Design intent determines how you want your model to react as a result of the changes you need to make to the model.

For example, if you make a boss with a hole in it, the hole should move when the boss moves:

Original part

Design intent maintained when boss moves

Design intent not maintained when boss moves

Design intent is primarily about planning. How you create the model determines how changes affect it. The closer your design implementation is to your design intent, the greater the integrity of the model.

Various factors contribute to the design process, including:

Current needs	Understand the purpose of the model to design it efficiently.
Future considerations	Anticipate potential requirements to minimize redesign efforts.

Design Method

Before you actually design the model, it is helpful to plan out a method of how to create the model.

After you identify needs and isolate the appropriate concepts, you can develop the model:

Sketches	Create the sketches and decide how to dimension and where to apply relations.
Features	Select the appropriate features, such as extrudes and fillets, determine the best features to apply, and decide in what order to apply those features.
Assemblies	Select the components to mate and the types of mates to apply.

A model almost always includes one or more sketches and one or more features. Not all models, however, include assemblies.

Sketches

The sketch is the basis for most 3D models.

Creating a model usually begins with a sketch. From the sketch, you can create features. You can combine one or more features to make a part. Then, you can combine and mate the appropriate parts to create an assembly. From the parts or assemblies, you can then create drawings.

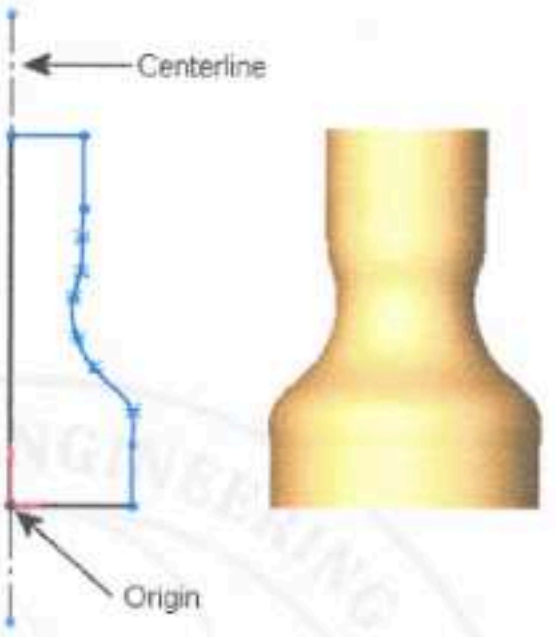
A sketch is a 2D profile or cross section. To create a 2D sketch, you use a plane or a planar face. In addition to 2D sketches, you can also create 3D sketches that include a Z axis, as well as the X and Y axes.

There are various ways of creating a sketch. All sketches include the following elements:

Origin

In many instances, you start the sketch at the origin, which provides an anchor for the sketch.

The sketch on the right also includes a centerline. The centerline is sketched through the origin and is used to create the revolve.

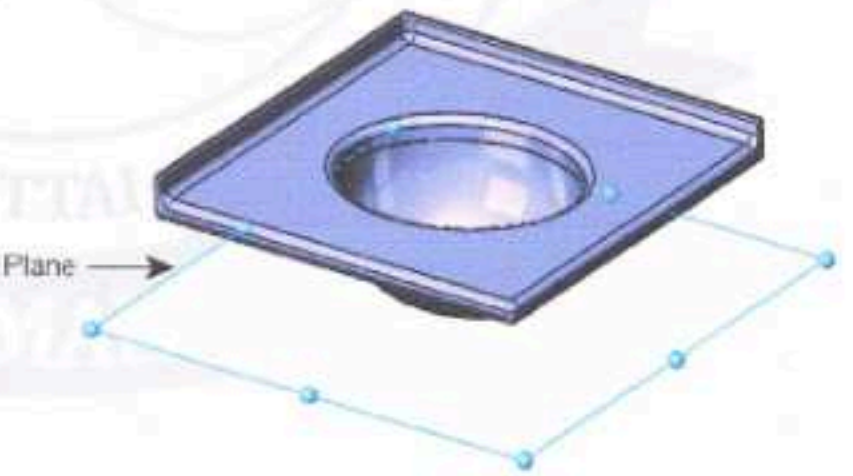


Although a centerline is not always needed in a sketch, a centerline helps to establish symmetry. You can also use a centerline to apply a mirror relation and to establish equal and symmetrical relations between sketch entities. Symmetry is an important tool to help create your axis-symmetric models quicker.

Planes

You can create planes in part or assembly documents. You can sketch on planes with sketch tools such as the **Line** or **Rectangle** tool and create a section view of a model. On some models, the plane you sketch on affects only the way the model appears in a standard isometric view (3D). It does not affect the design intent. With other models, selecting the correct initial plane on which to sketch helps you create a more efficient model.

Choose a plane on which to sketch. The standard planes are front, top, and right orientations. You can also add and position planes as needed. This example uses the top plane.



For more information on planes, see *Where to Start a Sketch* in the Help.

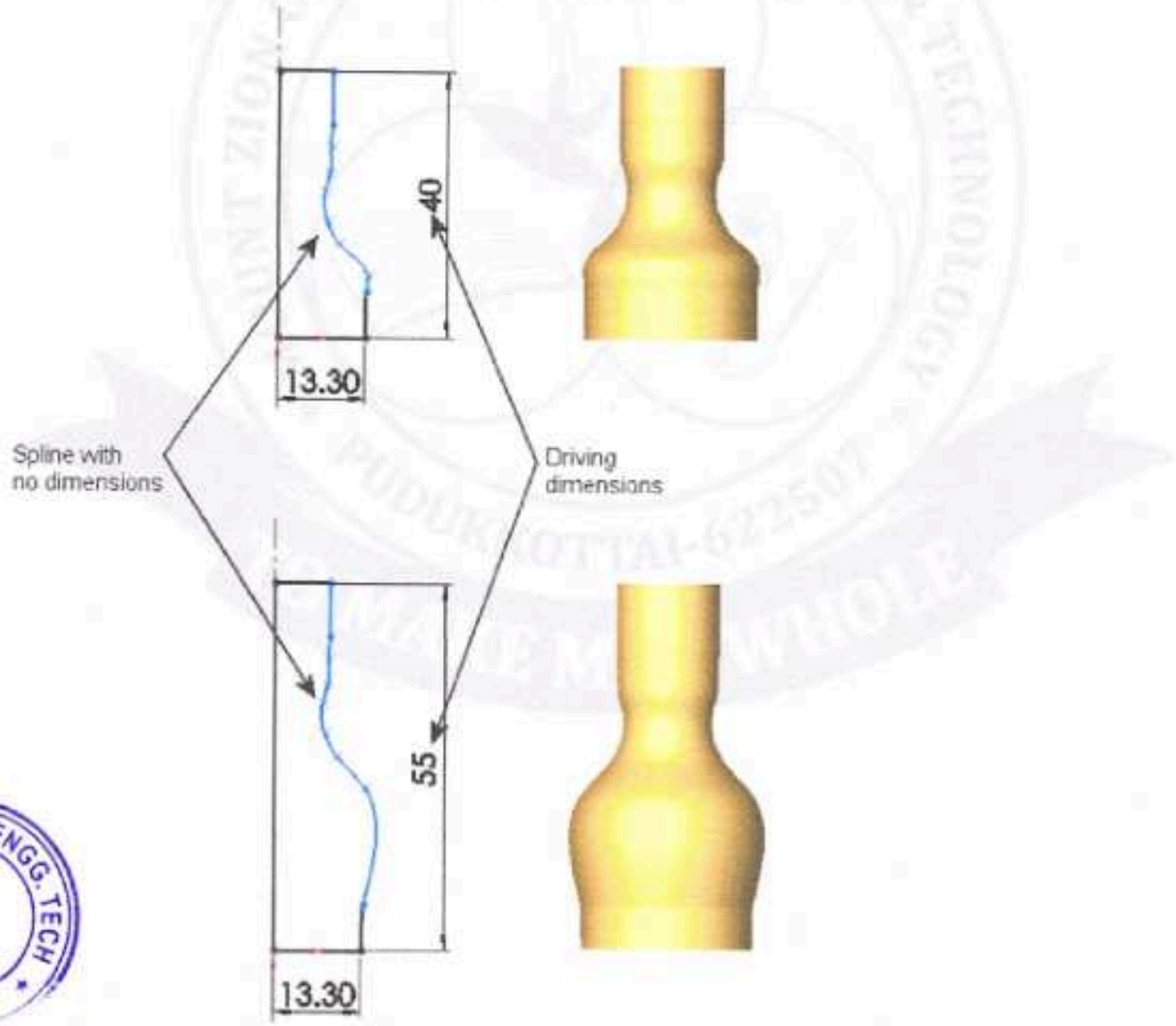
Dimensions

You can specify dimensions between entities such as lengths and radii. When you change dimensions, the size and shape of the part changes. Depending on how you dimension the part, you can preserve the design intent. See **Design Intent** on page 23.

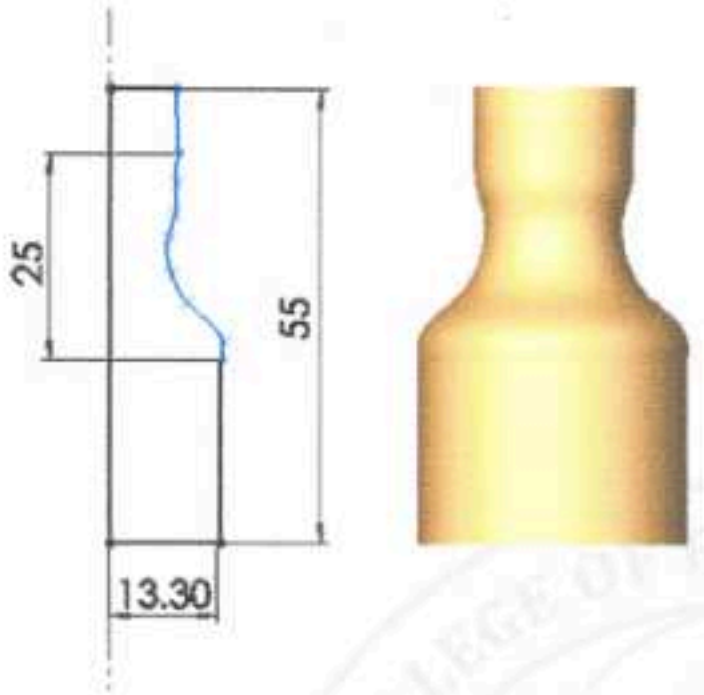
The software uses two types of dimensions: driving dimensions and driven dimensions.

Driving Dimensions

You create driving dimensions with the **Dimension** tool. Driving dimensions change the size of the model when you change their values. For example, in the faucet handle, you can change the height of the faucet handle from 40mm to 55mm. Note how the shape of the revolved part changes because the spline is *not* dimensioned.



To maintain a uniform shape generated by the spline, you need to dimension the spline.



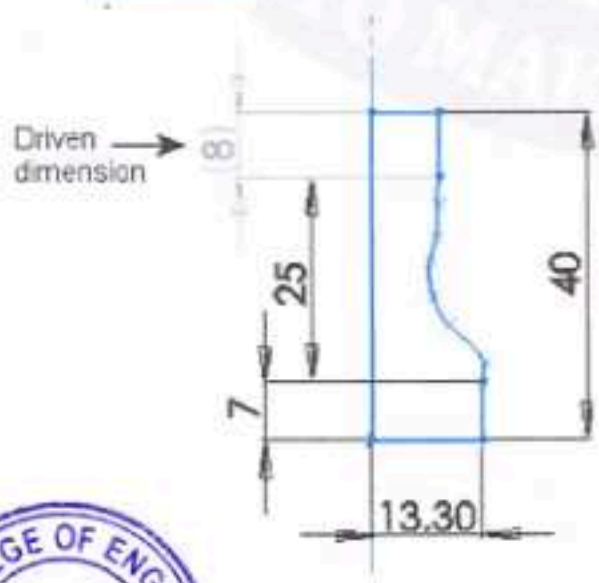
Driven Dimensions

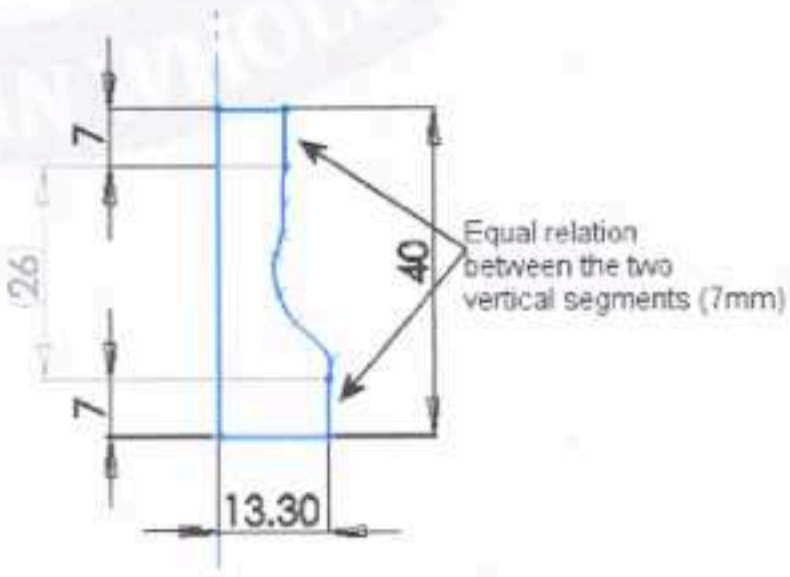
Some dimensions associated with the model are driven. You can create driven, or reference dimensions, for informational purposes using the **Dimension** tool. The value of driven dimensions changes when you modify driving dimensions or relations in the model. You cannot modify the values of driven dimensions directly unless you convert them to driving dimensions.

In the faucet handle, if you dimension the total height as 40mm, the vertical section below the spline as 7mm, and the spline segment as 25mm, the vertical segment above the spline is calculated as 8mm (as shown by the driven dimension).

You control design intent by where you place the driving dimensions and relations. For example, if you dimension the total height as 40mm and create an equal relation between the top and bottom vertical segments, the top segment becomes 7mm. The 25mm vertical dimension conflicts with the other dimensions and relations (because 40-7-7=26, not 25). Changing the 25mm dimension to a driven dimension removes the conflict and shows that the spline length must be 26mm.

See **Relations** on page 29 for more information.



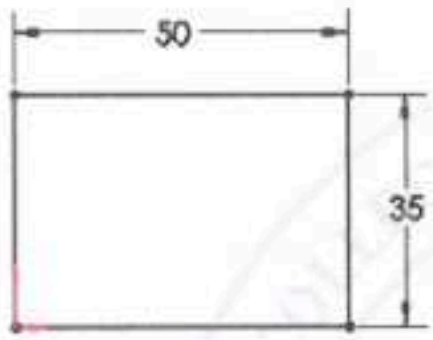


Sketch Definitions

Sketches can be fully defined, under defined, or over defined.

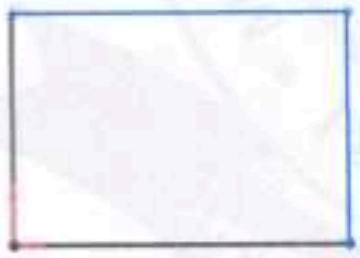
In fully defined sketches, all the lines and curves in the sketch, and their positions, are described by dimensions or relations, or both. You do not have to fully define sketches before you use them to create features. However, you should fully define sketches to maintain your design intent.

Fully defined sketches appear in black.



Fully defined

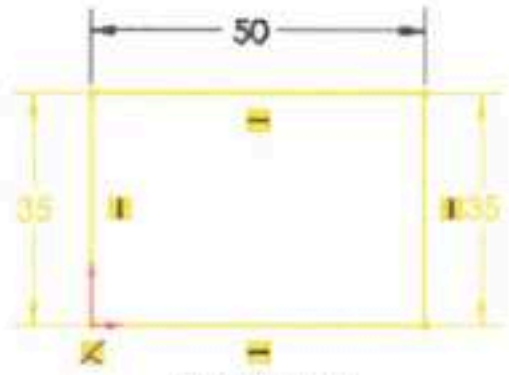
By displaying the entities of the sketch that are under defined, you can determine what dimensions or relations you need to add to fully define the sketch. You can use the color cues to determine if a sketch is under defined. Under defined sketches appear in blue. In addition to color cues, entities in under defined sketches are not fixed within the sketch, so you can drag them.



Under defined

Over defined sketches include redundant dimensions or relations that are in conflict. You can delete over defined dimensions or relations, but you cannot edit them.

Over defined sketches appear in yellow. This sketch is over defined because both vertical lines of the rectangle are dimensioned. By definition, a rectangle has two sets of equal sides. Therefore, only one 35mm dimension is necessary.

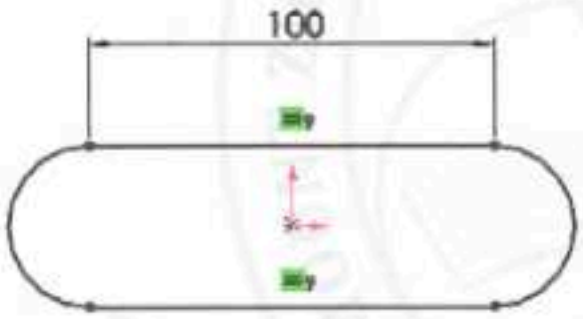


Over defined

Relations

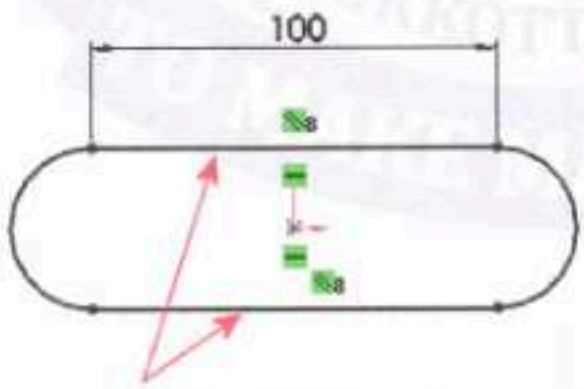
Relations establish geometric relationships such as equality and tangency between sketch entities. For example, you can establish equality between the two horizontal 100mm entities below. You can dimension each horizontal entity individually, but by establishing an equal relation between the two horizontal entities, you need to update only one dimension if the length changes.

The green ■ symbols indicate that there is an equal relation between the horizontal lines:



Relations are saved with the sketch. You can apply relations in the following ways:

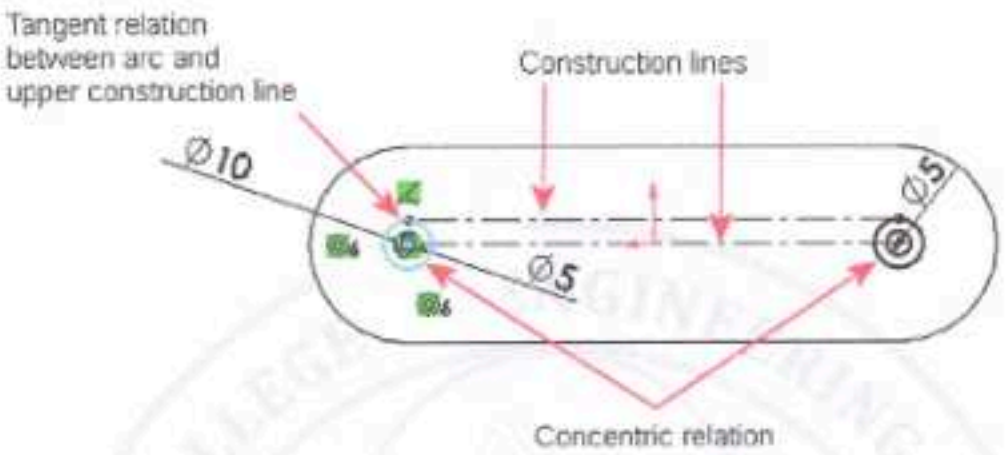
Inference Some relations are created by inference. For example, as you sketch the two horizontal entities to create the base extrude for the faucet base, horizontal and parallel relations are created by inference.



This example shows the concept of relations. The SOLIDWORKS application has a sketch slot tool to make this shape easily, as well as other types of slots.

Add Relations You can also use the **Add Relations** tool. For example, to create the faucet stems, you sketch a pair of arcs for each stem.

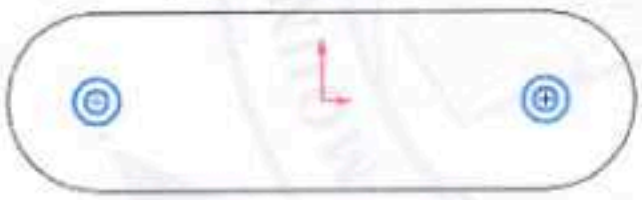
To position the stems, you add a tangent relation between the outer arcs and the top construction line horizontal (displayed as a broken line). For each stem, you also add a concentric relation between the inner and outer arcs.



Sketch Complexity

A simple sketch is easy to create and update, and it rebuilds quicker.

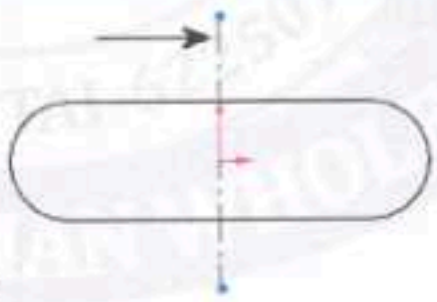
One way to simplify sketching is to apply relations as you sketch. You can also take advantage of repetition and symmetry. For example, the faucet stems on the faucet base include repeated sketched circles:



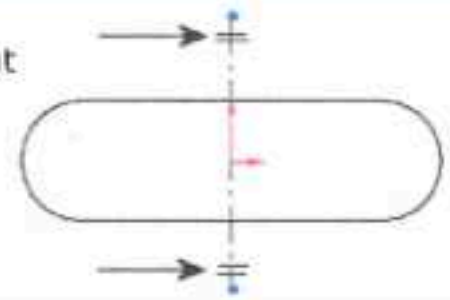
Here is one way you can create this sketch:

First, sketch a centerline through the origin. Centerlines help to create symmetrical sketch entities.

This centerline is considered construction geometry, which is different from actual geometry that is used in creating a part. Construction geometry is used only to assist in creating the sketch entities and geometry that are ultimately incorporated into the part.

