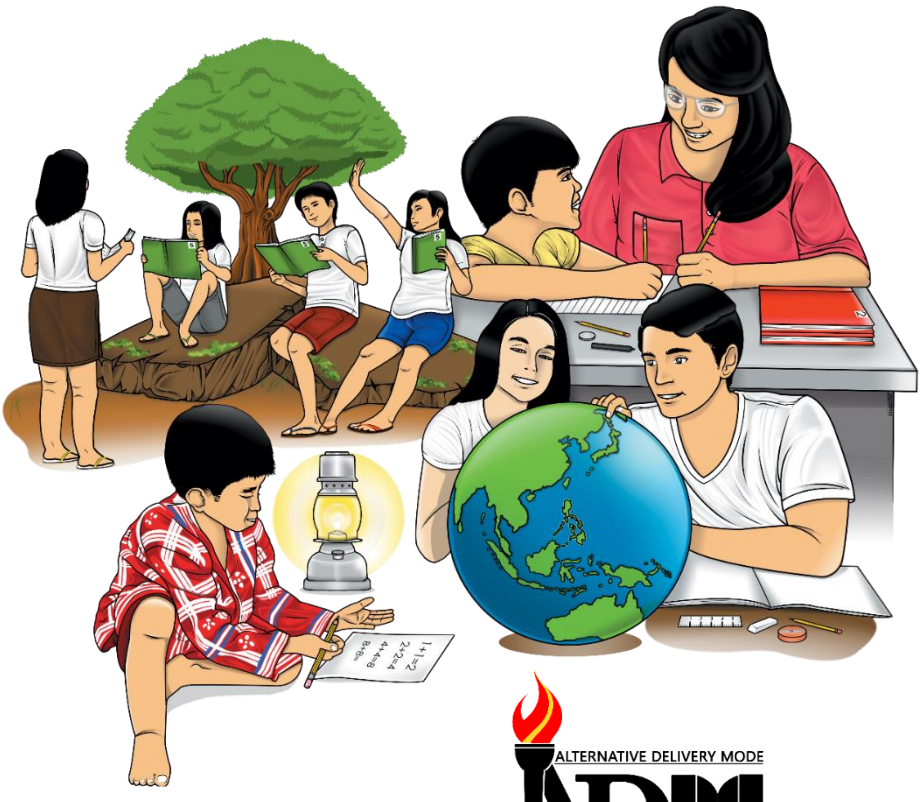
10

# Technology and Livelihood Education

## Quarter 1 - Module 6
## Operate CAD Software and Computer Hardware
(Manipulating CAD Features: Manipulations)

### Technical Drafting NC II



ALTERNATIVE DELIVERY MODE



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# 10

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## Quarter 1 - Module 6
## Operate CAD Software and Computer Hardware
(Manipulating CAD Features: Manipulations)

**Technical Drafting NC II**

DepED
DEPARTMENT OF EDUCATION

**ICT-Technical Drafting – Grade 10**
**Alternative Delivery Mode**
**Quarter 1 – Module 6: Operate CAD Software and Computer Hardware**
(Manipulating CAD features: Manipulations)

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# Introductory Message

This Self-Learning Module (SLM) is prepared so that you, our dear learners, can continue your studies and learn while at home. Activities, questions, directions, exercises, and discussions are carefully stated for you to understand each lesson.

Each SLMS is composed of different parts. Each part shall guide you step-by-step as you discover and understand the lesson prepared for you.

Pre-tests are provided to measure your prior knowledge on lessons in each SLM. This will tell you if you need to proceed on completing this module or if you need to ask your facilitator or your teacher's assistance for better understanding of the lesson. At the end of each module, you need to answer the post-test to self-check your learning. Answer keys are provided for each activity and test. We trust that you will be honest in using these.

In addition to the material in the main text, Notes to the Teacher are also provided to our facilitators and parents for strategies and reminders on how they can best help you on your home-based learning.

Please use this module with care. Do not put unnecessary marks on any part of this SLM. Use a separate sheet of paper in answering the exercises and test. And read the instructions carefully before performing each task.

If you have questions in using this SLM or any difficulty in answering the tasks in this module, do not hesitate to consult your teacher or facilitator.

Thank you.

***Notes to the Teacher***

This contains helpful tips or strategies that will help you in guiding the learner.

For the facilitator:

Hi, as a facilitator you are expected to orient the learners on how to use this module. You also need to keep track of the learners' progress while allowing them to manage their own learning. Kindly, advise the learner's parents or guardians of the same procedure since they will be the primary supporters in the learners' progress. Please, do not forget to remind the learner to use separate sheets in answering all of the activities found in the learning module

For the learner:

Hello learner, Welcome to the Technical Drafting NC II Alternative Delivery Mode (ADM) Module on Manipulating CAD features: Manipulations. I hope you are

ready to progress in your Grade 10 TLE in Technical Drafting with this learning module. This is designed to provide you with interactive tasks to further develop the desired learning competencies prescribed in our curriculum. With this, you are expected to appreciate staking through the information and activity given.