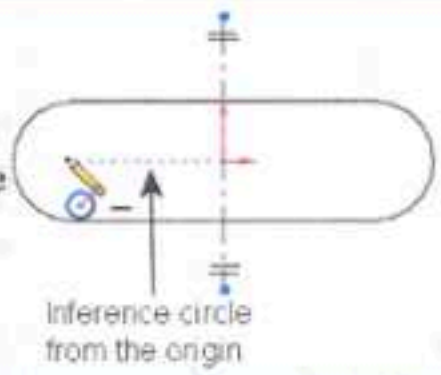


Second, use the **Dynamic Mirror** tool to designate the centerline as the entity about which to mirror the sketched circles.

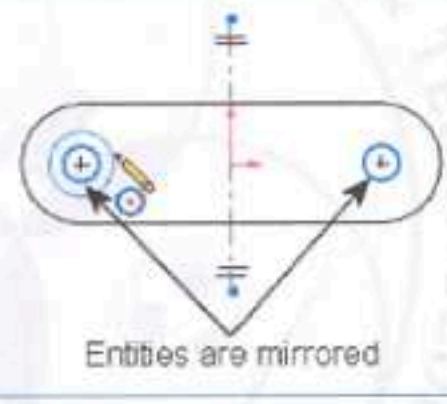


Next, sketch a circle by inferencing the sketch origin.

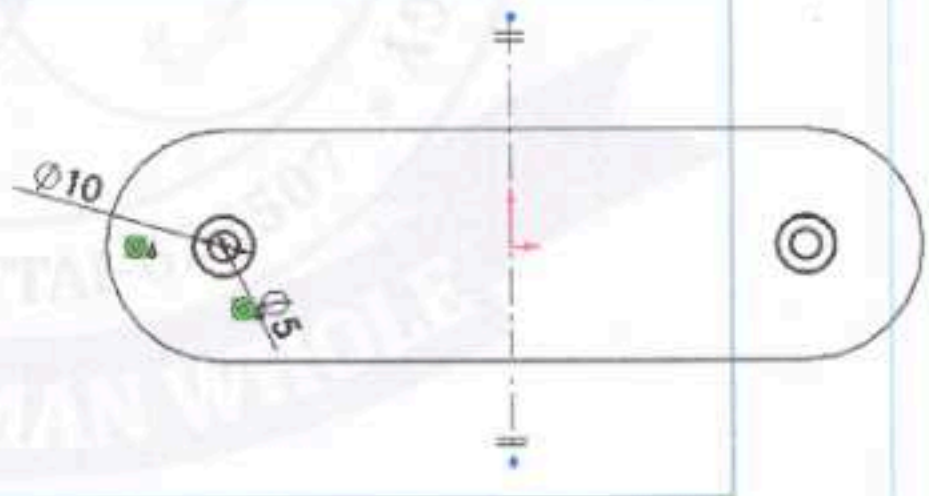
When you use dynamic mirroring with the centerline, anything you sketch on one side is mirrored on the other side of the centerline.



You create the circles on the left and they are mirrored to the right of the centerline.



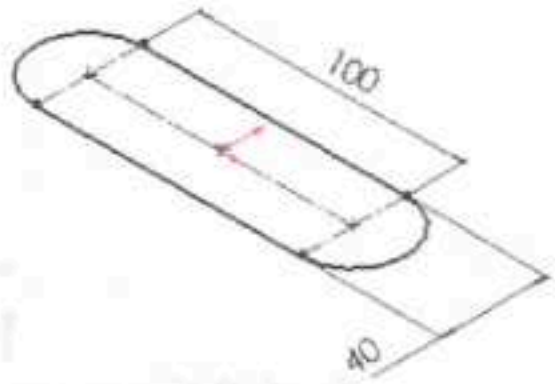
Finally, dimension and add a concentric relation between one of the circles and the outer arc of the base, and then use symmetry for the other.



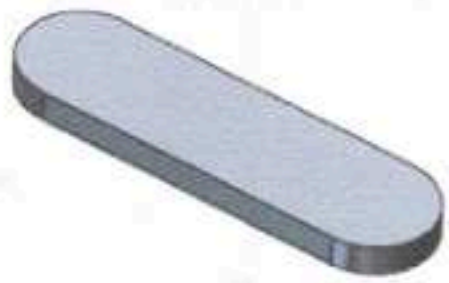
Features

Once you complete the sketch, you can create a 3D model using features such as an extrude (the base of the faucet) or a revolve (the faucet handle).

Create the sketch



Dimension the sketch



Extrude the sketch 10mm

Some sketch-based features are shapes such as bosses, cuts, and holes. Other sketch-based features such as lofts and sweeps use a profile along a path.

Another type of feature is called an applied feature, which does not require a sketch. Applied features include fillets, chamfers, or shells. They are called "applied" because they are applied to existing geometry using dimensions and other characteristics to create the feature.

Typically, you create parts by including sketch-based features such as bosses and holes. Then you add applied features.

> It is possible to create a part without sketch-based features. For example, you can import a body or use a derived sketch. The exercises in this document show sketch-based features.

Sketch-based features: Base sweep for the waste pipe

Applied feature: Fillets for rounding off edges

Several factors influence how you choose which features to use. For example, you can select between different features such as sweeps or lofts to achieve the same results and you can add features to a model in a specific order. For more information on features, see **Parts** on page 37.

Assemblies

You can combine multiple parts that fit together to create assemblies.

You integrate the parts in an assembly using **Mates**, such as **Concentric** and **Coincident**. Mates define the allowable direction of movement of the components. In the faucet assembly, the faucet base and handles have concentric and coincident mates.

With tools such as **Move Component** or **Rotate Component**, you can see how the parts in an assembly function in a 3D context.

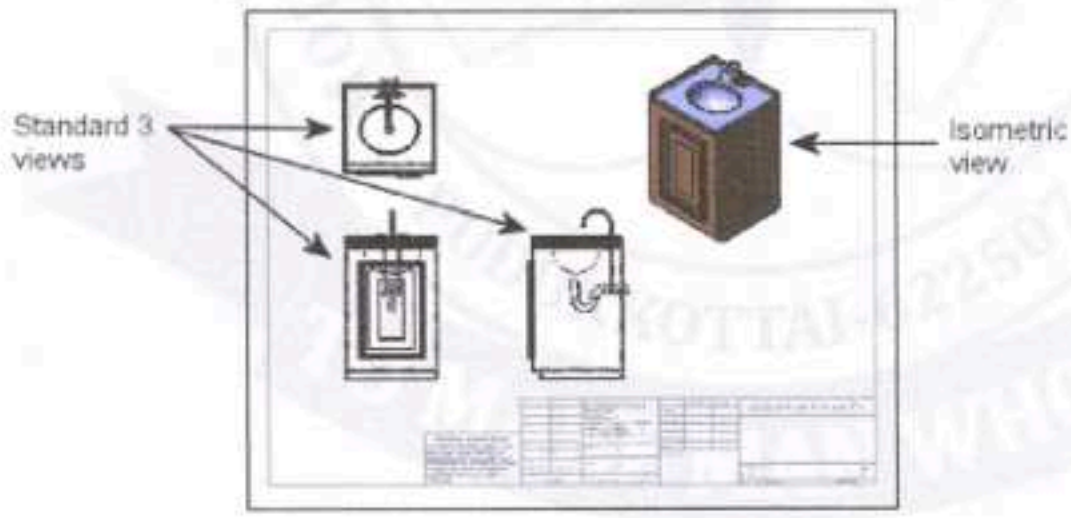
To ensure that the assembly functions correctly, you can use assembly tools such as **Collision Detection**. **Collision Detection** lets you find collisions with other components when moving or rotating a component.

Faucet assembly with **Collision Detection, Stop at collision** option enabled

Drawings

You create drawings from part or assembly models.

Drawings are available in multiple views such as standard 3 views and isometric views (3D). You can import the dimensions from the model document and add annotations such as datum target symbols.



Model Editing

Use the SOLIDWORKS FeatureManager design tree and the PropertyManager to edit sketches, drawings, parts, or assemblies. You can also edit features and sketches by selecting them directly from the graphics area. This visual approach eliminates the need to know the name of the feature.

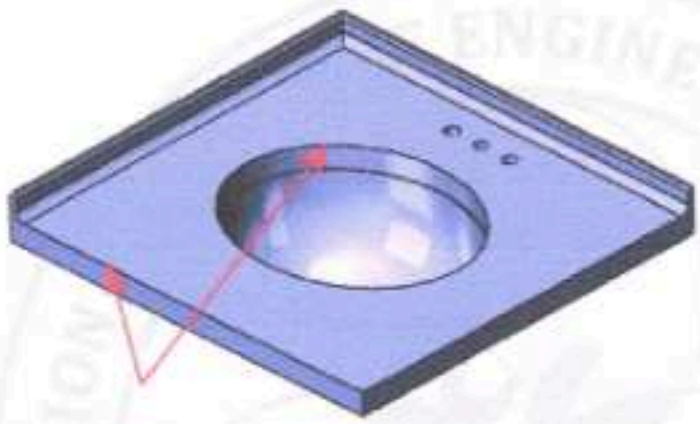
Editing capabilities include:

Edit sketch

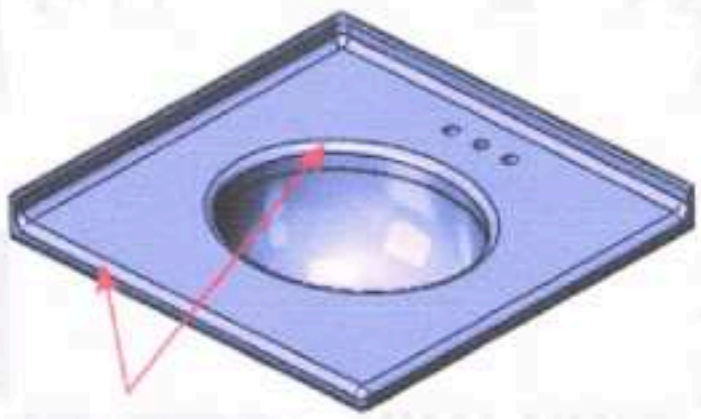
You can select a sketch in the FeatureManager design tree and edit it. For example, you can edit sketch entities, change dimensions, view or delete existing relations, add new relations between sketch entities, or change the size of dimension displays. You can also select the feature to edit directly from the graphics area.

Edit feature

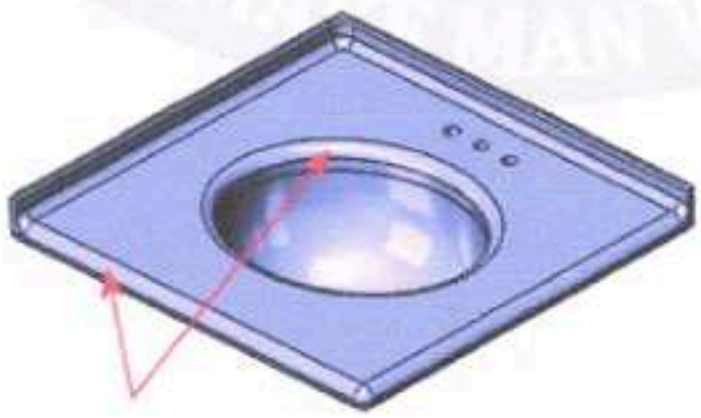
Once you create a feature, you can change most of its values. Use **Edit Feature** to display the appropriate PropertyManager. For example, if you apply a **Constant radius** fillet to an edge, you display the Fillet PropertyManager where you can change the radius. You can also edit dimensions by double-clicking the feature or sketch in the graphics area to show the dimensions and then change them in place.



No fillet feature



Fillet feature: 12mm applied

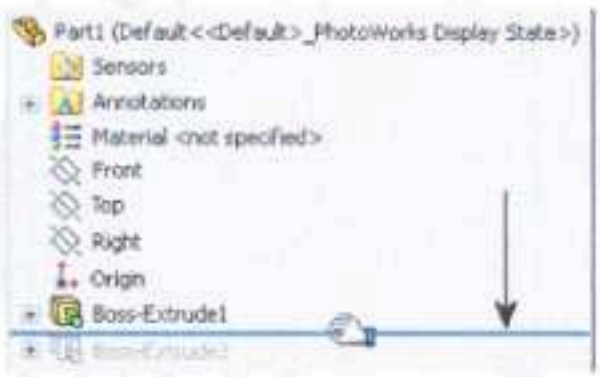


Fillet feature: 18mm applied

Hide and show With certain geometry such as multiple surface bodies in a single model, you can hide or show one or more surface bodies. You can hide and show sketches, planes, and axes in all documents, and views, lines, and components in drawings.

Suppress and unsuppress You can select any feature from the FeatureManager design tree and suppress the feature to view the model without that feature. When a feature is suppressed, it is temporarily removed from the model (but not deleted). The feature disappears from the model view. You can then unsuppress the feature to display the model in its original state. You can suppress and unsuppress components in assemblies as well (see **Assembly Design Methods** on page 55).

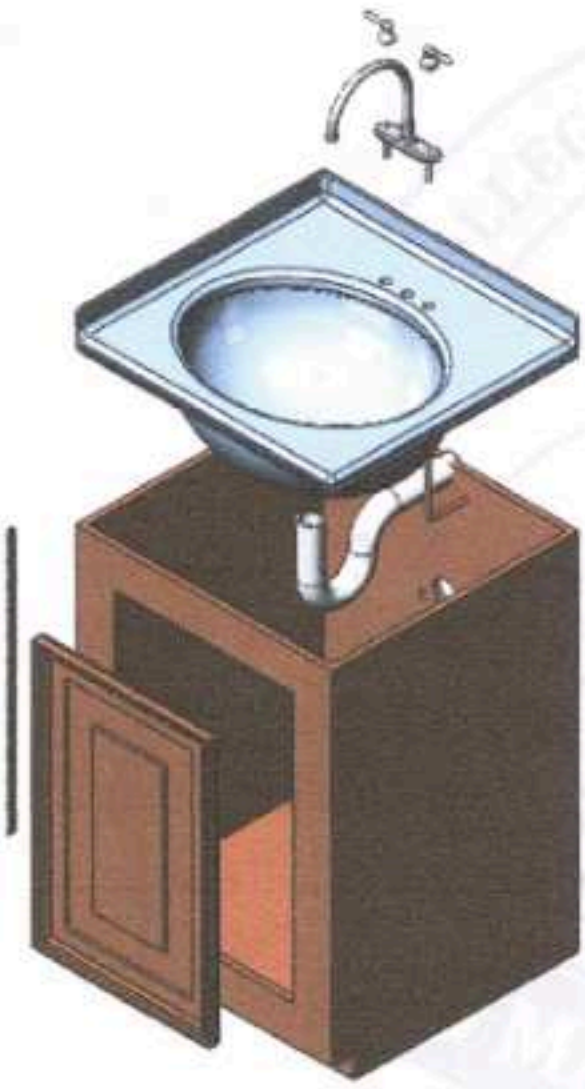
Rollback When you are working on a model with multiple features, you can roll the FeatureManager design tree back to a prior state. Moving the rollback bar displays all features in the model up to the rollback state, until you revert the FeatureManager design tree back to its original state. Rollback is useful for inserting features before other features, speeding up time to rebuild a model while editing it, or learning how a model was built.



2

Parts

Parts are the building blocks of every SOLIDWORKS model. Each assembly and drawing you create is made from parts.



This chapter includes the following topics:

- **Overview**
- **Countertop**
- **Faucet**
- **Faucet Handle**
- **Cabinet Door**
- **Moldings**
- **Hinge**

Overview

In this section, you learn about common tools for making parts in the SOLIDWORKS software. These tools are used for many parts, so they are discussed in detail only the first time they appear.

Each section begins with the design approach for each part, including a high-level overview of the tools that create the part. The overview provides an outline of the features, so you can skim those that you already understand.

> The cabinet, waste pipe, and supply pipes used in the vanity are not discussed in this section because they repeat the tools already presented. You will see these parts in later sections.

Countertop

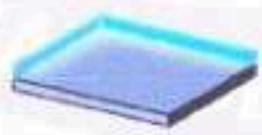
The countertop is a single part that includes a sink and counter. First you create the counter, then you make the sink.

This countertop uses several common SOLIDWORKS tools, including extrudes, a sweep, a shell, and fillets.

Design Approach

1. Extrude

2. Extrude



3. Cut-Extrude

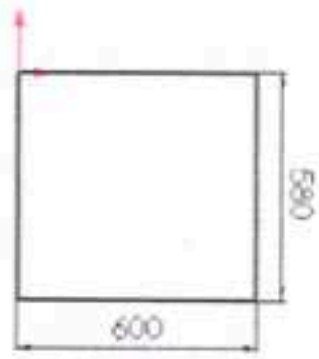
4. Loft

5. Shell

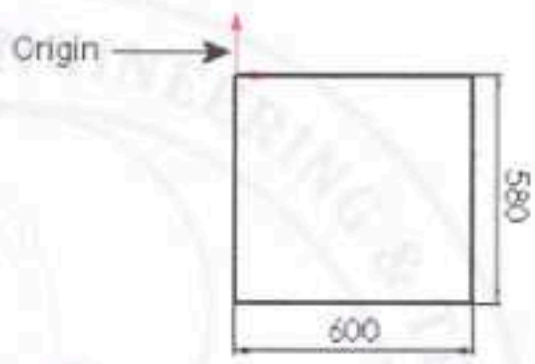
6. Fillet

Create the Base Feature with an Extrude

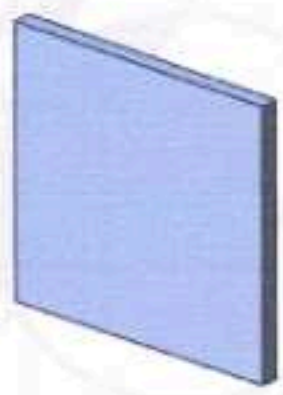
Before you create an extrude feature, you need to make a sketch. For example, this rectangular sketch is dimensioned at 600mm x 580mm.



The sketch begins at the origin, the (0,0) coordinate of a 2D sketch. The origin is a helpful reference point for sketches. If you begin a sketch at the origin, the sketch position is set. When you add dimensions and relations to the sketch, it becomes fully defined.



After you sketch the rectangle, use the **Extrude** tool to create a 3D base feature. The sketch is extruded 34mm normal to the sketch plane. This model is displayed in an isometric view so you can see the model structure.



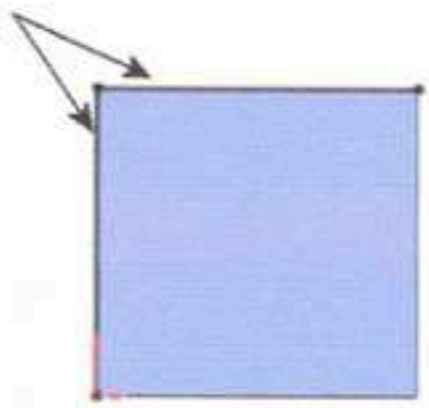
To design a 3D model, first make the 2D sketch, then create the 3D feature.

Add an Extrude to the Base

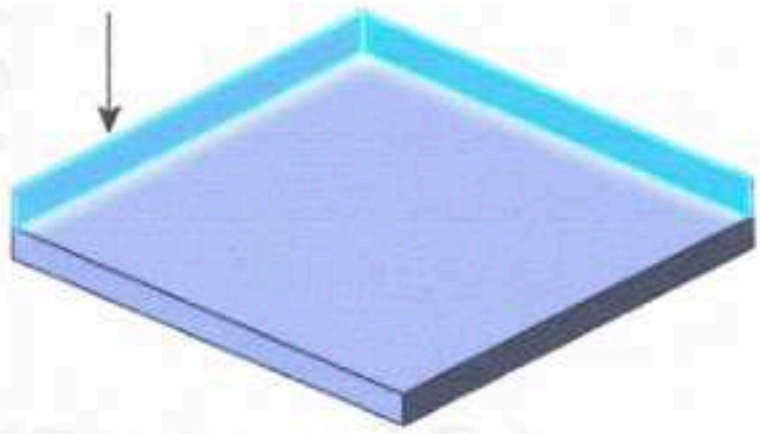
The second extrude adds material to a part by building upon the base. In this example, you extrude two of the countertop edges.

First, you create the sketch for the extrude with the **Convert Entities** tool.

The **Convert Entities** tool lets you create a sketch by projecting a set of edges onto the sketch plane. In this example, the left and upper edges are projected.



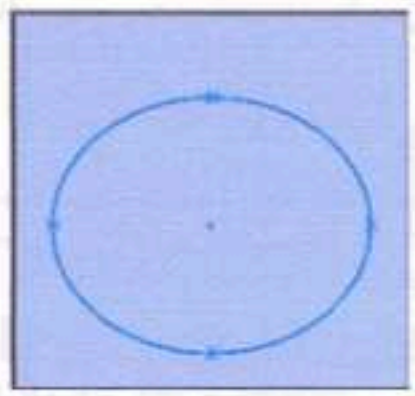
Next, you use the **Extrude** tool to create the countertop edges.



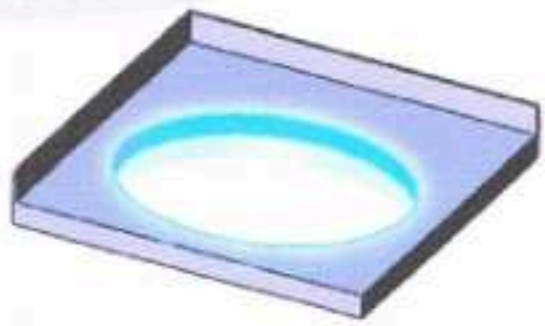
Remove Material with the Cut-Extrude

The **Cut-Extrude** tool is similar to an extrude feature, except that it removes material from the model instead of adding material.

First you create a 2D sketch, then you make the cut-extrude. In this example, you use the **Ellipse** tool to make an oblong sketch.



When the cut-extrude is complete, the countertop has an opening for the sink.



For a lesson that includes extrude features, see the *Lesson 1 - Parts* tutorial.