This module has the following parts and corresponding icons:

| ICON | LABEL | DETAIL |
|---|---|---|
| | What I Need to Know | This contains the learning objectives which you need to accomplish. |
| | What I know | This evaluates what you know about the lesson you are to learn. |
| | What's In | This connects the current lesson with a topic necessary in your understanding. |
| | What's New | This introduces the lesson through an activity. |
| | What Is It | This contains a brief discussion of the learning module lesson. |
| | What's More | These are activities to check your understanding of the lesson. |
| | What I have Learned | This summarizes the important ideas presented in the lesson. |
| | What I Can Do | This is a real-life application of what you have learned. |
| | Assessment | This is a post assessment of what you have learned. |
| | Additional Activity | This is an activity that will strengthen your knowledge about the lesson. |

At the end of this module you will also find:

| | |
|---|---|
| References | This is a list of all sources used in developing this module. |

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# Lesson 1 Manipulating CAD Features: Manipulations

The following are some reminders in using this module:

1. Use the module with care. Do not put unnecessary mark/s on any part of the module. Use a separate sheet of paper in answering the exercises.
2. Don't forget to answer *What I Know* before moving on to the other activities included in the module.
3. Read the instruction carefully before doing each task.
4. Observe honesty and integrity in doing the tasks and checking your answers.
5. Finish the task at hand before proceeding to the next.
6. Return this module to your teacher/facilitator once you are through with it.

If you encounter any difficulty in answering the tasks in this module, do not hesitate to consult your teacher or facilitator. Always bear in mind that you are not alone.

We hope that through this material, you will experience meaningful learning and gain deep understanding of the relevant competencies. You can do it!

## *What I Need to Know*

This module was designed and written to guide you to acquire the learning competencies and develop your skills in manipulation of drawing using the status bar in ICT-Technical Drafting. The scope of this module permits it to be used in many different learning situations. The language used recognizes the diverse vocabulary level of students. The lessons are arranged to follow the standard sequence of the course. However, the order in which you read the module can be changed to correspond with the textbook you are now using.

| | |
|---|---|
| Quarter/Week | Q1/W6 |
| Learning Competency Code | TLE_ICTTD9-12CA-Ic-j- 2 |
| Learning Competency | **LO 1. Operate CAD software and computer hardware**<br>1.3 Manipulate CAD features as per job requirement: Manipulations |

**Learning Objectives:**
After going through this module, you are expected to:

1. identify and match the commands in status bar and its functions;
2. explain functions of object snaps;
3. demonstrate accuracy in drafting a drawing using the object snaps in AutoCAD; and,
4. manifest organization, accuracy, creativity in choosing the appropriate commands to be used in drafting.

# *What I Know*

**Pretest**

**Multiple Choice.**

**Directions:** Choose the letter of the best answer. Write the chosen letter on the separate sheet of paper.

1. Which of the following Osnap breaks to the end points of lines, arcs and to polyline vertices?
   A. Center
   B. Endpoint
   C. Midpoint
   D. Quadrant
2. Which of the following Osnap breaks to the midpoints of lines and arcs and to the mid-point of polyline segments?
   A. Endpoint
   B. Midpoint
   C. Perpendicular
   D. Quadrant
3. What is the shortcut key of Ortho Mode?
   A. F5
   B. F6
   C. F7
   D. F8
4. It snaps to the center of a circle, arc or polyline arc segment.
   A. Center
   B. Intersection
   C. Tangent
   D. Quadrant
5. Which of the following will you press if you want to have a straight line either in horizontal or vertical?
   A. Object Snap
   B. Ortho Mode
   C. Snap Mode
   D. Polar Tracking
6. What Osnap can be useful if you have created a number of Points with the use of measure or divide commands?
   A. Display Grid
   B. Object Snap
   C. Node Osnap
   D. Snap Mode
7. If you want to disable the grid of your workplace, which of the following shortcut key will you press?
   A. F4
   B. F5
   C. F6
   D. F7
8. Which of the following is the shortcut key of Isodraft?
   A. F4
   B. F5
   C. F6
   D. F7
9. What will you do if you want to open the Osnap settings?
   A. Ask you teacher.
   B. Press F2 and choose OSNAP setting.
   C. Go to the status bar and left click on Object Snap.
   D. Press SHIFT while right-clicking in the drawing area and choose OSNAP setting.

10. Which of the following snap to one of the four circle quadrant points?
    A. Center
    B. Intersection
    C. Intersection
    D. Quadrant
11. What will you press if you want to specify angles in your drawing?
    A. F9
    B. F10
    C. F11
    D. F12
12. Which of the following Osnap is used to draw a line parallel to any otherline in your drawing?
    A. Intersection
    B. Nearest
    C. Parallel
    D. Perpendicular
13. You want to create drawings at a scale of 1:1. Which commands in status bar will you use?
    A. Annotation
    B. Annotation Scale
    C. Scaling
    D. Plot
14. What will you select if you want to hide part of your drawing in AutoCAD?
    A. Click CTRL + New.
    B. Click the hide button.
    C. Click the setting button.
    D. Click the isolate button.
15. Which of the following allows you to snap a point which forms a perpendicular with the selected object?
    A. Intersection
    B. Nearest
    C. Parallel
    D. Perpendicular

## *What's In*

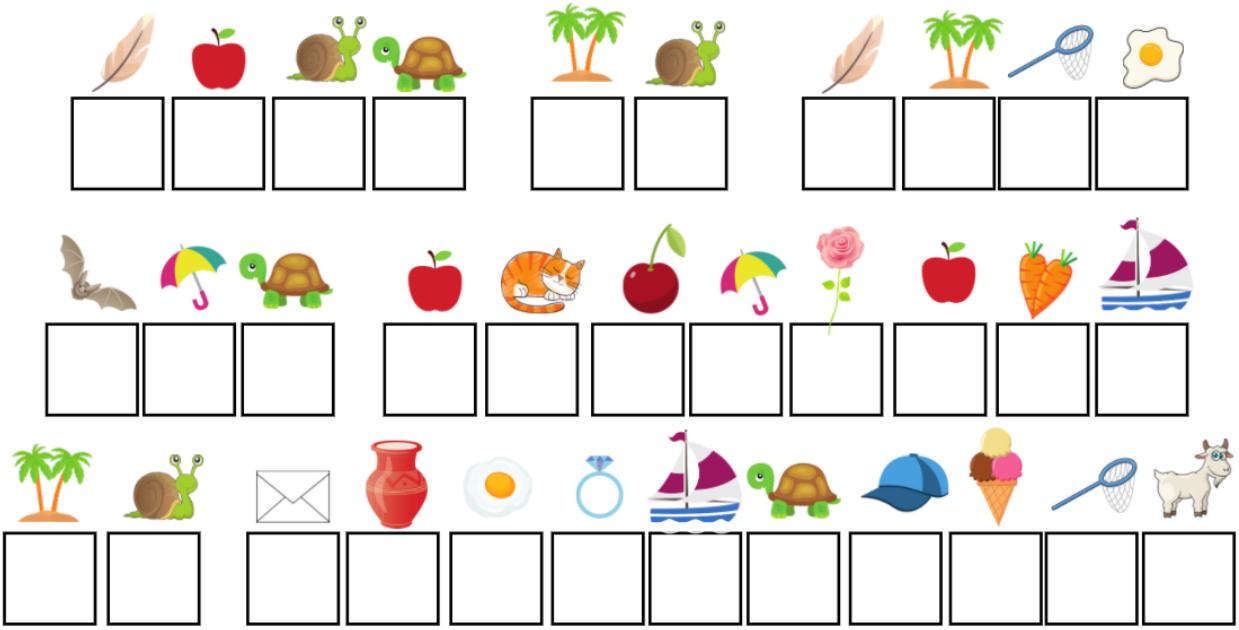
**Letter Mix -Up**
**Directions.** Arrange the letters to spell the words correctly. Write your answer on the answer sheet provided. Good Luck!

| | | | | | |
|---|---|---|---|---|---|
| 1. sivlibe | _____ | 5. thnoapm | _____ | 8. lerdea | _____ |
| 2. ieidmssonn | _____ | 6. ialenr | _____ | 9. agaurnl | _____ |
| 3. jdgoeg | _____ | 7. ctsnioe | _____ | 10. odeirtna | _____ |
| 4. iendiiuctrnoal | _____ | | | | |