Use a Loft to Make a Solid

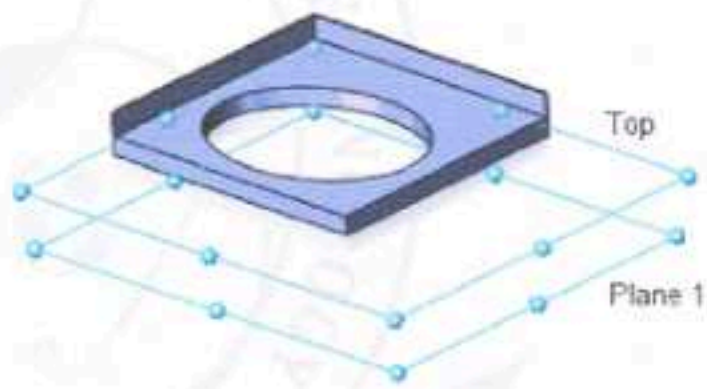
After you make the cut-extrude feature, you create the sink with the **Loft** tool. A loft creates a feature by making transitions between two or more sketch profiles.

When you create a loft, the sketch profiles must reside on different planes (or planar faces).

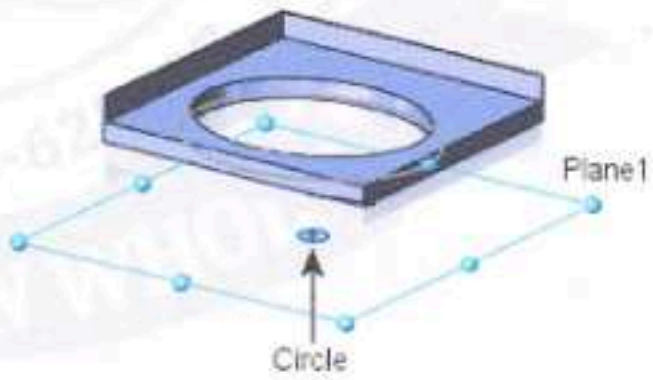
In this example, the loft creates the sink by connecting an elliptical sketch and a circular sketch.

First, create a sketched ellipse on the bottom of the countertop with the **Convert Entities** tool. This tool creates a sketch by projecting the existing ellipse from the **Cut-Extrude** onto the bottom of the countertop.

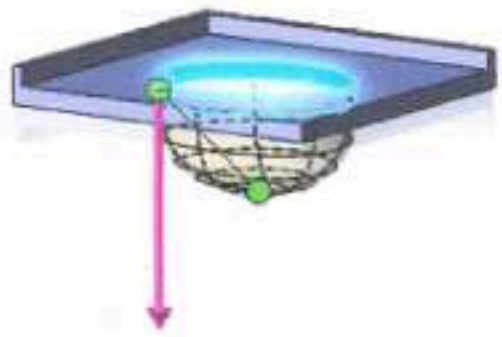
Second, create a new plane, **Plane1**, by offsetting it from the **Top** plane. **Plane1** is parallel to the **Top** plane.



Next, use the **Circle** tool to sketch a circle on **Plane1**.



Now that you have two sketch profiles, use the **Loft** tool to connect them. The SOLIDWORKS software uses a shaded preview to illustrate what the model will look like before you accept the feature.



For a lesson on lofts, see the *Lofts* tutorial.

Shell the Part

Because the loft creates a solid feature, you need to cut out material to make the sink. The **Shell** tool hollows out the sink and removes the top face. When you shell a part in SOLIDWORKS, selected faces are removed and thin faces remain on the rest of the part.

For a lesson that includes shells, see the *Lesson 1 - Parts* tutorial.

Round Sharp Edges with Fillets

To complete the countertop, you round off sharp edges by adding fillet features to the model. When you create a fillet, you set the radius to determine the smoothness of the edges.

It is best to save cosmetic fillets for the last step, after all of the geometry is in place. Models rebuild faster when fillets are made at the end of the design process.

Fillets are applied features, not sketch features. This means that fillets do not require you to create a sketch. Instead, you select the edges of an existing feature, set the fillet radius, and create the fillet. As you increase the radius, the edges or faces become rounder.

For a lesson on fillets, see the *Fillets* tutorial.

Faucet

Most parts have extrude and fillet features. The faucet uses these tools, in addition to a sweep. In the following example, a sweep creates the faucet spigot.

Design Approach

1. Extrude

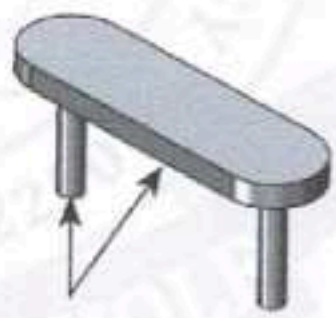
2. Extrude

3. Sweep

4. Additional Extrudes and Fillets

Create the Sweep

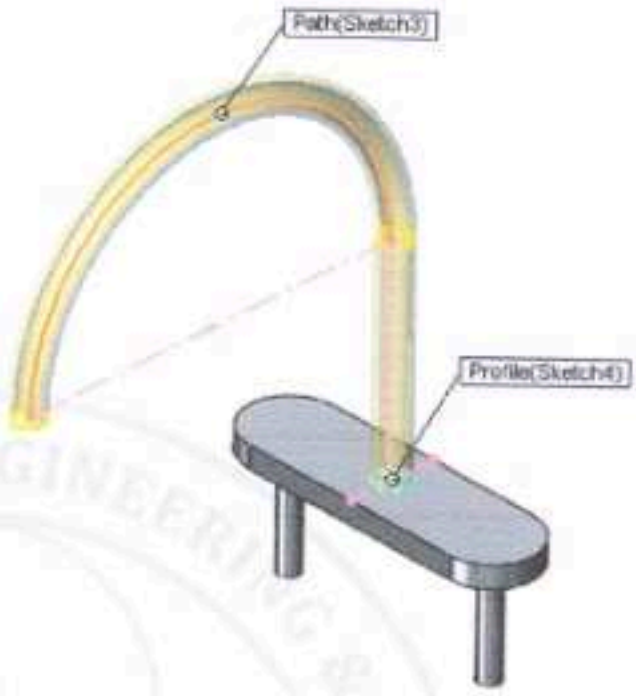
The faucet base is made from two extrude features. After you create the two extrudes, the model appears as shown.



Use the **Sweep** tool to make the spigot by projecting a profile along a path. In this example, the *profile* is a circular sketch, and the *path* is a sketched arc and a tangent vertical line. The circular profile remains the same shape and diameter for the entire sweep.

> When you sketch the profile and path, make sure the starting point of the path lies on the same plane as the profile.

Sweep preview:



After you create some additional extrudes and fillets as shown, the faucet is complete.

Faucet Handle

The faucet handle is built with two revolve features. The model uses a simple design approach, although the revolves require detailed sketches. The **Revolve** tool revolves a sketch profile around a centerline at a specified angle. In the following examples, the revolve angles are set to 360°.

Design Approach

1. Revolve

2. Revolve

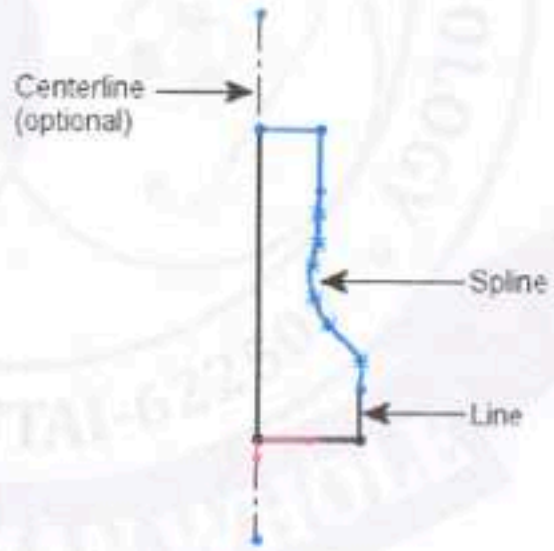
3. Fillets

Revolve the Sketch

Create the First Revolve

A revolve creates the base of the handle, and completes the first feature in the faucet handle.

First, you create a sketch with the **Line** and **Spline** tools. In some cases, you can add an axis of revolution with the **Centerline** tool. A centerline creates an axis that is construction geometry; it is not built into the feature.

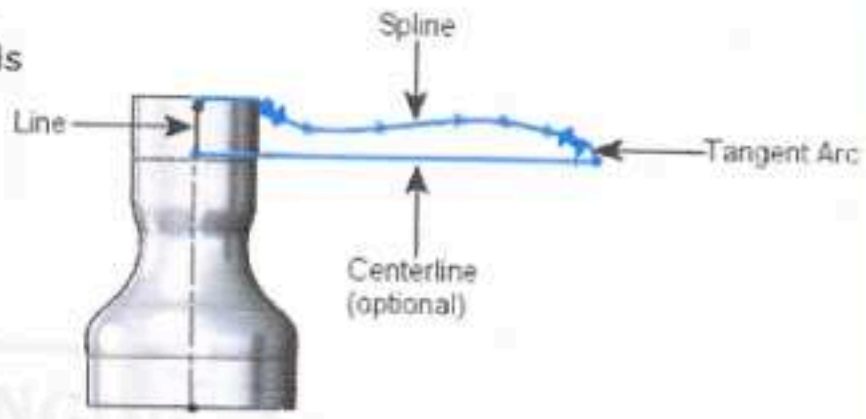


You then use the **Revolve** tool to rotate the sketch and create a solid feature.

Create the Second Revolve

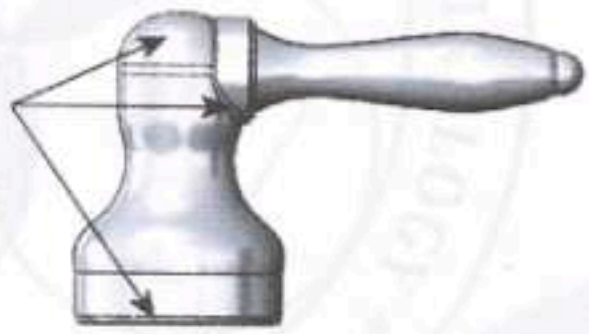
You create a second revolve feature to add the faucet handle.

Again, you begin with a sketch, as shown, then create a 3D solid with the revolve. This sketch uses the **Line**, **Tangent Arc**, and **Spline** tools.



The **Revolve** tool revolves the sketch to generate a solid.

After you add cosmetic fillets, the faucet handle is complete.



For a lesson on revolves, see the *Revolves and Sweeps* tutorial.

Cabinet Door

The cabinet door uses an extrude and a cut-extrude to make the exterior detail.

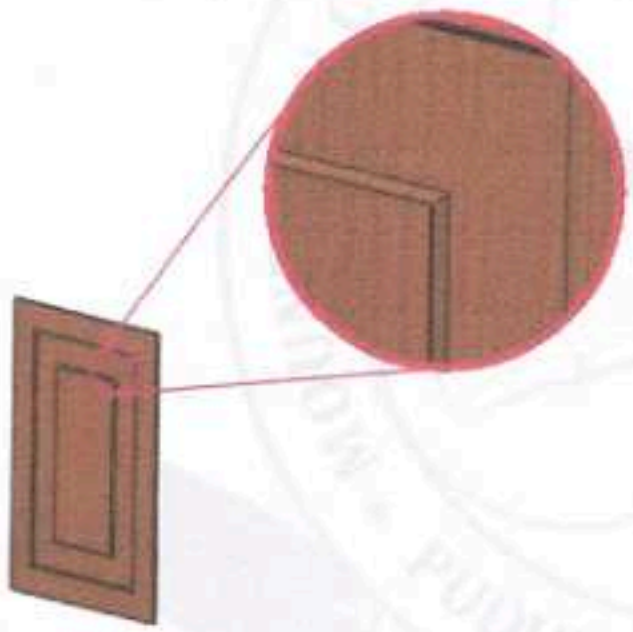
Design Approach

1. Extrude **2. Cut-Extrude** **3. Chamfer**

Create Beveled Edges with the Chamfer Tool

The **Chamfer** tool creates beveled faces. A chamfer, like a fillet, is an applied feature, and does not require you to make a sketch to create the feature.

In this example, the face with the extruded cut has chamfered edges.



For more information on chamfers, see *Chamfer Feature* in the Help.

Moldings

The moldings around the edges of the door use an extruded sketch, an extruded cut, and a mirror feature. Only one part file is created, although there are four pieces of molding on the door. With configurations, you create the different molding lengths within one part.

Design Approach

1. Extrude

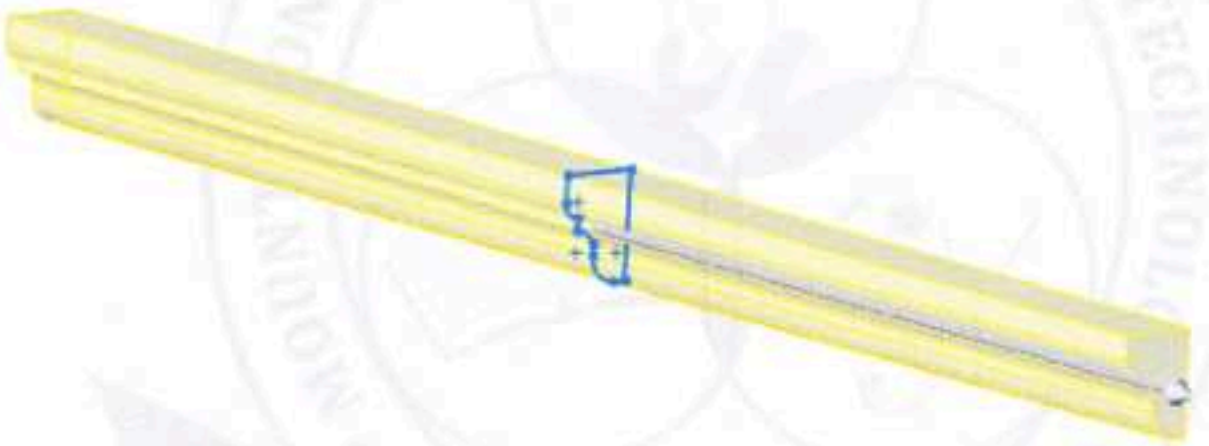
2. Cut-Extrude

3. Mirror

4. Configurations

Design a Mid-Plane Extrude

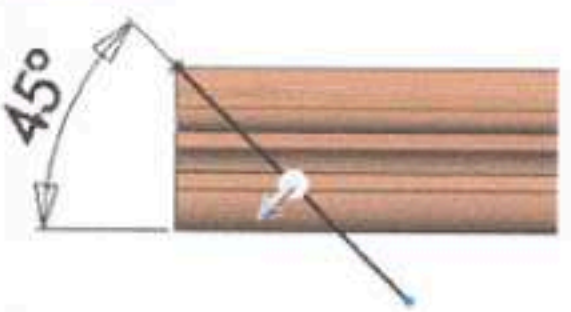
The molding sketch uses a mid-plane extrusion. Instead of extruding the sketch in one direction, you extrude the sketch equally in both directions perpendicular to the sketch plane.



Although you do not have to use a mid-plane extrusion, it ensures that you have equal lengths of material on both sides of the sketch.

Sketch a Profile for the Cut-Extrude

Next, you cut the molding at a 45° angle. The 45° cut ensures that the molding pieces fit together accurately.



When you sketch a profile to cut, make the sketch larger than the model so that you make a clean cut through the entire molding.

Mirror the Cut

Finally, to cut the model at the same angle on the opposite side, use the **Mirror** tool to mirror the original cut about the plane of symmetry.

Use Configurations of a Part

Configurations create multiple variations of a part within a single part file.

When you design a part, the SOLIDWORKS software automatically creates the **Default** configuration. In the molding that you created, the default configuration matches the length of the shorter sides of the door. To easily identify the configuration, rename the default configuration to `short`.

In the same document you create another configuration and name it `long`. This configuration increases the length to match the longer sides of the door.

The SOLIDWORKS ConfigurationManager displays the two configurations in the document. When you double-click a configuration name, the graphics area displays that configuration. Later on, you insert different configurations of the same part into an assembly.

For a lesson that includes mirroring and configurations, see the *Advanced Design* tutorial.

Hinge

The hinge connecting the cabinet door to the vanity is a sheet metal part. By definition, sheet metal parts are constructed of uniform thickness and have a specified bend radius.

When you design sheet metal in the SOLIDWORKS software, you can use a base flange instead of an extrude to create the base of the part. The base flange is the first feature in a sheet metal part, and it designates the part as sheet metal. The SOLIDWORKS software has several tools that are specific to sheet metal, including the tab and the hem, which you use in the hinge design.

Design Approach

1. Base Flange

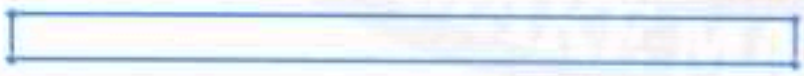
2. Tab

3. Linear Pattern

4. Hem

Create Sheet Metal with the Base Flange

As with other base features, you first create a sketch. In the hinge, you make a sketch with the **Rectangle** tool.



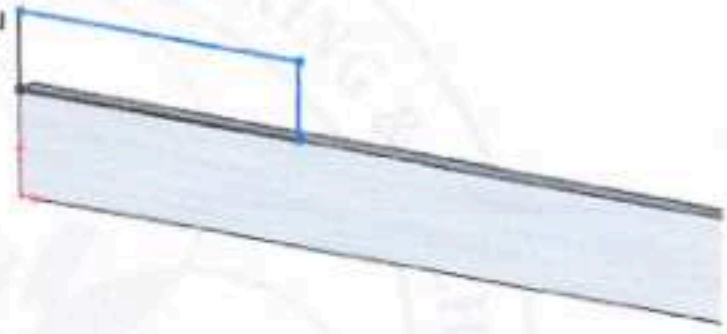
The base of the hinge is an example where a simple sketch allows for easier creation of the model.

Next, you use the **Base Flange/Tab** tool to automatically create a sheet metal part.

Make the Tab

The **Tab** tool adds a tab to the sheet metal part. The depth of the tab automatically matches the thickness of the sheet metal part. The direction of the depth automatically coincides with the sheet metal part to prevent a disjoint body.

When you make the sketch for the tab, you sketch on the face where you want the tab to appear. You make this sketch with the **Rectangle** tool on the front face.



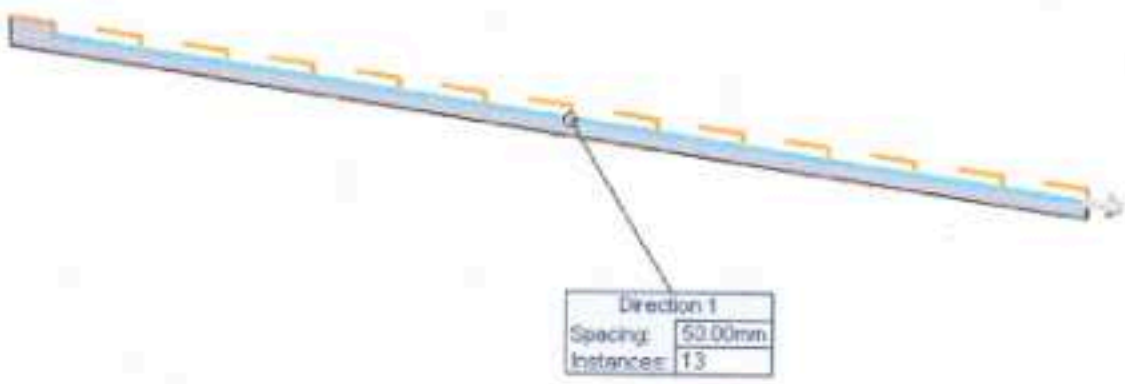
After you complete the sketch, use the **Base Flange/Tab** tool to add the tab.

For more information on tabs, see *Sheet Metal Tab* in the help.

Generate the Linear Pattern

To make tabs that span the length of the hinge, use the **Linear Pattern** tool to copy the original tab a specified number of times. The linear pattern creates multiple instances of a selected feature along a linear path.

When you make a linear pattern, you specify the number of instances and the distance between each tab. In the hinge, there are 13 tabs separated by 50mm.



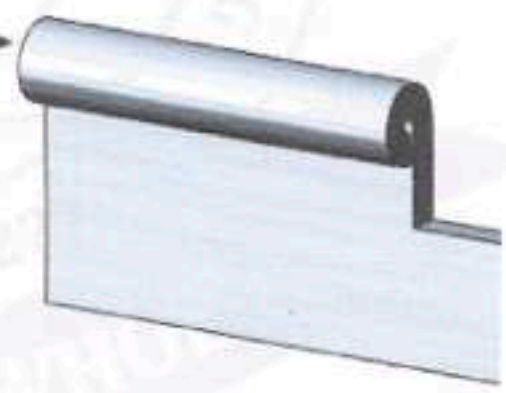
This is the first piece of the hinge. When you create the second piece, you change the location of the tabs so both pieces fit together.

For more information, see *Linear Patterns* in the Help.

Add the Hem

A **Hem** is a sheet metal tool that folds the edge of a part and uses the same model thickness as the base flange.

In this example, you add a rolled hem to each tab to curl the sheet metal.



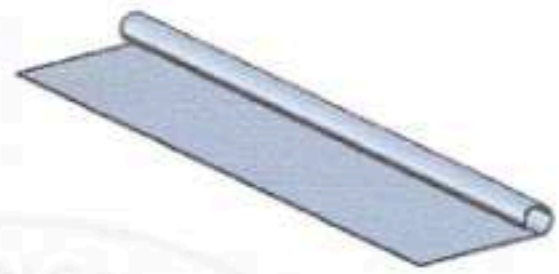
For a lesson on sheet metal, see the *Sheet Metal* tutorial.

Alternate Design Approach

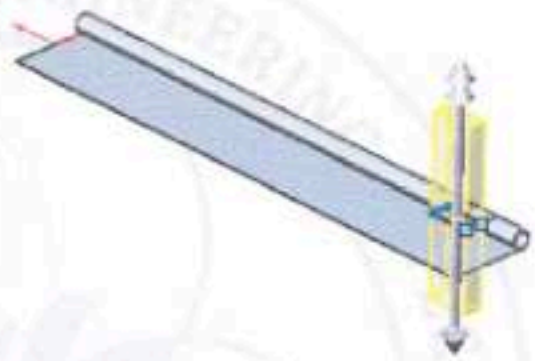
Another way to design the hinge is to build the rolled section as part of the base flange. In this example, you do not need the **Hem** tool.

First, create a sketch with the **Line** and **Tangent Arc** tools.

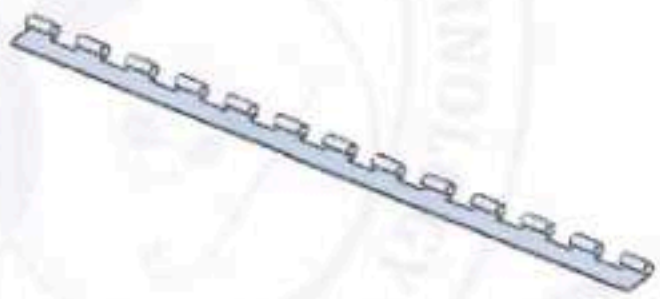
Second, extrude the sketch with the **Base Flange** tool.



Next, create the first tab with an extruded cut.



Finally, use the **Linear Pattern** tool to create multiple cuts.

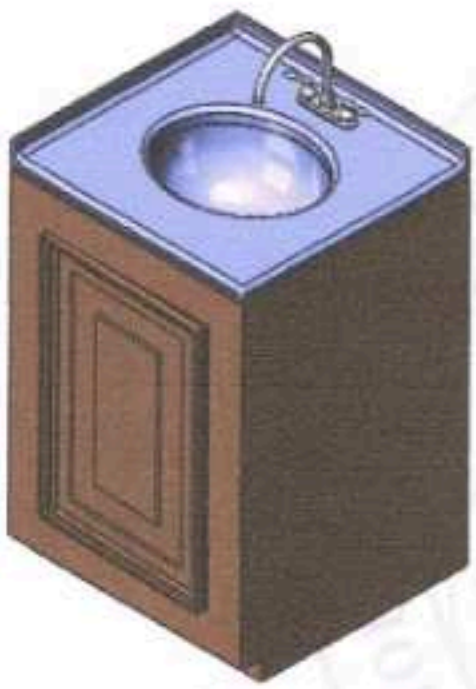


> Using the **Hem** tool gives you more flexibility if you need to change the radius, hem type, and position.

3

Assemblies

In this section, you use the vanity cabinet parts described and built in **Chapter 2 "Parts"** to build subassemblies, such as the spigot and the faucet handles. Then you bring the subassemblies together to create an assembly, the vanity.



This chapter includes the following topics:

- **Assembly Definition**
- **Assembly Design Methods**
- **Prepare an Assembly**
- **Mates**
- **In-Context Design**
- **Load an Assembly**
- **Examine the Assembly**

Assembly Definition

An assembly is a collection of related parts saved in one SOLIDWORKS document file with a `.sldasm` extension.

Assemblies:

- Contain anywhere from two to over one thousand components, which can be parts or other assemblies called subassemblies
- Display movement between related parts within their degrees of freedom

The components in an assembly are defined in relation to each other using assembly mates. You attach the assembly components using various types of mates such as coincident, concentric, and distance mates. For example, the faucet handle components are mated to the faucet base component using concentric and coincident mates. The mated components create the spigot subassembly. Later, you include this subassembly in the main vanity assembly, mating it to the other components in the vanity assembly.

Assembly Design Methods

You create assemblies using two basic methods: bottom-up design and top-down design.

You can also use a combination of the two methods. With either method, your objective is to mate the components to create the assembly or subassembly (see **Mates** on page 57).

Bottom-up Design

In bottom-up design, you create parts, insert them into an assembly, and mate them as required by your design. Bottom-up design is the preferred technique when you use previously constructed, off-the-shelf parts.

An advantage of bottom-up design is that because components are designed independently, their relationships and regeneration behavior are simpler than in top-down design. Working bottom-up allows you to focus on the individual parts. It is a good method to use if you do not need to create references that control the size or shape of parts with respect to each other.

Most of the vanity cabinet uses bottom-up design. You create the components such as the sink and the spigot in their own part windows. Then you open an assembly document, bring the components into the assembly, and add various mates.

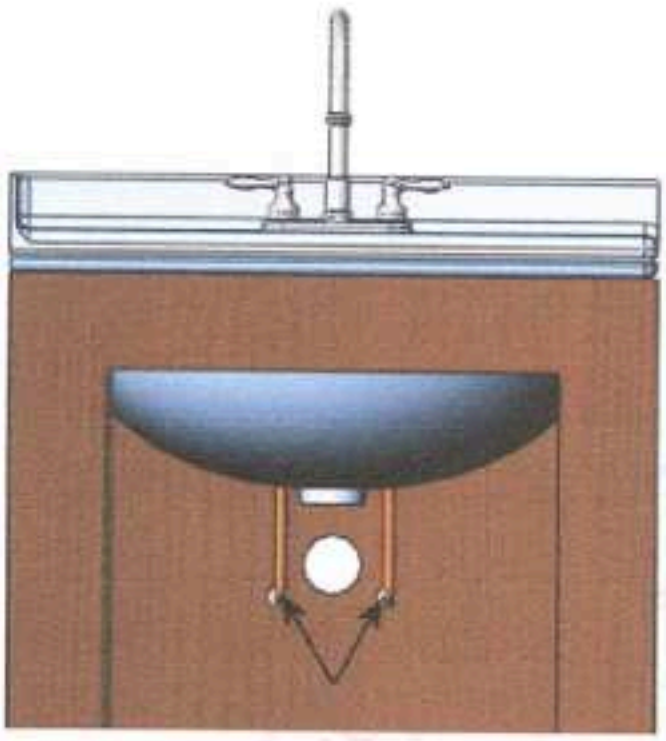
Top-down Design

In top-down design, you start your work in the assembly. You can use the geometry of one part to help define other parts, to create features that affect multiple parts, or to create machined features that are added only after the parts are assembled. For instance, you can start with a layout sketch or define fixed part locations, then design the parts referencing these definitions.

> Top-down design is also known as in-context design.

For example, you can insert a part in an assembly, then build a fixture based on this part. Working top-down, creating the fixture in context, allows you to reference model geometry, so you can control the dimensions of the fixture by creating geometric relations to the original part. That way, if you change a dimension of the part, the fixture is updated automatically.

The vanity cabinet also uses top-down design. You create the two supply pipes within the context of the assembly. Then you reference the size and location of the faucet subassembly and the vanity cabinet to define the supply pipes.



Supply pipes

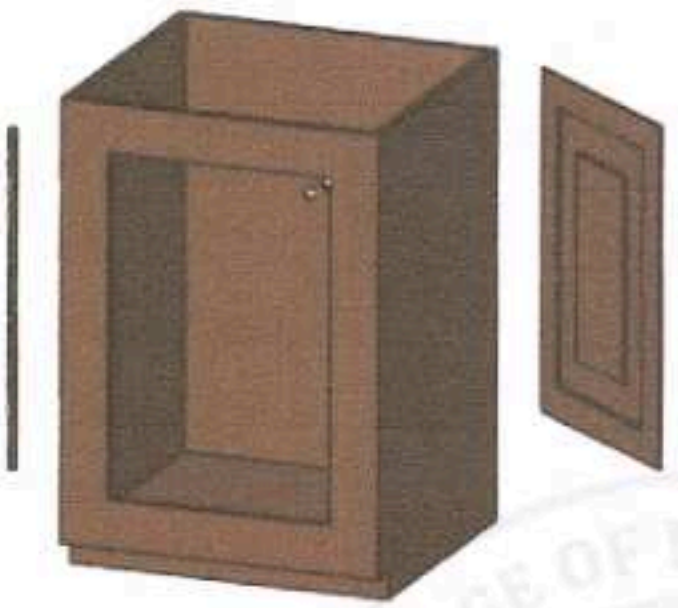
Prepare an Assembly

Before you build an assembly, you need to prepare the assembly components. Throughout this section, you use the parts for the vanity cabinet created in **Parts** on page 37. The vanity includes the following subassemblies:

- Faucet and faucet handles
- Door and moldings
- Door subassembly, cabinet, and hinge

Faucet and faucet handles

Door and moldings



Door subassembly, cabinet, and hinge

For each subassembly document, you do the following prior to mating the components:

- Load and anchor the first component to the assembly origin
- Load the additional components
- Move and position the components

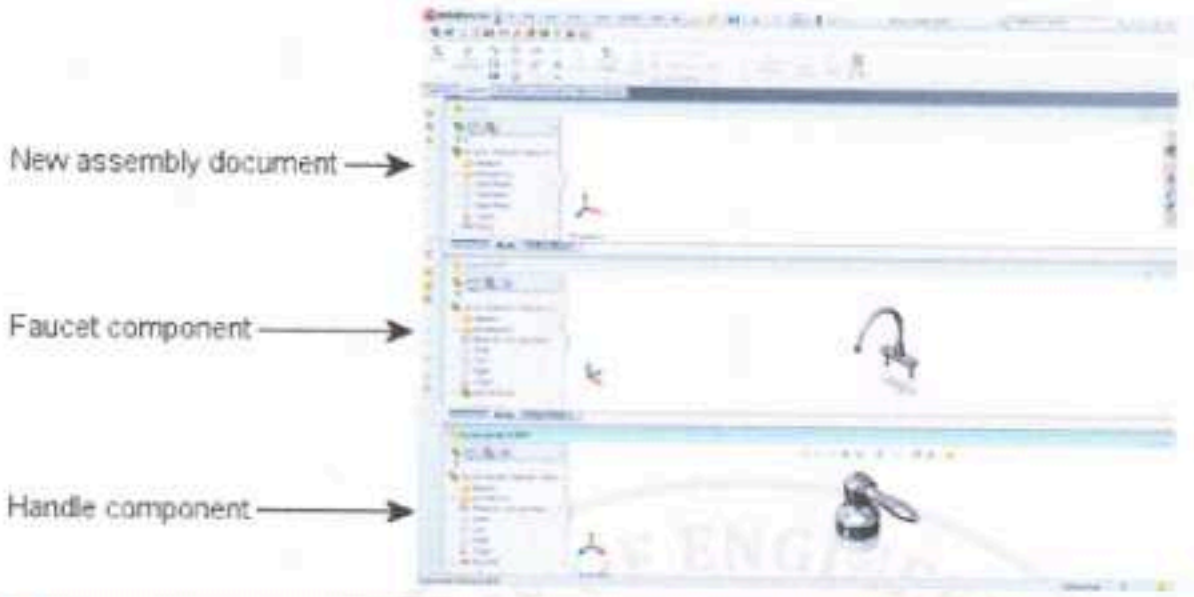
Mates

Mates position the components in an assembly precisely with respect to each other.

Positioning the components defines how they move and rotate with respect to each other. Mates create geometric relations, such as coincident, perpendicular, and tangent. Each mate is valid for specific combinations of geometry such as cones, cylinders, planes, and extrusions. For example, if you mate a cone to another cone, the valid types of mates you can use include coincident, concentric, and distance(see **Coincident Mate** on page 60).

Faucet Subassembly

Depending on the complexity of the assembly (the number of separate components), you can open one or all of your components. In the faucet example, there are only two components (the faucet and the handle), so you can tile the two documents. After you open the components, you need to open a new assembly document into which you bring the components.



You can add more than one instance of the same part to an assembly. You do not have to create a unique part for each component in the assembly.

You want to place the bottom of the handle component on the flat base of the faucet component, so the handle sits on the faucet. You also need to center the handle components over the faucet stems to position them correctly. To position the components, you apply a coincident mate and a concentric mate.

Load the First Assembly Component

When creating an assembly, start with the component that does not move with respect to the other components. This is the component you anchor or fix to the assembly origin. In the example of the faucet subassembly, you anchor the faucet component.

Anchoring the first component ensures that the planes in both documents are aligned.

Bring the first component into the `.sldasm` document as follows:

- Select the component name in the FeatureManager design tree of the `.sldprt` document and drag it into the `.sldasm` document.
- To position the first component on the origin of the `.sldasm` document, drop it on the origin in the graphics area or anywhere in the FeatureManager design tree. Dropping it in the FeatureManager design tree requires less fine mouse movement and will automatically align the part's origin and the assembly origin.

As you bring each component into the `.sldasm` document, the component appears in the FeatureManager design tree.

Load the Additional Components

You load the other components of the assembly by selecting the component in the FeatureManager design tree of the `.sldprt` document, and dragging the component into the graphics area of the `.sldasm` document. In the example of the faucet subassembly, you drag in two instances of the handle.

> The first component you add to an assembly is fixed in space by default, which is useful for mating of components. It is common to choose a component that you wish to be fixed; however, you can change which component is fixed later.

Faucet component with origin (assembly origin and component origin)

First handle component added

Second handle component added

Position the Additional Components

When you bring the additional components into the assembly, you can position them anywhere in the graphics area. Then you can use the left mouse button to drag a component closer to the first, anchored component. You can use the right mouse button to rotate a component into the proper orientation.

Leave some space between components to view the relevant component areas. You can use the following methods to change the orientation of the components:

- Middle mouse button: Rotates all components.
- Middle mouse button with **Ctrl**: Pans all components.
- Middle mouse wheel: Zooms all components in or out.

These mouse functions help select edges, faces, or other entities needed to apply mates.

Coincident Mate

To create a coincident mate between the handle component and the faucet component, attach the flat bottom face of the handles to the flat top face of the faucet.

Flat bottom face of the faucet handles

Flat top face of the faucet base component

When you apply the coincident mate, the faucet handle component moves closer to the faucet component. Note that you can still slide the handle anywhere along the top face of the faucet by dragging it with the left mouse button, indicating that a second mate is required to further define the position of the two components.

Concentric Mate

Select any round face on the faucet handle. Then select the round face of the faucet stem (the portion of the component that slides into the counter top, and connects to the supply pipe).

Round face on the faucet handle

Round face on the stem

Once you apply the concentric mate between the faucet handle component and the faucet component, you can no longer move the faucet handle along the top face of the faucet to shift its position. You can, however, use the left mouse button to drag the faucet handle on its axis.

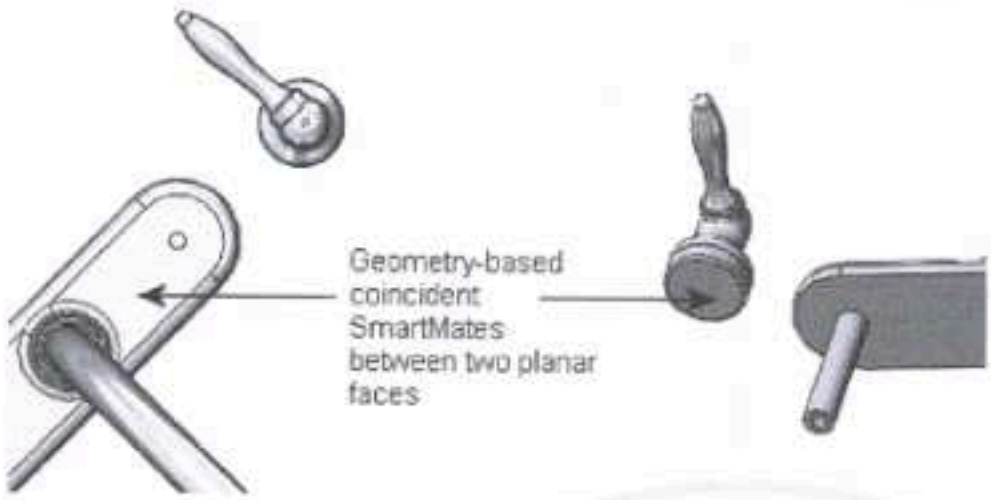
For a lesson on assembly mates, see the *Assembly Mates* tutorial.

Faucet Subassembly - Alternate Design Approach

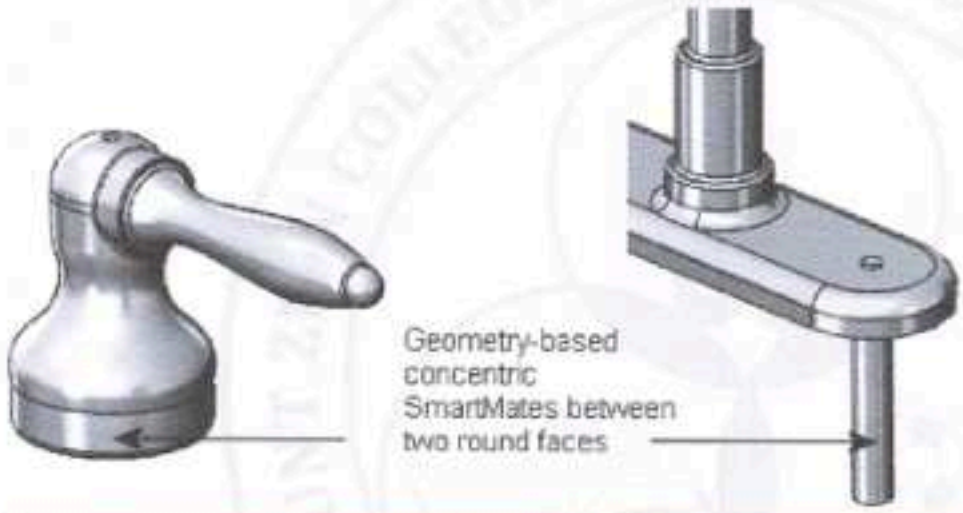
Another approach to mating the faucet and handle components is to use SmartMates. With SmartMates, the system automatically creates some mates. SmartMates are based on the entity you use to drag the component.

When you drag components into assemblies, you infer the geometry of existing components to create mates. SmartMates automatically infer mate partners and eliminate the need to use the **Mate** PropertyManager.

There are different types of SmartMates. You can use geometry-based SmartMates to create coincident mates between planar faces. For example, use SmartMates to create a coincident mate between the faucet component and each of the faucet handles in the faucet subassembly. Use **Alt** and drag the bottom face of the handle to create a coincident mate between the handle and faucet.



You can use another type of geometry-based SmartMate to create the concentric mate between the two round faces to completely define the faucet subassembly.



There are other types of SmartMates, including feature-based SmartMates and pattern-based SmartMates. For more information, see *SmartMates Overview* in the Help.

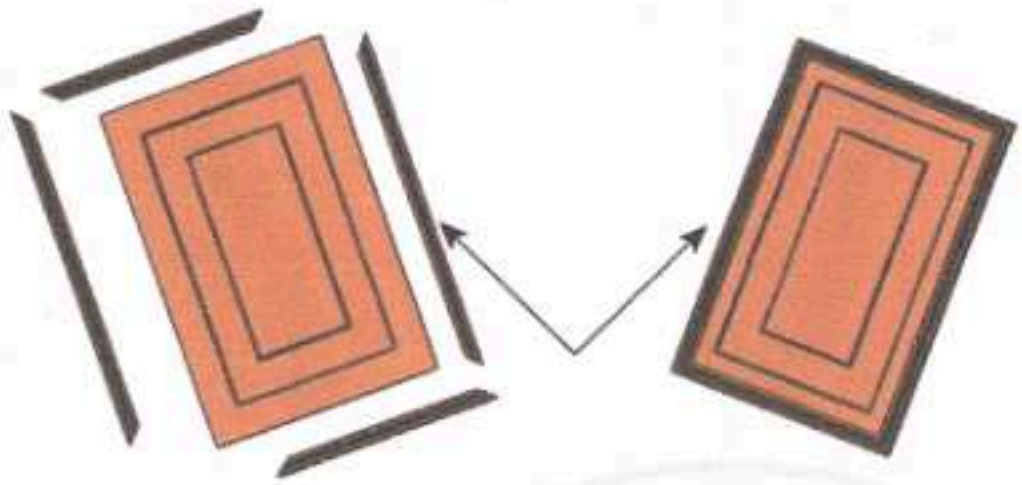
Door Subassembly

The cabinet door uses coincident mates between the door component and the four molding components. It also uses configurations of the molding as a time-saving design step.

Configurations let you create multiple variations of a part or an assembly within a single document. Configurations provide a convenient way to develop and manage families of models with different dimensions, components, or other parameters (see **Use Configurations of a Part** on page 49).

As stated earlier, you can use the same part more than once in an assembly. Each instance of the part can also use a different configuration.

The door subassembly uses configurations. There are four instances of the molding component. Two of the instances use the **short** configuration and fit across the short sides of the door. The other two instances use the **long** configuration.



Door subassembly with molding components

Cabinet Subassembly

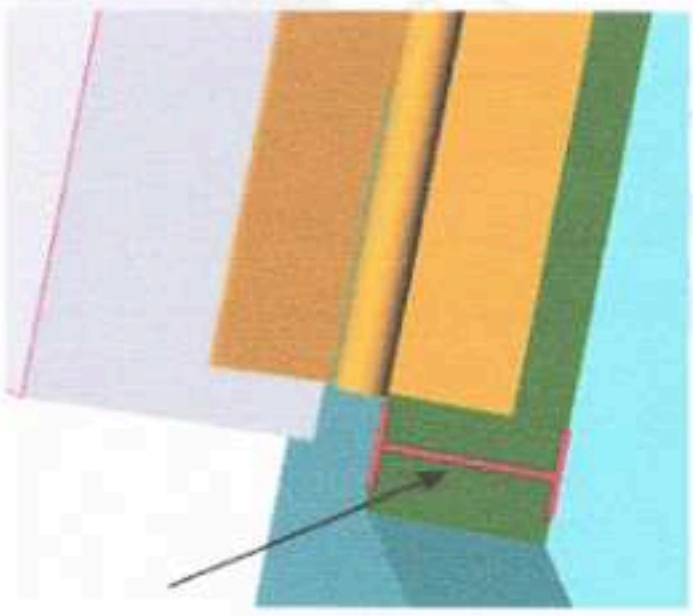
The cabinet subassembly uses concentric and coincident mates. It also uses a distance mate between the cabinet and one of the hinge components.

Distance Mate

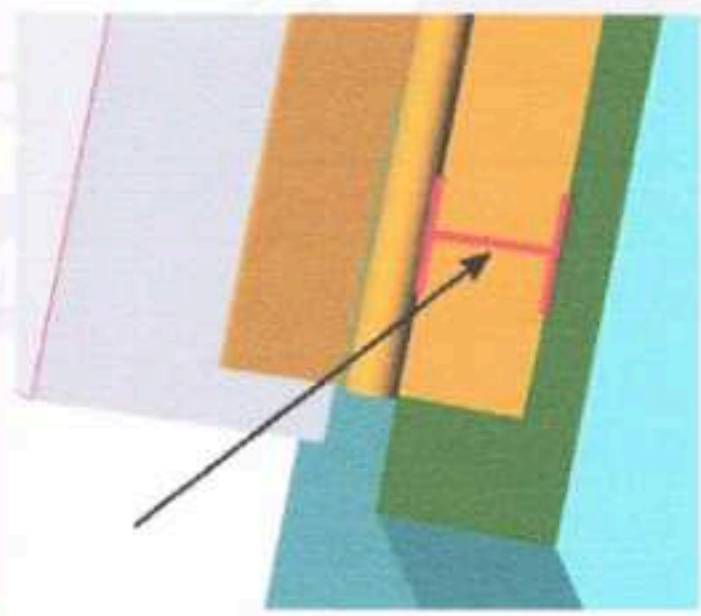
A distance mate uses a value you assign to separate the two entities.

In the vanity cabinet, the distance mate positions the hinge optimally, so that it functions freely. You determine the correct mate distance using the **Measure** tool.

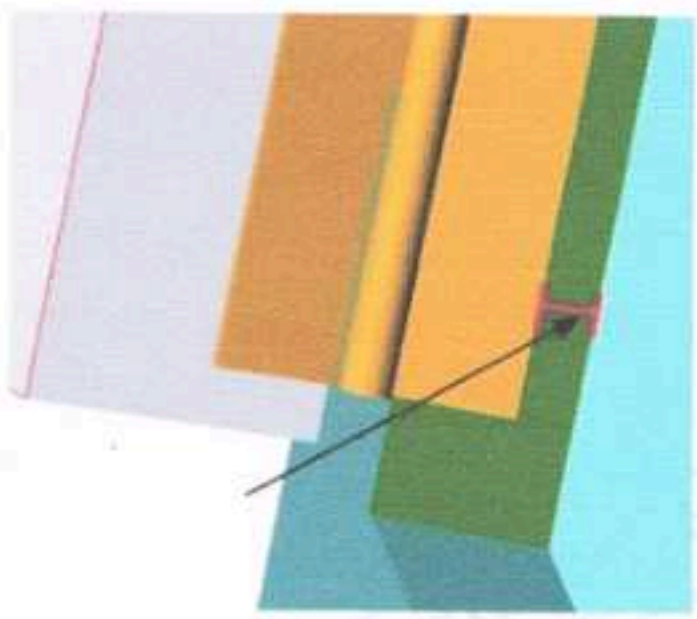
By measuring the entities of different components, you can determine at what position to place the hinge so that it does not bind when you open the cabinet door. Once you know the thickness of the door opening and the width of the hinge, you can position the hinge using a distance mate.



Measure the width of the inside for the cabinet door opening.



Measure the width of the hinge that you attach to the inside of the cabinet door opening.



Apply a distance mate, based on measurements of the cabinet and of the hinge.

In-Context Design

You can create a new part within an assembly document (in the context of an assembly).

In addition to creating or editing components in their own part windows, the SOLIDWORKS software lets you create or edit components in the assembly window. The advantage is that you can reference the geometry of one component to create or modify another component. By referencing the geometry of another component, you ensure that the components fit together correctly. This method of design is called top-down or in-context design because you are working in the context of the assembly.

In the vanity assembly, there are two examples of in-context design. One example is the diameter of the supply pipe component and the waste pipe component. The pipe components are both new parts that you create in the context of the assembly. The other example is the cut feature for the holes in the back of the vanity cabinet. The vanity cabinet is an existing part that you edit in the context of the assembly. These examples are discussed in the next two sections.

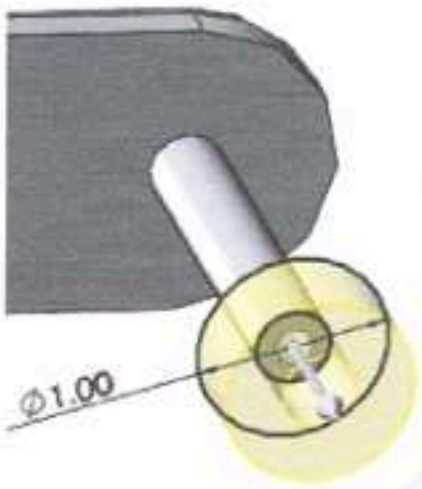
As you create an in-context part, the software includes notations and options with information about the relationships in the features.

> For more information on creating in-context components, see *Creating a Part in an Assembly* in the Help.

Create an Assembly Component In-Context

The diameter of the supply pipe component depends on the diameter of the faucet stem. It is a good idea to create the supply pipe component in the assembly so you can reference the geometry of the faucet stem. You use the **Convert Entities** and **Offset Entities** sketch tools to reference the geometry of the faucet stem for a sketch in the supply pipe component. This reference ensures that the size of the supply pipe changes if you change

the size of the faucet stem. You can use the same method to create the waste pipe component, which depends on the diameter of the exit stem at the bottom of the basin.

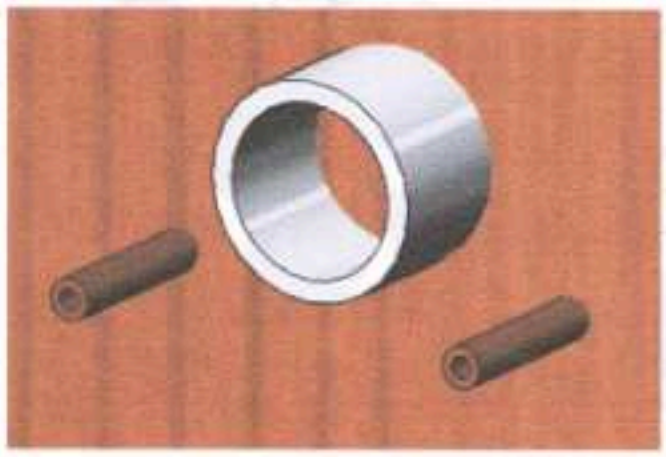


Use **Convert Entities** and **Offset Entities** to create the sleeve between the faucet stem and the supply pipe.

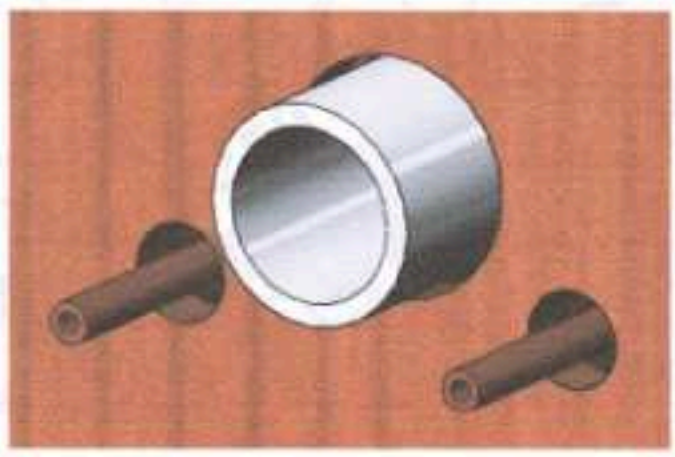
Extrude the sketch to create the sleeve between the faucet stem and the supply pipe.

Modify a Part In-Context of an Assembly

The positions of the holes in the back of the vanity cabinet depend on the length of the supply pipe and the waste pipe components. It is a good idea to edit the vanity cabinet component in the assembly so you can reference the geometry of the supply pipes and waste pipe. You use the **Offset Entities** sketch tool to reference the geometry of the pipes for a sketch of the cut in the vanity cabinet component. This reference ensures that the position and size of the holes changes if you change the position and size of the supply pipes or waste pipe.



Supply and waste piping before in-context cut



Supply and waste piping after in-context cut

Load an Assembly

You can improve performance of large assemblies significantly by using lightweight components.

After you create an assembly, you can load it with its active components fully resolved or lightweight.

- When a component is fully resolved, all of its model data is loaded in memory.
- When a component is lightweight, only a subset of its model data is loaded in memory. The remaining model data is loaded on an as-needed basis.

Loading an assembly with lightweight components is faster than loading the same assembly with fully resolved components.

Lightweight components are efficient because the full model data for the components is loaded only as it is needed.

Assemblies with lightweight components rebuild faster because fewer details are evaluated. However, mates on a lightweight component are solved, and you can edit existing mates.

> The vanity cabinet is a relatively simple assembly, so any performance gains using lightweight components are minimal.

Examine the Assembly

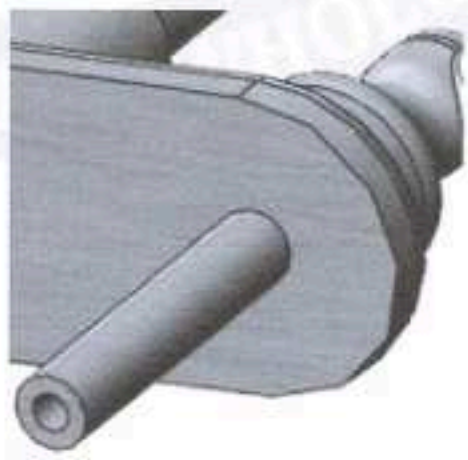
The SOLIDWORKS software includes various assembly tools that can display, test, and measure your assembly components once you apply the mates.

Some of the assembly tools include:

Hide and Show Components

You can hide or show components in the graphics area. Hiding components often facilitates component selection when you add mates or when you create in-context parts. For example, to select the inner and outer diameters of the faucet stems, you can hide all components except the faucet subassembly, and then zoom, rotate, or change the view as needed.

Hide all components except the one you need

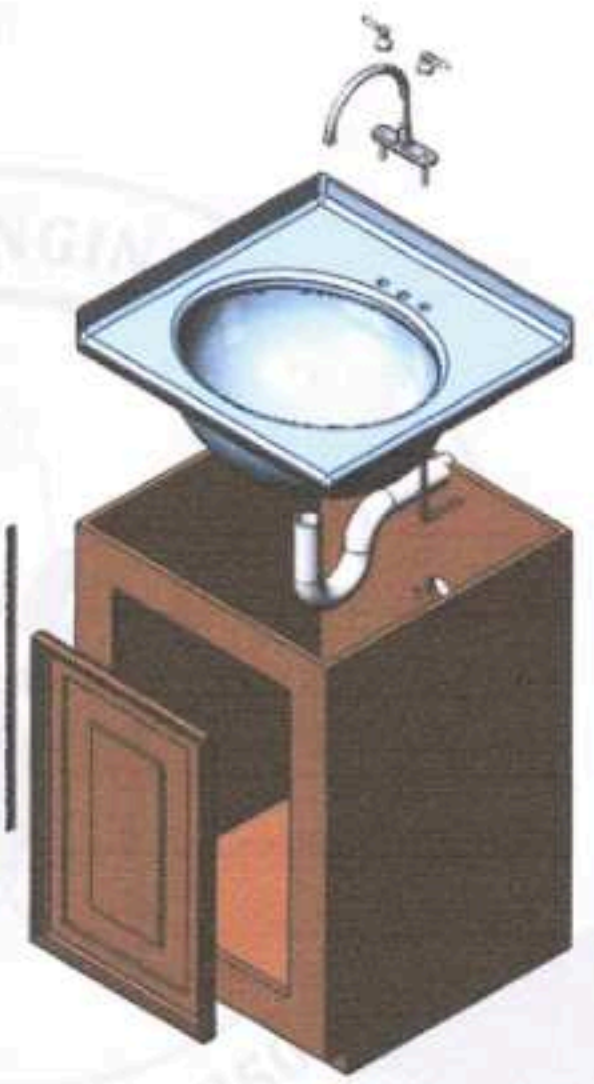


Zoom, rotate, and change the view if necessary to select the feature

Hide Components and **Show Components** do not affect the mates between the components. They affect only the display.

Explode the Assembly

An exploded view separates the components in an assembly to facilitate viewing. Exploded views include many options such as which components to include, what distances to use, and in which direction to display the exploded components. The exploded view is saved with a configuration of the assembly or subassembly.

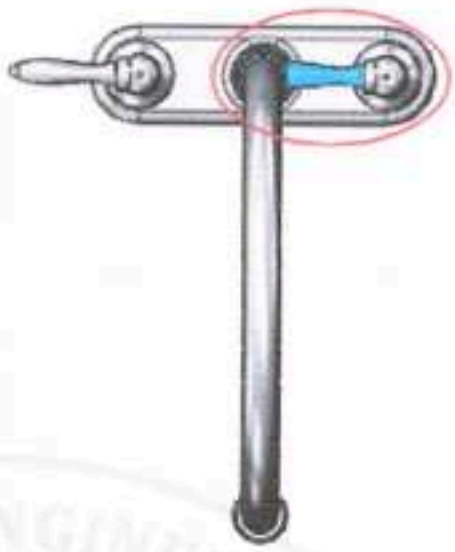


Detect Collisions Between Components

You can detect collisions with other components when you move or rotate a component. The SOLIDWORKS software can detect collisions with the entire assembly or a selected group of components that move as a result of mates.

In the faucet subassembly, note how the faucet handles collide with the faucet. You can set the **Stop at collision** option to determine where the components collide.

Normal position of handles



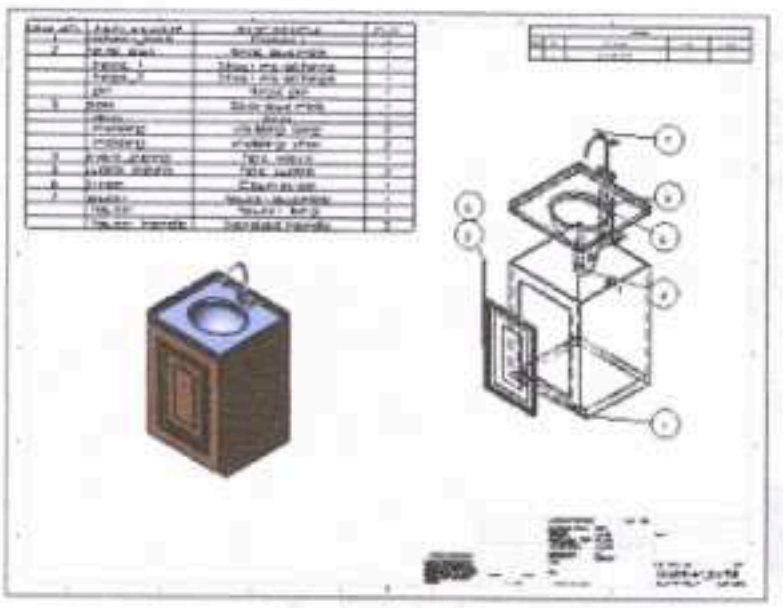
Collision Detection without **Stop at collision** active. Notice the handle moves inside the faucet.

Collision Detection with **Stop at collision** active. Notice the handle cannot move inside the faucet.

4

Drawings

Drawings are 2D documents that convey a design to manufacturing.

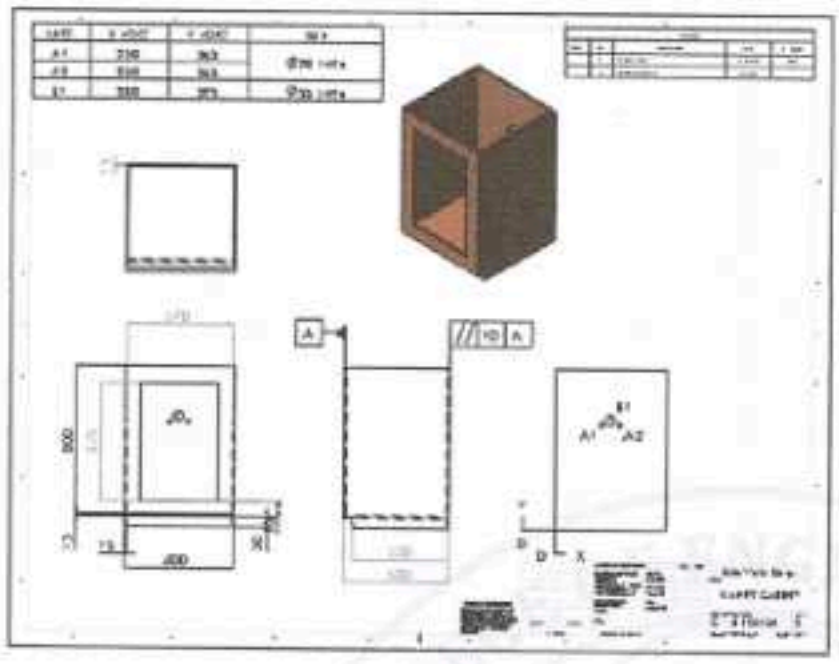


This chapter includes the following topics:

- **Drawing Documents**
- **Vanity Cabinet Drawing Sheet**
- **Faucet Assembly Drawing Sheet**
- **Vanity Assembly Drawing Sheet**

Drawing Documents

You create drawings from drawing templates. Within a drawing document are drawing sheets that contain drawing views. The drawing sheets have underlying formats.



Drawing templates and sheet formats are two distinct entities. The software comes with one drawing template and a set of sheet formats (in English and metric). When you begin a new drawing using the default drawing template, the size of the drawing is undefined. The software prompts you to select a sheet format. The sheet format controls:

- Size of the drawing sheet
- Drawing borders
- Title block
- Sheet scale

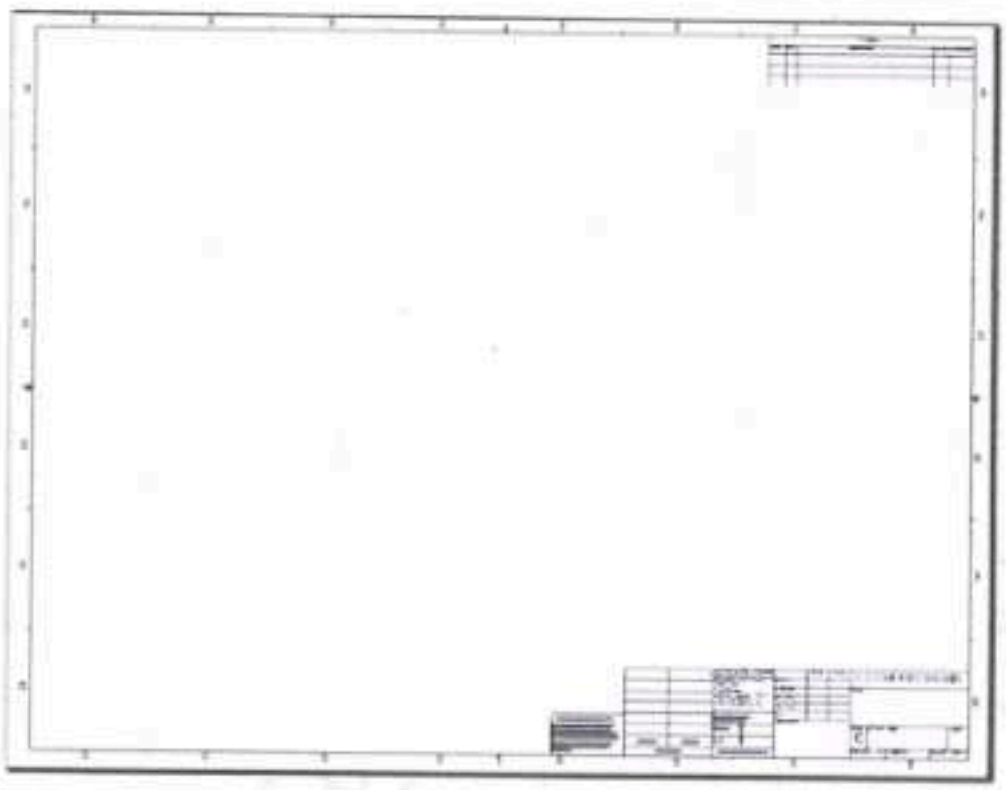
Drawing Templates

To start the drawing document, you open a drawing template. Drawing templates contain basic document information. You choose from templates supplied with the SOLIDWORKS software containing default drawing sheets or templates you customize. You can create custom drawing templates with any of the following characteristics:

- Drawing sheet size (for example, A, B, and C)
- Drawing standard (for example, ISO and ANSI)
- Units (for example, millimeters and inches)
- Company name and logo, author's name, and other information

Drawing Sheets

For the vanity drawings, a drawing template with a C-size drawing sheet in landscape orientation is appropriate. The standard drawing sheet formats contain borders and title blocks for the C-size landscape format:



The drawing document for the vanity contains three sheets. You can have any number of drawing sheets in a drawing document, like a set of drawings. You can add sheets at any time using any format, regardless of the format of other sheets in the document. Tabs with sheet names appear at the bottom of the graphics area.

Sheet Formats

The bottom right corner of the default sheet format contains a title block.

After changing the sheet scale, adding two sheets, and editing and adding notes, the title block appears as shown. The scale and page numbers are linked to system variables and updated automatically.

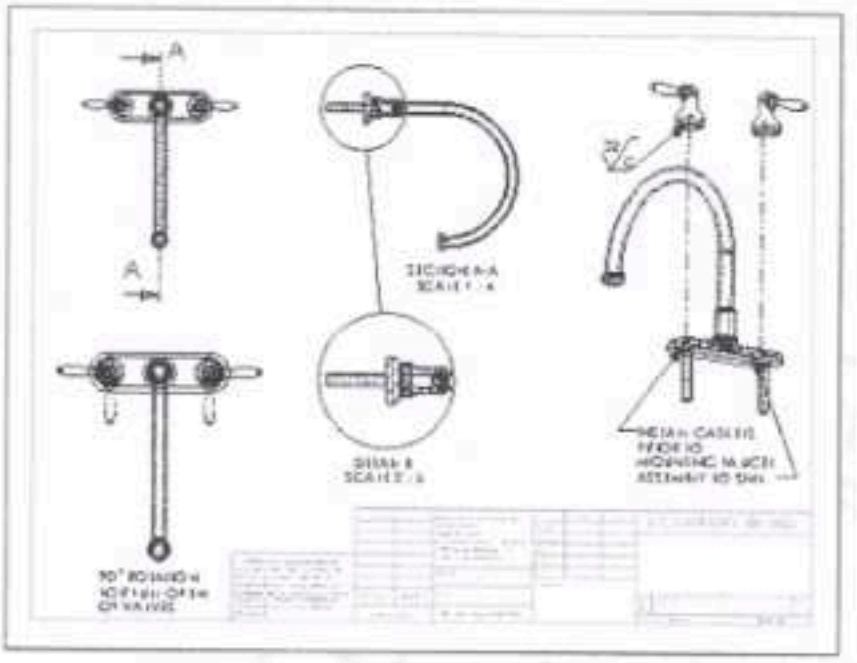
The sheet format underlies the drawing sheet and is separate from the drawing sheet. You edit the sheet format separately from the drawing sheet. Sheet formats can contain items such as lines, note text, bitmaps, and the bill of materials anchor point. You can link the notes to system properties and custom properties.

SolidWorks Corp.		
TITLE:		
SIZE C	DWG. NO. 8112159	REV
SCALE: 1:8	WEIGHT:	SHEET 1 OF 3

Drawing Views

Drawing views are placed on drawing sheets and contain the images of the models, plus dimensions and annotations.

Drawings begin with standard views. From those views, you can derive other types of views, such as projected, section, and detail.



For a lesson on drawing documents, inserting standard views, and adding dimensions to drawings, see the *Lesson 3 - Drawings* tutorial.

For more information on document templates, drawing sheets, and drawing views, see the Help.

Vanity Cabinet Drawing Sheet

The vanity cabinet sheet contains standard 3 views and named views that are generated from the part. The views are displayed in different modes and contain dimensions and annotations.

Standard Views

Drawings generally start with a standard 3 view or some type of named view, for example, front, top, isometric, or exploded. You can insert these views from an open part or assembly document, from a file, or from other views in the same drawing document.

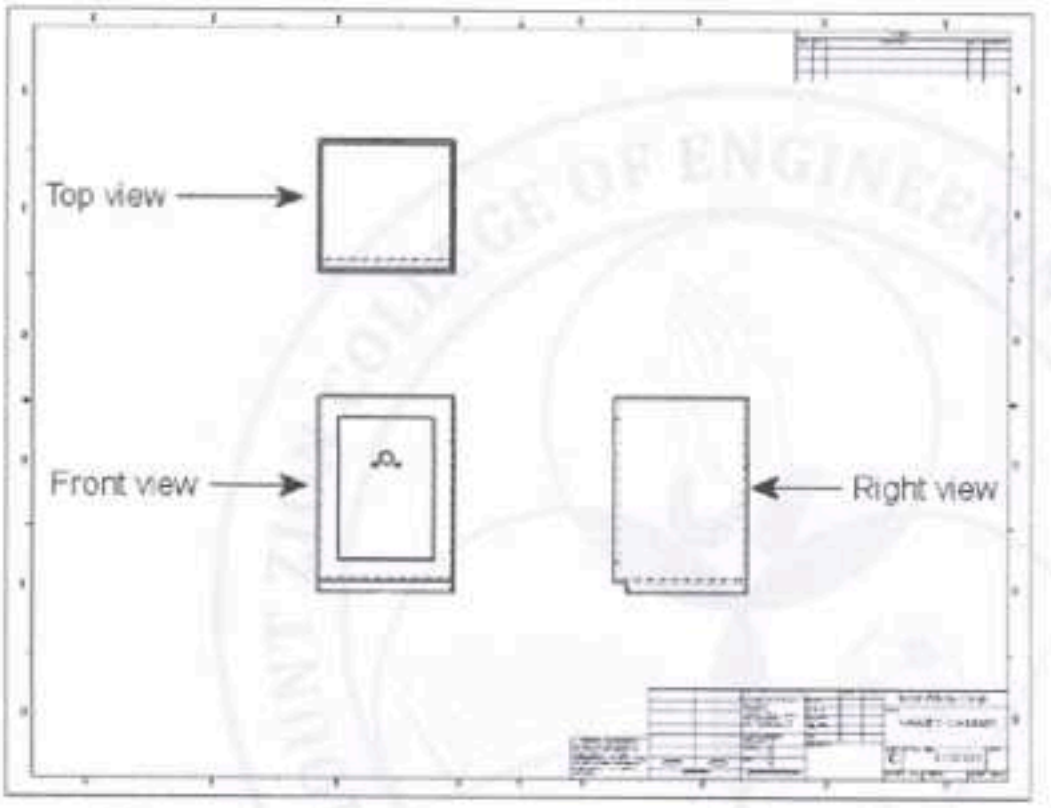
Standard 3 Views

Standard 3 views, as the name implies, comprise three views: front, top, and right (third angle projection) or front, top, and left (first angle projection). In third angle projection, the default front view is displayed at the lower left. In first angle projection, the front view is displayed at the upper left. First angle projection is typically used in Europe. Third

angle projection is typically used in the United States. The example in this section uses third angle projection.

> For more information on first and third angle projection, see *First Angle and Third Angle Projection* in the Help.

The standard 3 views of the vanity cabinet are the first views that are placed on this sheet.

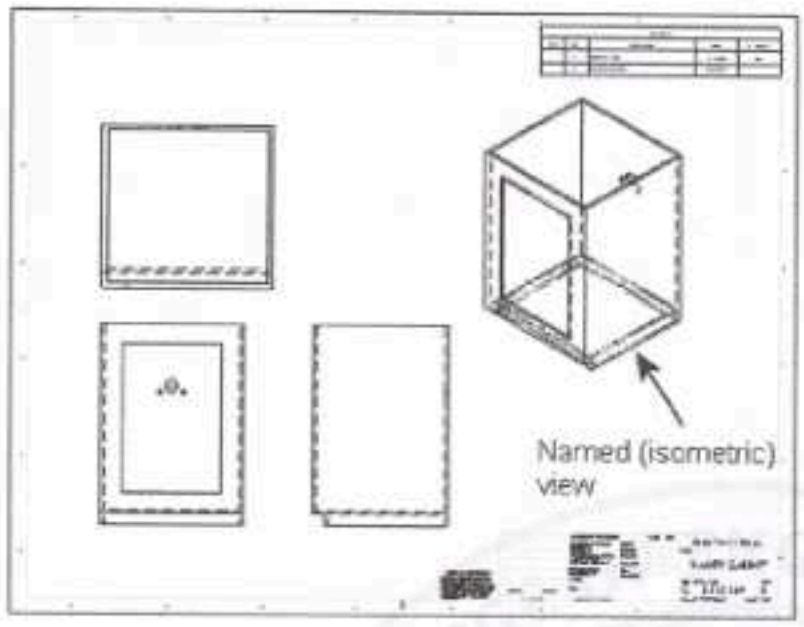


Named Views

Views are named in the model documents. Named views include:

- Standard orientations, for example, front, top, and isometric
- Current model view
- Custom named views

Next, you add an isometric view of the cabinet (a named view) to the drawing sheet.

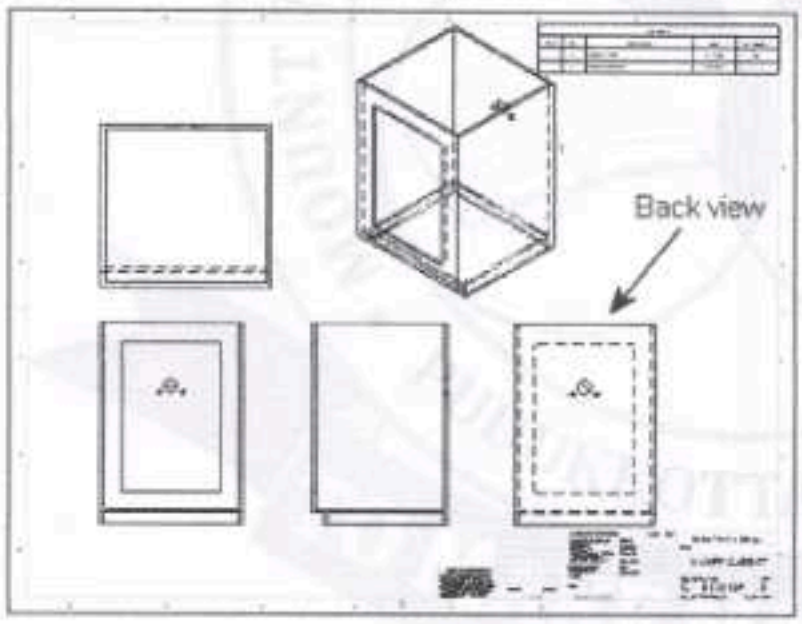


You select the view orientation as you bring the view into the drawing.

Projected Views

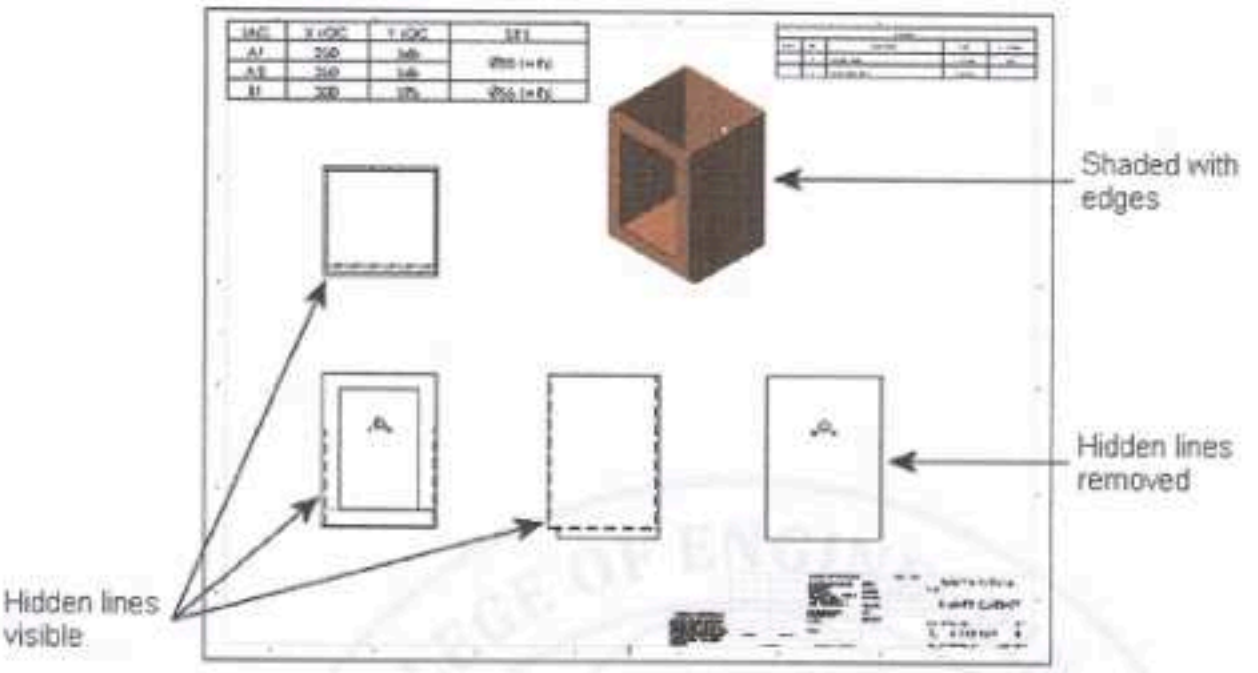
Projected views are orthographic projections of existing views.

The vanity has details in the back that are important to show. To create a back view, project the right view and place it to the right.



View Display and Alignment

You can choose various display modes for drawing views. On the Vanity Cabinet sheet, the back view is displayed with **Hidden Lines Removed**. The standard 3 views are displayed with **Hidden Lines Visible**. (Hidden lines appear gray on screen, but as dashed lines when printed.) The isometric view is displayed with **Shaded With Edges**.



Some views are aligned automatically, but you can break the alignments. Standard 3 views are aligned so that if you drag the front view, both the top and right views move with it. The right view moves independently in the horizontal direction, but not vertically. The top view moves independently in the vertical direction, but not horizontally.

Section views, projected views, and auxiliary views automatically align in the direction of the view arrows. Detail views are not aligned by default.

You can align views that are not automatically aligned. For example, the back view of the cabinet is aligned horizontally with the right view, which is aligned with the front view by default.

> For more information on displaying, hiding, and aligning views, see *Drawing View Alignment and Display* in the Help.

Dimensions

Dimensions in a SOLIDWORKS drawing are associated with the model. Changes in the model are reflected in the drawing, and vice versa.

Typically, you create dimensions as you create each feature in a part, then insert those dimensions into the drawing views. Changing a dimension in the model updates the drawing, and changing a model dimension in a drawing changes the model.

You can also add dimensions in the drawing document, but these are *reference* dimensions, and are driven; you cannot edit the value of reference dimensions to change the model. The values of reference dimensions change when the model dimensions change.

You can set the units (for example, millimeters or inches) and the drawing standard (for example, ISO or ANSI) in the detailing options. The vanity is in millimeters in the ISO standard.

> For more information about dimensions in drawings, see *Dimensions Overview* in the Help.

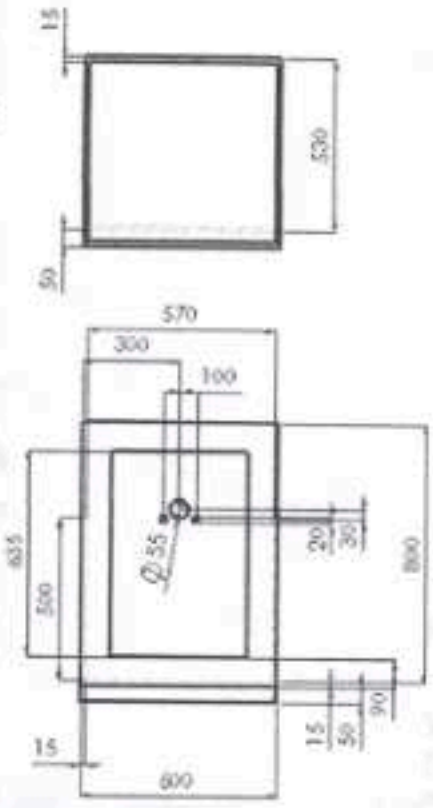
Insert Model Items

You use the **Insert Model Items** tool as a convenient way to insert existing model dimensions into the cabinet drawing. Insert items for a selected feature, an assembly component, a drawing view, or all views.

When inserted into all views (as in the example), dimensions and annotations appear in the most appropriate view. Features that appear in partial views, such as detail or section views, are dimensioned in those views first.

Once you insert the dimensions, you can manipulate them. For example, you can drag them into position, drag them to other views, hide them, or edit properties.

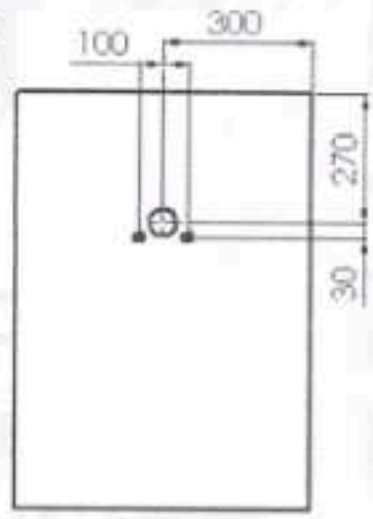
If the model contains annotations, you can also insert the annotations into drawings by the same procedure.



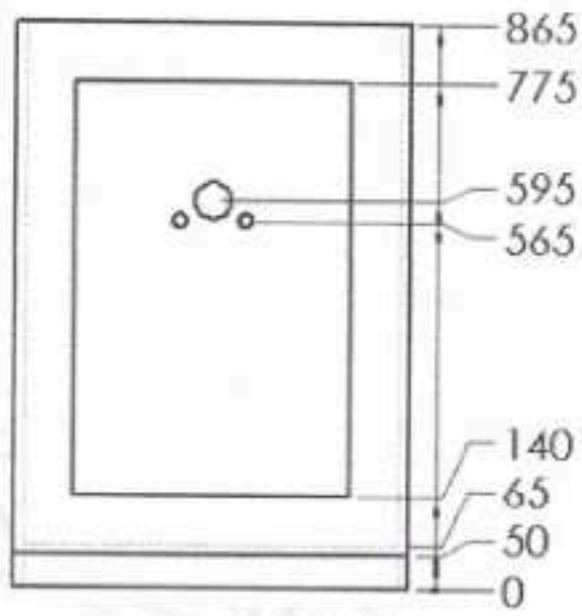
Reference Dimensions

The back view on the Vanity Cabinet sheet is included to show the dimensions of the holes in the cabinet for the supply and waste pipes.

Reference dimensions help you to locate the holes. You can choose whether to enclose reference dimensions in parentheses automatically.



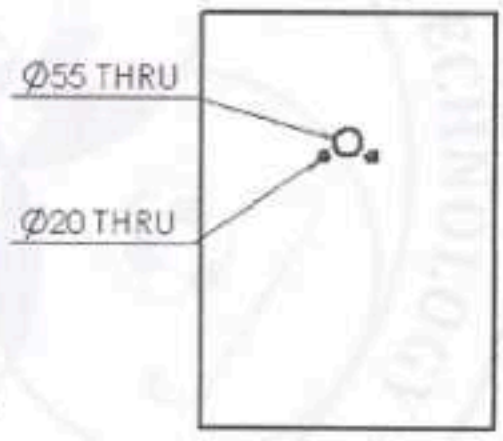
Other types of reference dimensions include baseline dimensions and ordinate dimensions. For example, you might add ordinate dimensions to the front view of the cabinet as shown. You can dimension to edges, vertices, and arcs. The dimensions jog automatically to avoid overlapping. You can display ordinate dimensions without the chain (the arrows between the dimension extension lines).



Hole Callouts

You can specify hole callouts when creating holes in models with the Hole Wizard. The Hole Wizard creates and positions holes you define for fasteners such as counterbore and countersunk screws and tap holes. Hole Wizard design data, such as diameter, depth, and counterbore, becomes part of the hole callout automatically.

Hole callouts help you to specify the size and depth of the holes in the cabinet. Hole callouts are annotations that are also dimensions. These hole callouts are in the back view.



Annotations

In addition to dimensions, you can add other types of annotations to your models and drawings to convey manufacturing information:

- Notes
- Geometric tolerance symbols
- Datum feature symbol
- Center marks
- Surface finish symbols
- Datum target symbols
- Weld symbols
- Balloons and stacked balloons
- Blocks

- Multi-jog leaders
- Area hatches
- Dowel pin symbols

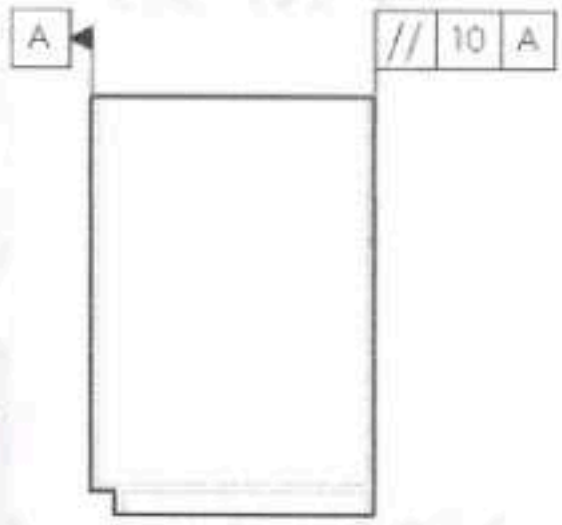
Most annotations can be added in part and assembly documents and inserted automatically into drawings in the same way that dimensions are inserted into drawings. Some annotations (center marks, multi-jog leaders, hole callouts, area hatch, and dowel pin symbols) are available in drawings only.

For more information on annotations, see *Annotations Overview* in the Help.

Geometric Tolerance and Datum Feature Symbols

Geometric tolerance symbols display various manufacturing specifications, often in conjunction with datum feature symbols as shown in the example. You can insert these symbols in sketches and in part, assembly, and drawing documents.

In the right view of the cabinet, the back edge is specified with a geometric tolerance symbol as parallel to the front edge within 10mm.



Center Marks

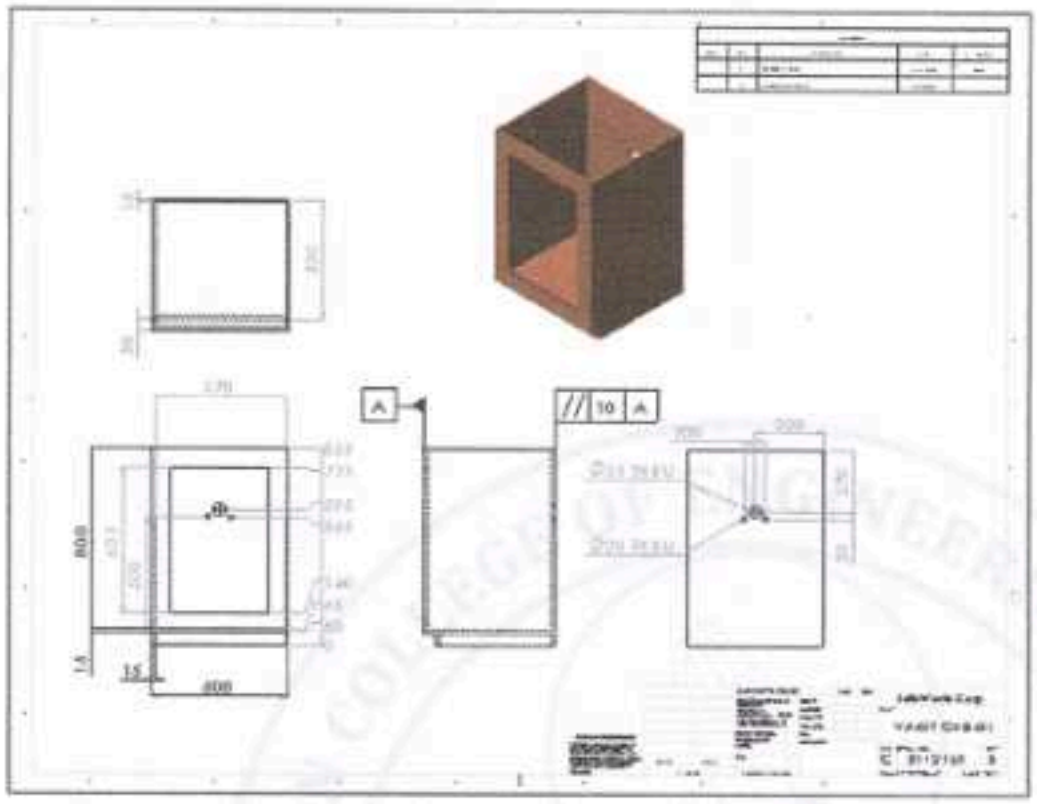
Center marks are annotations that mark circle or arc centers and describe the geometry size on the drawing.

In this example, center marks are added to the holes in the back view of the cabinet. You can place center marks on circles or arcs. Center marks can be used as reference points for dimensioning.

You can rotate center marks, specify their sizes, and choose whether or not to display extended axis lines.

For a lesson on adding derived views, annotations, and exploded views to drawings, see the *Advanced Drawings* tutorial.

Here is the completed vanity cabinet drawing sheet.



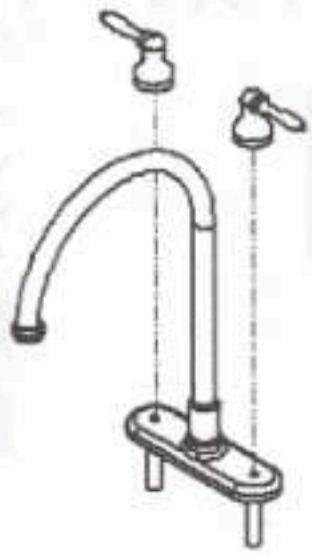
Faucet Assembly Drawing Sheet

The faucet assembly drawing sheet displays several derived views and annotations.

Explode Lines

The faucet assembly is shown in an isometric named view in its exploded configuration. Explode lines show the relationships between assembly components.

You add the explode lines to the assembly document in an explode line sketch. You can also jog the lines as needed. The lines are displayed in phantom line font.



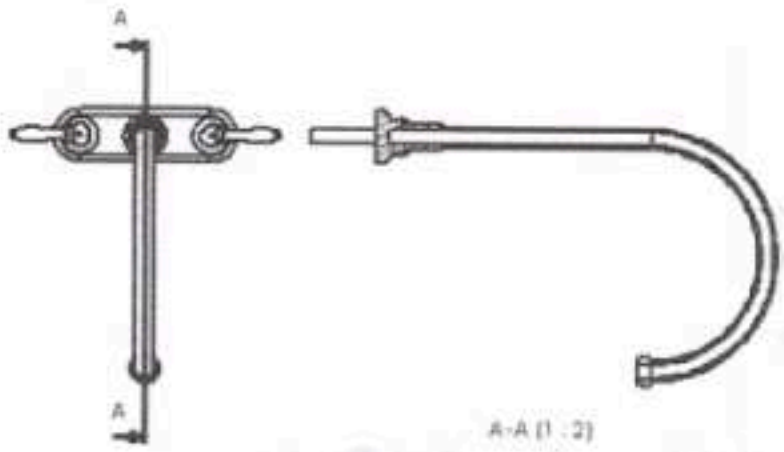
Derived Views

Derived views are created from the standard views. With standard 3 views or a named view in a drawing, you can create other views without going back to the model.

Section Views

You can create a section view in a drawing by cutting the parent view with a section line.

A section view of the faucet in the faucet assembly drawing shows the faucet pipe walls and connections. In this example, you insert a top view of the faucet assembly as the basis for the section view.



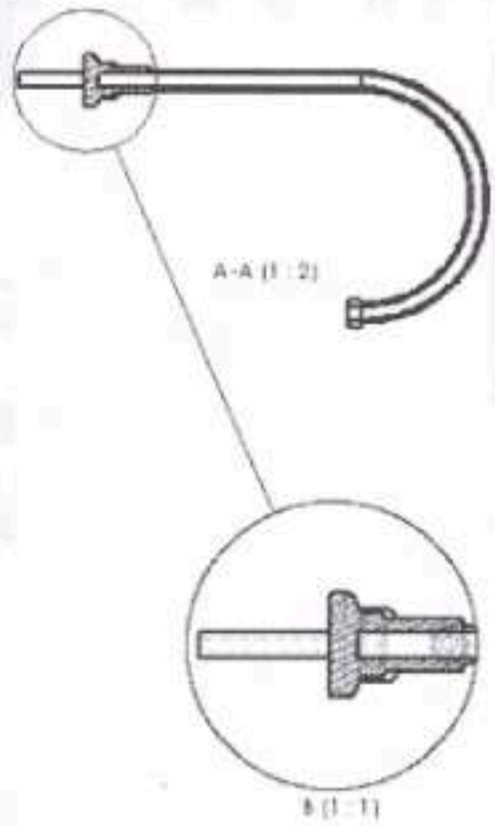
There are other types of section views, such as aligned section views and broken-out section views.

The sectioned components automatically display crosshatching. You can edit the properties of the crosshatching (pattern, scale, and angle).

Detail Views

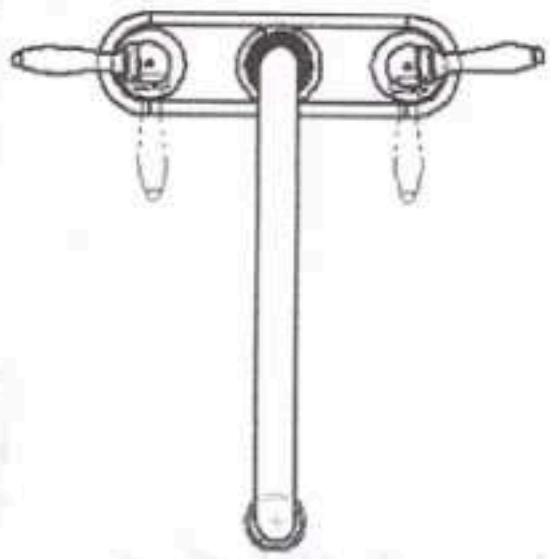
Detail views show a portion of an orthographic, 3D, or section view, usually at an enlarged scale.

The connection of the faucet is shown in a detail view. The parent view is the section view.



Additional Drawing Views

Alternate position views display overlays of two or more positions on the same view, often to show range of motion of an assembly component. The overlay views are displayed in the drawing in phantom lines.



The faucet handles are shown on the faucet assembly sheet in an alternate position view to display the range of motion of the handles.

Other drawing views include:

Auxiliary view	A projection normal to a reference edge
Crop view	Everything outside a sketched profile removed
Broken-out section	Material inside a profile removed to expose inner details
Broken view	Portion of a long part with a uniform cross-section removed

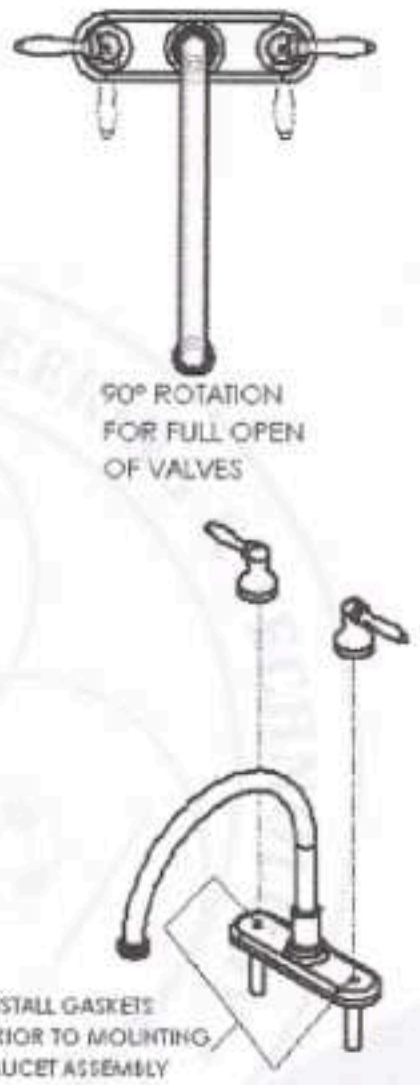
For more information about drawing views, see *Derived Drawing Views* in the Help.

Notes and Other Annotations

Notes and Multi-Jog Leaders

The alternate position view has a note with a degree symbol. In the exploded faucet view, the note uses a multi-jog leader.

A note can be free floating, as in the first example, or pointing to an item (face, edge, or vertex) in the document, as in the second example.

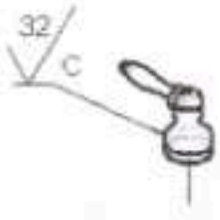


Surface Finish Symbols

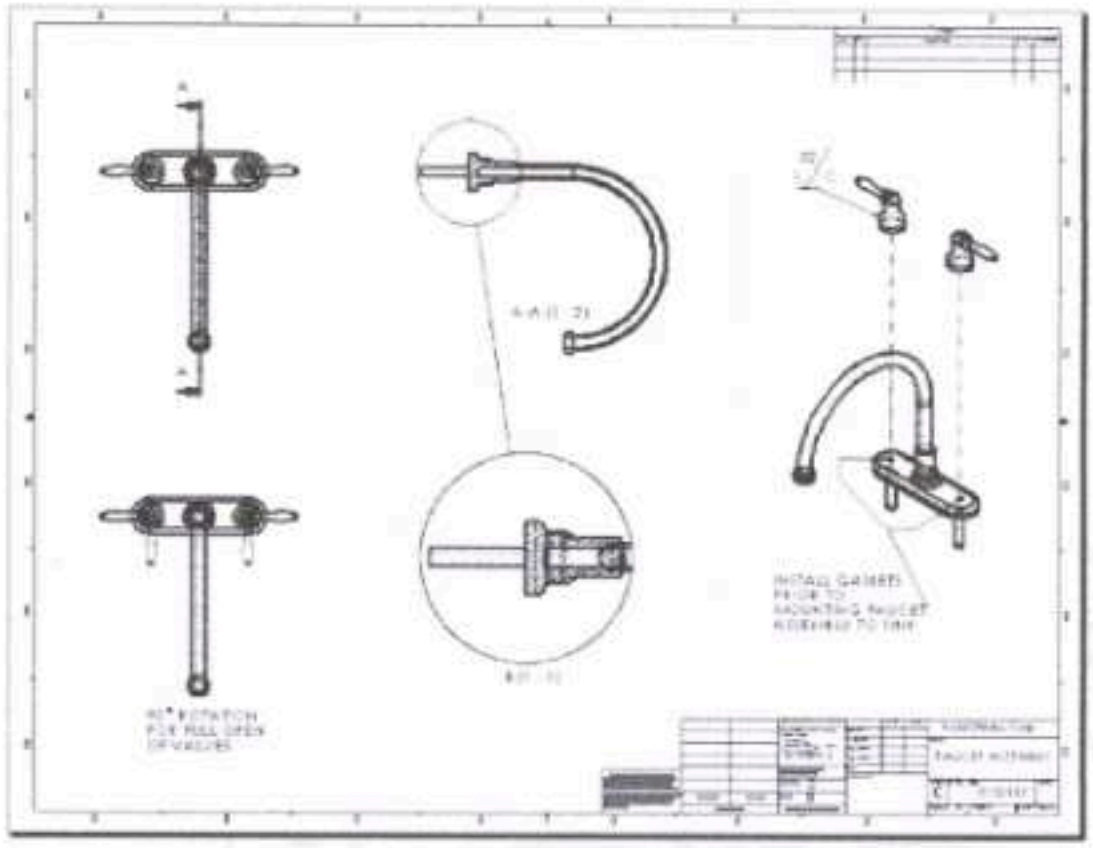
You can add surface finish symbols to part, assembly, or drawing documents. You can insert multiple symbols and multiple copies of a symbol.

Some of the characteristics that you can specify for a surface finish symbol include type of symbol, direction of lay, roughness, production method, material removal, and rotation.

The surface finish symbol attached to the faucet handle specifies a circular finish and the maximum roughness of the surface.



Here is the completed faucet assembly drawing sheet.



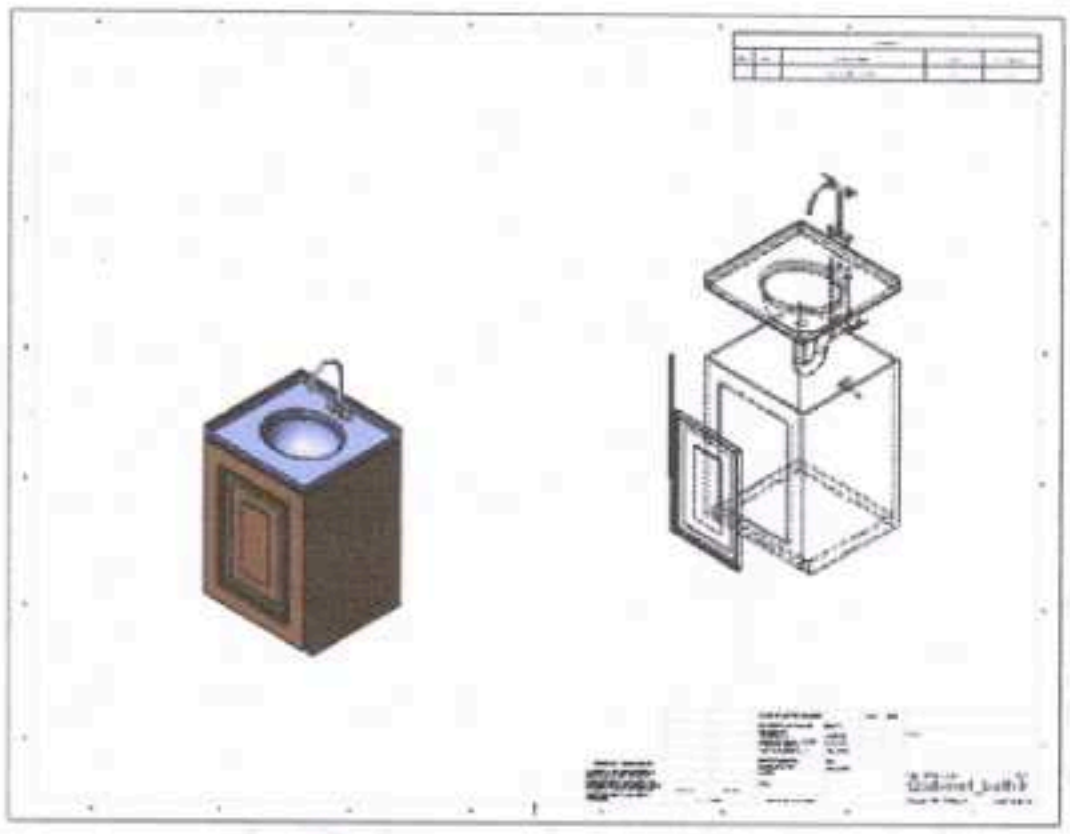
Vanity Assembly Drawing Sheet

This drawing sheet contains an exploded view, a bill of materials, and balloons.

Exploded Views

Exploded views are versions of named views defined in configurations in the assembly document. This drawing contains an exploded view of the vanity assembly.

The drawing also contains an isometric named view of the complete assembly, unexploded, at the lower left.



Bill of Materials

A bill of materials (BOM) is a table that lists the components of an assembly along with information needed in the manufacturing process. If the assembly or its components change, the BOM updates to reflect the changes.

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	cabinet_bath	Cabinet	1
2	hinge_assy	Hinge assembly	1
	hinge_1	Sheet metal hinge	1
	hinge_2	Sheet metal hinge	1
	pin	Hinge pin	1
3	door	Door assembly	1
	door	Door	1
	molding	Molding, long	2
	molding	Molding, short	2
4	waste_piping	Pipe, waste	1
5	supply_piping	Pipe, supply	2
6	ctrtop	Countertop	1
7	faucet	Faucet assembly	1
	faucet	Faucet, long	1
	faucet_handle	Standard handle	2

When you insert a BOM, you have a choice of BOM templates with various columns for data such as item number, quantity, part number, description, material, stock size, vendor number, and weight. You can also edit and save a custom BOM template.

The SOLIDWORKS software populates the item number, quantity, and part number columns automatically. The item numbers reflect the sequence in which the model was assembled.

You set the anchor point for the BOM in the drawing sheet format.

For more information, see *Bill of Materials - Overview* in the Help.

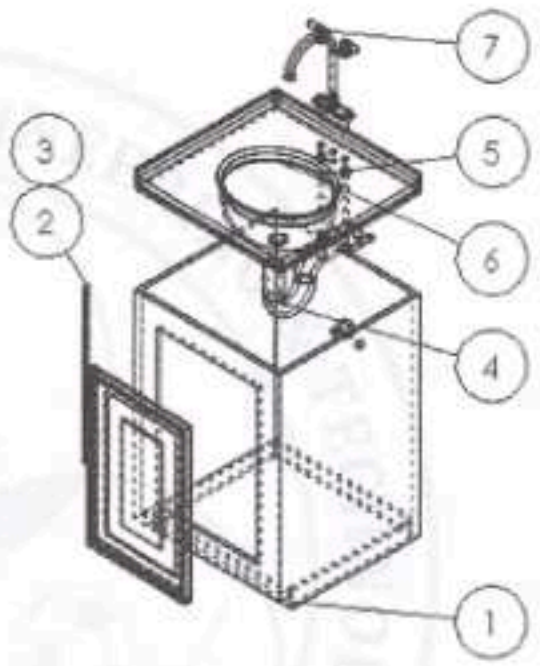
Balloons and Stacked Balloons

You can insert balloons in assembly and drawing documents. You can set the style, size, and type of information for balloons. In the example, the balloons display the item number corresponding to the BOM in a circle.

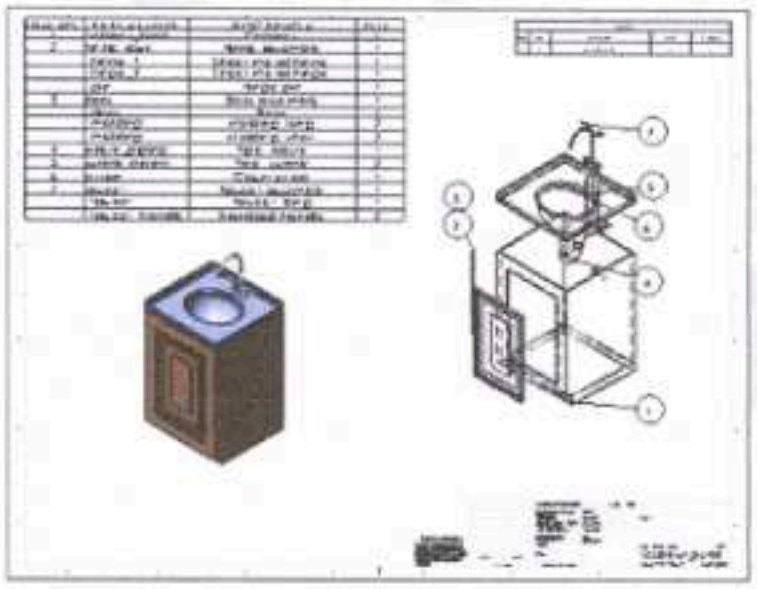
The exploded vanity assembly includes balloons and stacked balloons for each component. The item numbers appear in the balloons automatically.

Stacked balloons have one leader for a series of balloons. You can stack the balloons vertically or horizontally.

> For a lesson on bills of materials and balloons, see the *Advanced Drawings* tutorial.



Here is the completed vanity assembly drawing sheet.



Mount Zion College of Engineering and Technology

To Make Man Whole!!

FEEDBACK

VENKATESVARA POLYTECHNIC COLLEGE

(Run by - M/s.Venkatesvara Educational Trust)
(Approved by AICTE, New Delhi)

ISO 9001 : 2006 CERTIFIED INSTITUTION

ISO 9001 : 2006
Reg.No : RQ91 / 4099

Aranthangi Road, Kaikuruchi, PUDUKKOTTAI - 622 303.
Principal : 94445 69438 Office : 94452 32438

Date : 15/12/2017

Appreciation Letter

From

R.Jeevanantham M.E ., MBA .,
Principal,
Venkatesvara Polytechnic College,
Kaikkurichi ,
Pudukkottai .

To

The Principal,
Mount Zion College of Engineering and Technology,
Lenavilakku,
Pudukkottai.

Sub: Appreciation for conducting a technical workshop for rural students-Regarding

Dear Sir

I am writing this letter with great pride and bliss to appreciate your progress in conducting technical workshops every year for rural students. Weare delighted by your dedication to the work and your enthusiasm toward your goal. We do not have enough words to express our heartly thanks to appreciate your effort in developing rural students.

We are happy to share that most of our students were benefited through this workshop. Some of them got a good job and few of the do their higher studies. This is tremendous effort that you are taking to improve the rural students in advanced technologies. We heartily congratulate you and your effort in your future endeavour.

With Best Wishes

VENKATESVARA POLYTECHNIC COLLEGE PUDUKKOTTAI Date: 15/12/2017

MOUNT ZION COLLEGE OF ENGG. TECH.

Principal,
MOUNT ZION COLLEGE OF ENGG. TECH.,
Lenavilakku, Pilivalam (Po),
Thirumayam (Tk), Pudukkottai - 622 507.

PRINCIPAL
516. VENKATESVARA POLYTECHNIC COLLEGE
PUDUKKOTTAI

Annamalai Polytechnic College

A Government Aided Institution - Established in 1956
Run by Rajah Muthiah Chettiar Charitable and Educational Trust
(in memory of Dr. Rajah Sir Annamalai Chettiar of Chettinad)

Certificate of Appreciation

17.04.2018

From

Er.N.Palanisamy M.E.,
Principal,
Annamalai Polytechnic College,
Chettinad – 630 102.

To

The Principal,
Mount Zion College of Engineering and Technology,
Lenavilakku,
Pudukkottai

Sub: Appreciation for conducting technical workshop for rural students-Regarding

Dear Sir,

This is certify that our final year Diploma in Civil, Mechanical and Electrical and Electronics Engineering students attended a training program in advanced technology at Mount Zion College of Engineering and Technology. The program was very useful to them and they could update their knowledge in their specific discipline which was a felt need of the students. I am sure that this program conducted for the rural Diploma students has mould them and enabled them to do their best in their future endeavor, when they joined a company of their choice or in their higher studies as the case may be.

With kind regards,

17/4/18

Principal
Annamalai Polytechnic College
Chettinad - 630 102.

MOUNT ZION COLLEGE OF ENGG. TECH.

Principal,
MOUNT ZION COLLEGE OF ENGG. TECH.,
Lenavilakku, Pilivalam (Po),
Thirumayam (Tk), Pudukkottai - 622 507

Chettinad - 630 102,
Sivagangai District, Tamil Nadu.
(04565) 283250
(04565) 283303
principal@annamalaipolytechnic.in
www.annamalaipolytechnic.in

SUBRAMANIAN POLYTECHNIC COLLEGE

(An ISO 9001 : 2000 Certified Institution)

RAYAVARAM

15.07.2019

To

The Principal,
Mount Zion College of Engineering &Technology,
Lenavilakku,
Pudukkottai.

Dear Sir,

Sub : Technical Workshop – Appreciation –Regarding.

I owe my sincere thanks for having organized the training session on Recent Trends and Technology for our rural based students at your campus. The session was very much informative for our students and the training materials provided were much beneficial. Hope this would definitely support our students' career.

Especially my thanks to your staff team, who are all involved in this training program and made it so productive. Please extend your interest in the coming years also and encourage our students to attend similar training sessions.

Thanking you,

Principal,
MOUNT ZION COLLEGE OF ENGG. TECH.
Lenavilakku, Pilivalam (Po),
Thirumayam (Tk), Pudukkottai-622 507.

PRINCIPAL
SUBRAMANIAN POLYTECHNIC COLLEGE
RAYAVARAM - 622 506.

Rayavaram - 622 506, Pudukkottai District. Telep[illegible] : 04339 - 272226, 272878
Website : www.sptc.org.in E-mail : principal@sptc.org.in

Mount Zion College Of Engineering And Technology

Technical Workshop Series'16

Registration Form

Name of the Participant	:J.MEENAL
Department	:EEE
Name of the Polytechnic College	:ALAGAPPA POLYTECHNIC COLLEGE
Date of attending the Workshop	:08.04.2016
Father's Name	:M.JAYARAMAN
Communication Address	:NO.48 MADHAVAN ST, ANNANAGAR, KARAIKUDI

Feedback:

* The workshop was Very useful to us.

* The Content delivery was good and easy to understand.

Mobile No : 9750258318

I hereby declare that the details furnished above are true and I allow the college to contact me for any purposes through the above given contact numbers.

Meent.
signature

MOUNT ZION COLLEGE OF ENGG. TECH

Principal,
MOUNT ZION COLLEGE OF ENGG. TECH.,
Lenavilakku, Pilivalam (Po),
Thirumayam (Tk), Pudukkottai - 622 507

Mount Zion College Of Engineering And Technology

Technical Workshop Series'16

Registration Form

Name of the Participant	:T.JEEVA
Department	:MECH
Name of the Polytechnic College	:N.M. POLYTECHNIC COLLEGE
Date of attending the Workshop	:11.04.2016
Father's Name	:T.THANGAMANI
Communication Address	:1/137, KOTHAMANGALAM, ALANGUDI.

Feedback:

The workshop was very useful. I learned lot of new things. It will help for my career in future.

Mobile No : 9600608654

I hereby declare that the details furnished above are true and I allow the college to contact me for any purposes through the above given contact numbers.

T. Jeeva

signature

MOUNT ZION COLLEGE OF ENGG. TECH.

Principal,
MOUNT ZION COLLEGE OF ENGG. TECH.,
Lenavilakku, Pilivalam (Po),
Thirumayam (Tk), Pudukkottai - 622 5

Mount Zion College Of Engineering And Technology

Technical Workshop Series'16

Registration Form

Name of the Participant	:G.CHITRADEVI
Department	:CSE
Name of the Polytechnic College	:ALAGAPPA POLYTECHNIC COLLEGE
Date of attending the Workshop	:6.04.2016
Father's Name	:S.GANEASAN
Communication Address	:PK.MANGALAM, RAMNAD DIST.

Feedback:

இந்த workshop எனக்கு மிகவும் உபயோகமாக இருந்தது. என்னுடைய job-க்கு உதவும் என நினைக்கிறேன். இந்த Training நன்றாக இருந்தது.

Mobile No : 9788778431

I hereby declare that the details furnished above are true and I allow the college to contact me for any purposes through the above given contact numbers.

G. Chitradevi

signature

MOUNT ZION COLLEGE OF ENGG. TECH

Principal,
MOUNT ZION COLLEGE OF ENGG. TECH.,
Lenavilakku, Pilivalam (Po),
Thirumayam (Tk), Pudukkottai - 622 502

Mount Zion College Of Engineering And Technology

Technical Workshop Series'16

Registration Form

Name of the Participant	:K.S. VIKRAMADHITHAN
Department	:ECE
Name of the Polytechnic College	:VENKATESVARA POLYTECHNIC COLLEGE
Date of attending the Workshop	:6.04.2016
Father's Name	:K.SELVARAJ
Communication Address	:1778, KUMARAN COLONY, GANDARVAKOTTAI.

Feedback:

* The workshop was more informative.
* We learn more knowledge and simulate the various ckts.
* Very nice presentation.
* Thanks Management for hospitality.

Mobile No : 7402372808

I hereby declare that the details furnished above are true and I allow the college to contact me for any purposes through the above given contact numbers.

signature

MOUNT ZION COLLEGE OF ENGG. TECH

Principal,
MOUNT ZION COLLEGE OF ENGG. TECH.,
Lenavilakku, Pilivalam (Po),
Thirumayam (Tk), Pudukkottai - 622 507

Mount Zion College of Engineering and Technology

Technical Workshop Series'17

Registration Form

Name of the Participant : MANIKANDAN

Department : ECE

Name of the Polytechnic College : ALAGAPPA CHETTIAR POLYTECHNIC COLLEGE

Date of Attending the Workshop : 16-02-2017

Father's Name : SHANMUGASUNDARAM

Communication Address : 19/13,VEERAPANDIA PURAM EAST ,DEVAKOTTAI

Feedback :

This work shop is very usefull, Triner so good

Thanks for the MOUNTZION.

Mobile No : +918675337376 EmailID : mani98dece@gmail.com

I hereby declare that the details furnished above are true and I allow the college to contact me for any purposes through the above given contact numbers.

Signature

MOUNT ZION COLLEGE OF ENGG. TECH

Principal,
MOUNT ZION COLLEGE OF ENGG. TECH.,
Lenavilakku, Pilivalam (Po),
Thirumayam (Tk), Pudukkottai - 622 507

Mount Zion College of Engineering and Technology

Technical Workshop Series'17

Registration Form

Name of the Participant : M .MANIKANDAN

Department : ECE

Name of the Polytechnic College : ALAGAPPA CHETTIAR POLYTECHNIC COLLEGE

Date of Attending the Workshop : 16-02-2017

Father's Name : V .MURUGAN

Communication Address : 26/41 MANTHOPPU STREET
DEVAKOTTAI
26/41 MANTHOPPU STREET
DEVAKOTTAI

Feedback :

PCB layout design project is very useFull. This college is wonderFull. I impressed in this class.

class room மிகவும் நன்றாக இருக்கிறது.
நிறைகுறைகள் நன்றாக சொல்லிதருகிறார்கள். நான் இந்த கல்லூரியில்
சேர்ந்ததற்கு பெருமை அடைகிறேன்.

Thank you

Mobile No : +917373891933 EmailID : Mani105857.km@gmail.com

I hereby declare that the details furnished above are true and I allow the college to contact me for any purposes through the above given contact numbers.

Signature

M. Manikandan

Don't call

MOUNT ZION COLLEGE OF ENGG. TECH

Principal,
MOUNT ZION COLLEGE OF ENGG. TECH.,
Lenavilakku, Pilivalam (Po),
Thirumayam (Tk), Pudukkottai - 622 507

Mount Zion College of Engineering and Technology

Technical Workshop Series'18

Registration Form

Name of the Participant : V.VEERIYAPERUMAL

Department : EEE

Name of the Polytechnic College : S.S.R. POLYTECHNIC COLLEGE

Date of Attending the Workshop : 23-01-2018

Father's Name : VALIYAPPAN

Communication Address : S/O VALIYAPPAN VEERAN KOVIL STREET THUVAR [POST]
THIRUPATHUR [TK] SIVAGANGAI [DIST] PINCOAD [630 405]

Feedback :

இந்த பயிற்சி பயனுள்ளதாக அமைந்தது.
அனைத்து விளக்கங்களும் நன்கு புரிந்தது.
நன்றாக கொள்ளி கொடுத்தார்கள். புதிய
விஷயங்களை கற்றுக் கொண்டோம்.
மிக்க நன்றி.

Mobile No : +918940170053 EmailID : veeriyaperumal.v@gimal.com

I hereby declare that the details furnished above are true and I allow the college to contact me for any purposes through the above given contact numbers.

V. Veeriyaperumal
Signature

MOUNT ZION COLLEGE OF ENGG. TECH.

Principal,
MOUNT ZION COLLEGE OF ENGG. TECH.,
Lenavilakku, Pilivalam (Po),
Thirumayam (Tk), Pudukkottai - 622 507

Mount Zion College of Engineering and Technology

Technical Workshop Series'18

Registration Form

Name of the Participant : AJITHKUMAR

Department : EEE

Name of the Polytechnic College : S.S.R. POLYTECHNIC COLLEGE

Date of Attending the Workshop : 23-01-2018

Father's Name : RASU

Communication Address : S/O K.RASU
PUTHU KALANI
SUNDARAM (PO)
PONNAMARAVATHI (TK)
PUDUKKOTTAI (DT)
622 402

Feedback :

It was so useful
Everything good
Hands on training useful.

Mobile No : +919626093269 EmailID :

I hereby declare that the details furnished above are true and I allow the college to contact me for any purposes through the above given contact numbers.

R. Ajithkumar
Signature

MOUNT ZION COLLEGE OF ENGG. TECH

Principal,
MOUNT ZION COLLEGE OF ENGG. TECH.,
Lenavilakku, Pilivalam (Po),
Thirumayam (Tk), Pudukkottai - 622 507

Mount Zion College of Engineering and Technology

Technical Workshop Series'18

Registration Form

Name of the Participant : SURYA

Department : EEE

Name of the Polytechnic College : S.S.R. POLYTECHNIC COLLEGE

Date of Attending the Workshop : 23-01-2018

Father's Name : CHINNASAMY

Communication Address : SOLAYAMMAPATTI
AYANPORUVAI(POST)
MARUNGAPURI(TH)
TRICHY(DT)-621308

Feedback :

Course useful
Hospitality was good.
Software training was very interesting and we develop knowledge.
Thank you.

Mobile No : +917373284616 EmailID :

I hereby declare that the details furnished above are true and I allow the college to contact me for any purposes through the above given contact numbers.

Signature

MOUNT ZION COLLEGE OF ENGG. TECH.

Principal,
MOUNT ZION COLLEGE OF ENGG. TECH.,
Lenavilakku, Pilivalam (Po),
Thirumayam (Tk), Pudukkottai - 622 507

Mount Zion College of Engineering and Technology

Technical Workshop Series'18

Registration Form

Name of the Participant : MOHAMED THARICK.S

Department : EEE

Name of the Polytechnic College : ALAGAPPA CHETTIAR POLYTECHNIC COLLEGE

Date of Attending the Workshop : 23-02-2018

Father's Name : SETTU.K

Communication Address : NO:45 , BOSE NAGAR,
6TH STREET ,
PUDUKKOTTAI.

Feedback :

The circuit wizard workshop Programme was very well organized. and we learned about more knowledge about this workshop.

Mobile No : +918248577085 EmailID : mohdtharick07@gmail.com

I hereby declare that the details furnished above are true and I allow the college to contact me for any purposes through the above given contact numbers.

Signature

MOUNT ZION COLLEGE OF ENGG. TECH.

Principal,
MOUNT ZION COLLEGE OF ENGG. TECH.,
Lenavilakku, Pilivalam (Po),
Thirumayam (Tk), Pudukkottai - 622 507

Mount Zion College of Engineering and Technology

Technical Workshop Series'18

Registration Form

Name of the Participant : G.KARUPPASAMY

Department : EEE

Name of the Polytechnic College : ALAGAPPA CHETTIAR POLYTECHNIC COLLEGE

Date of Attending the Workshop : 23-02-2018

Father's Name : C.GANESAN

Communication Address : 5/39,WEST STREET,P.THOTTIYANKULAM,THIRUCHULI(T),VIRUDHUNAGAR (D.T)

Feedback :

The workshop conducted is very useful.
It is knowledgable and learned about it well.
The Hospitality is Good.

Mobile No : +919994983272 EmailID :

I hereby declare that the details furnished above are true and I allow the college to contact me for any purposes through the above given contact numbers.

G. Karuppasamy

Signature

MOUNT ZION COLLEGE OF ENGG. TECH

Principal,
MOUNT ZION COLLEGE OF ENGG. TECH.,
Lenavilakku, Pilivalam (Po),
Thirumayam (Tk), Pudukkottai - 622 507

Mount Zion College of Engineering and Technology

Technical Workshop Series'18

Registration Form

Name of the Participant : VIGNESH M

Department : EEE

Name of the Polytechnic College : ALAGAPPA CHETTIAR POLYTECHNIC COLLEGE

Date of Attending the Workshop : 23-02-2018

Father's Name : MURUGANANTHAM R

Communication Address : 1125,MUTHURAMAN NAGAR,
KOVILOOR.

Feedback :

The delivery of the content is good. Presentation is nice. Need more webinars on electrical domain.

Mobile No : +919600562623 EmailID : muruganvicky2312@gmail.com

I hereby declare that the details furnished above are true and I allow the college to contact me for any purposes through the above given contact numbers.

Signature

MOUNT ZION COLLEGE OF ENGG. TECH

Principal,
MOUNT ZION COLLEGE OF ENGG. TECH.,
Lenavilakku, Pilivalam (Po),
Thirumayam (Tk), Pudukkottai - 622 507

Mount Zion College of Engineering and Technology

Technical Workshop Series'18

Registration Form

Name of the Participant : K KRISHNAKUMAR

Department : EEE

Name of the Polytechnic College : S.S.R. POLYTECHNIC COLLEGE

Date of Attending the Workshop : 23-01-2018

Father's Name : N KANNAN

Communication Address : S/OKANNAN PALLAPATTI PUTUR KOTTAMPATTI(POST) MELUR(TK) MADURAI (DT)

Feedback :

The content of the workshop is very Knowledgeable to me. The given time for the programme is good.

Mobile No : +919943718845 EmailID :

I hereby declare that the details furnished above are true and I allow the college to contact me for any purposes through the above given contact numbers.

Signature

MOUNT ZION COLLEGE OF ENGG. TECH.

MOUNT ZION COLLEGE OF ENGG. TECH.,
Lenavilakku, Pilivalam (Po),
Thirumayam (Tk), Pudukkottai - 622 507

Mount Zion College of Engineering and Technology

Technical Workshop Series'18

Registration Form

Name of the Participant : KARTHIKEYAN.A

Department : EEE

Name of the Polytechnic College : ALAGAPPA CHETTIAR POLYTECHNIC COLLEGE

Date of Attending the Workshop : 23-02-2018

Father's Name : ARULALAN.V

Communication Address : A.K.COMPLEX ,BHARATHINAGAR, KARAIKUDI-03.

Feedback :

* My overall experience the workshop was good
* They provided handson Training is good
* I learnt lot of new informations today.
* Good hospitality and taught well
* Continue the same workshop for next year also.

Thank you

Mobile No : +919500242073 EmailID : karthiarulalan@gmail.com

I hereby declare that the details furnished above are true and I allow the college to contact me for any purposes through the above given contact numbers.

A Karthikeyan

Signature

MOUNT ZION COLLEGE OF ENGG. TECH *

Principal,
MOUNT ZION COLLEGE OF ENGG. TECH.,
Lenavilakku, Pilivalam (Po),
Thirumayam (Tk), Pudukkottai - 622 507

Mount Zion College of Engineering and Technology

Technical Workshop Series'18

Registration Form

Name of the Participant : SANTHOSH

Department : EEE

Name of the Polytechnic College : S.S.R. POLYTECHNIC COLLEGE

Date of Attending the Workshop : 23-01-2018

Father's Name : C.VAITHIYANATHAN

Communication Address : MELATHERU THIRUKKALAMPUR(PO

Feedback :

This workshop was very useful and informative. I learnt many things especially my domain such as circuit wizard. Hospitality was good.

Mobile No : +919751301693 EmailID :

I hereby declare that the details furnished above are true and I allow the college to contact me for any purposes through the above given contact numbers.

Signature

MOUNT ZION COLLEGE OF ENGG. TECH

Principal,
MOUNT ZION COLLEGE OF ENGG. TECH.,
Lenavilakku, Pilivalam (Po),
Thirumayam (Tk), Pudukkottai - 622 507

Mount Zion College Of Engineering And Technology

Technical Workshop Series'19

Registration Form

Name of the Participant	:M.KABIL
Department	:MECH
Name of the Polytechnic College	:KUMARAN POLYTECHNIC COLLEGE
Date of attending the Workshop	:03.05.2019
Father's Name	:
Communication Address	:ARANTHANGI

Feedback:

The material distribution is good.
The practical session was interesting
I learnt lot of informatcin in this technical workshop.
The overall workshop experience is good.

Mobile No: 8525941094

I hereby declare that the details furnished above are true and I allow the college to contact me for any purposes through the above given contact numbers.

M. Kabil.
signature

MOUNT ZION COLLEGE OF ENGG. TECH

Principal,
MOUNT ZION COLLEGE OF ENGG. TECH.,
Lenavilakku, Pilivalam (Po),
Thirumayam (Tk), Pudukkottai - 622 507

Mount Zion College Of Engineering And Technology

Technical Workshop Series'19

Registration Form

Name of the Participant	:S.BOSE
Department	:MECH
Name of the Polytechnic College	:N.M. POLYTECHNIC COLLEGE
Date of attending the Workshop	:19.04.2019
Father's Name	:
Communication Address	:PUDUKKOTTAI

Feedback:

எனக்கு இந்த course மிகவும் பயனுள்ளதாக இருந்தது. நான் இந்த course ன் மூலம் நிறைய கற்றுக் கொண்டேன். எனது மேற்படிப்பிற்கு மிகவும் useful ஆக இருந்தது.

Mobile No: 8525941094

I hereby declare that the details furnished above are true and I allow the college to contact me for any purposes through the above given contact numbers.

S. Bose
Signature

MOUNT ZION COLLEGE OF ENGG. TECH

Principal,
MOUNT ZION COLLEGE OF ENGG. TECH.,
Lenavilakku, Pilivalam (Po),
Thirumayam (Tk), Pudukkottai - 622 507

Mount Zion College Of Engineering And Technology

Technical Workshop Series'19

Registration Form

Name of the Participant	:S.JANCY
Department	:ECE
Name of the Polytechnic College	:ALAGAPPA POLYTECHNIC COLLEGE
Date of attending the Workshop	:05.04.2019
Father's Name	:
Communication Address	:KARAIKUDI

Feedback:

எனக்கு இந்த வொர்க் ஷாப் பயனுள்ளதாக இருந்தது. இதன் மூலம் நிறைய பயனுள்ள தகவல் தெரிந்துக் கொண்டேன்.

Mobile No: 9159973796

I hereby declare that the details furnished above are true and I allow the college to contact me for any purposes through the above given contact numbers.

S. Jancy

signature

MOUNT ZION COLLEGE OF ENGG. TECH

Principal,
MOUNT ZION COLLEGE OF ENGG. TECH.,
Lenavilakku, Pillivalam (Po),
Thirumayam (Tk), Pudukkottai - 622 507

Mount Zion College Of Engineering And Technology

Technical Workshop Series'19

Registration Form

Name of the Participant	:M.SAKTHIVEL
Department	:CSE
Name of the Polytechnic College	:ALAGAPPA POLYTECHNIC COLLEGE
Date of attending the Workshop	:12.04.2019
Father's Name	:
Communication Address	:KARAIKUDI

Feedback:

College is good
Infrastructure is good
Food is good
Course is good

Mobile No: 9087572038

I hereby declare that the details furnished above are true and I allow the college to contact me for any purposes through the above given contact numbers.

MOUNT ZION COLLEGE OF ENGG. TECH

signature

Mount Zion College of Engineering and Technology

To Make Man Whole!!

TECHNICAL WORKSHOP SERIES'20

SAMPLE PARTICIPANT ONLINE FEEDBACK

SL.NO	NAME	DEPT	AREA	ABOUT WORKSHOP	HOSPITALITY	CONTENT DELIVERY
1	V.ARAVIND	EEE	THIRUUMAYAM	EXCELLENT	GOOD	EXCELLENT
2	VIJAYAKUMAR.V	EEE	THIRUUMAYAM	GOOD	EXCELLENT	GOOD
3	R.SELVAKUMAR	ECE	THIRUUMAYAM	GOOD	EXCELLENT	GOOD
4	SANJAYAKASH.R	EEE	THIRUUMAYAM	GOOD	EXCELLENT	GOOD
5	SANTHOSH KUMAR.S	ECE	THIRUUMAYAM	EXCELLENT	EXCELLENT	EXCELLENT
6	ABISH M	ECE	THIRUUMAYAM	GOOD	GOOD	EXCELLENT
7	P.KARTHICK	EEE	SIVAGANGAI	GOOD	EXCELLENT	GOOD
8	ELAVARASAN.R	EEE	SIVAGANGAI	GOOD	GOOD	EXCELLENT
9	N.NANTHAKUMAR	EEE	SIVAGANGAI	GOOD	EXCELLENT	GOOD
10	MTHAVASI	EEE	SIVAGANGAI	GOOD	EXCELLENT	GOOD
11	JANARTHANAN. N	EEE	SIVAGANGAI	EXCELLENT	EXCELLENT	EXCELLENT
12	PANDI RAJA	EEE	SIVAGANGAI	GOOD	GOOD	EXCELLENT
13	VIGNESHWARAN T	ECE	ALANGUDI	EXCELLENT	EXCELLENT	GOOD
14	ARUN EDISON.J	EEE	ALANGUDI	EXCELLENT	EXCELLENT	EXCELLENT
15	HARIHARAN.K	EEE	ALANGUDI	GOOD	GOOD	GOOD
16	P.DIVYA	ECE	ALANGUDI	GOOD	EXCELLENT	GOOD
17	MANIKANDAN MC	EEE	ALANGUDI	GOOD	EXCELLENT	GOOD
18	KAVIRAJ V	ECE	ALANGUDI	EXCELLENT	EXCELLENT	EXCELLENT
19	M. SUBASH	EEE	PUDUKKOTTAI	GOOD	EXCELLENT	GOOD
20	KANITHRAJ. N	EEE	PUDUKKOTTAI	GOOD	GOOD	EXCELLENT
21	K. KAMARAJ	ECE	PUDUKKOTTAI	EXCELLENT	GOOD	GOOD
22	A. AKASH	ECE	PUDUKKOTTAI	GOOD	EXCELLENT	GOOD
23	C. VASANTHAKUMAR	ECE	PUDUKKOTTAI	GOOD	EXCELLENT	GOOD
24	G.PONMARAN	ECE	PUDUKKOTTAI	GOOD	EXCELLENT	EXCELLENT
25	KALIDASS.T	EEE	KARAIKUDI	GOOD	EXCELLENT	GOOD

MOUNT ZION COLLEGE OF ENGG. TECH

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