## *What's New*

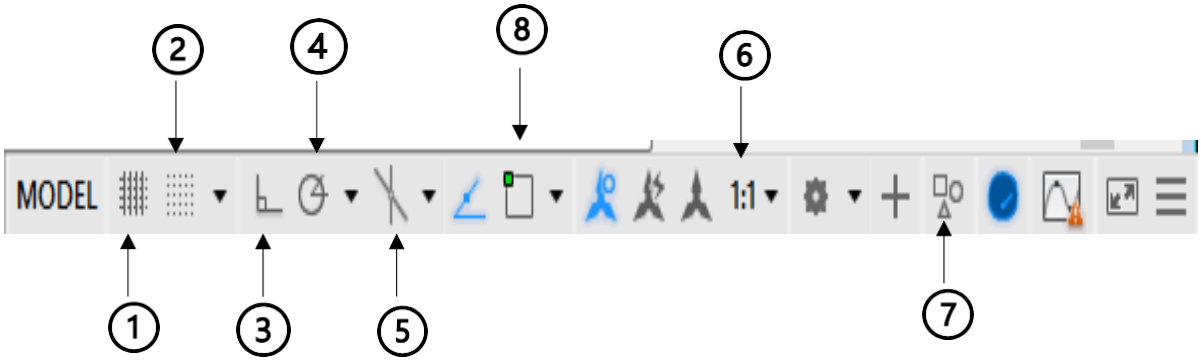
**Secret Sentence**

**Directions.** Write the beginning sound of each word to discover the secret sentence. Write the secret sentence on the answer sheet provided.

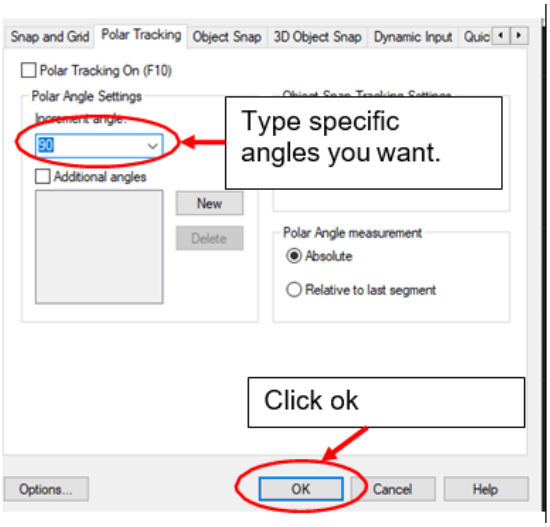
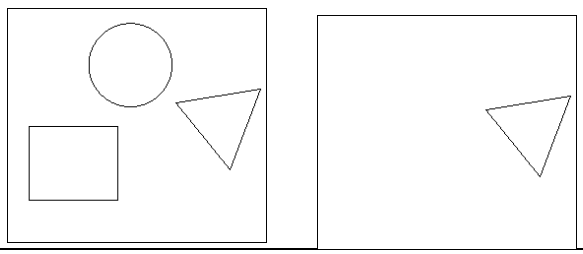


## *What Is It*

Hello learners, let us explore some of the drawing aids in the status bar used in creating precise and accurate drawings.

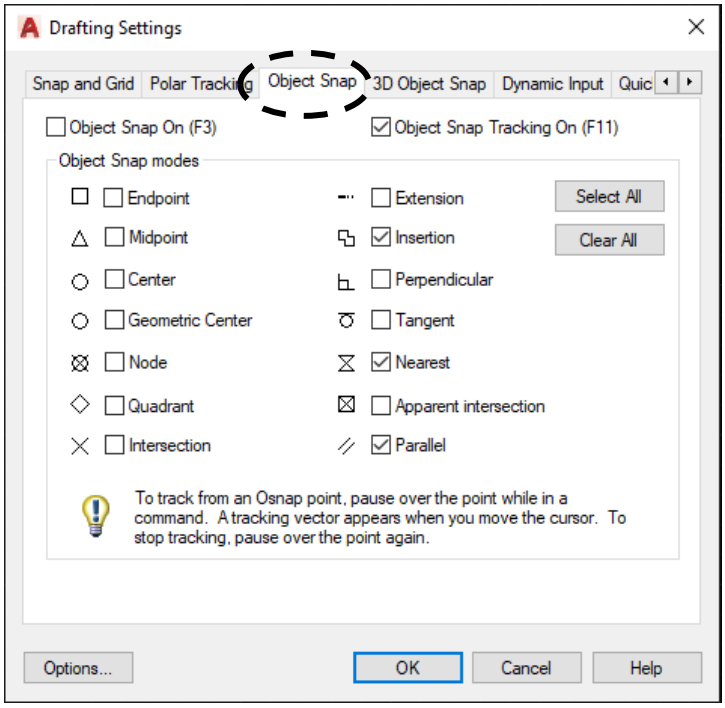



| Commands | Functions |
|---|---|
| 1. Display drawing Grid<br>Shortcut key: F7<br><br>Command: GRID [enter]<br>Specify grid spacing(X) or [ON/OFF/Snap/Aspect] <10.000>:<br>(enter grid spacing) | A regular pattern of dots displayed on the screen which acts as a visual aid, it is the equivalent of having a sheet of graph paper behind your drawing on a drawing board. You can control the grid spacing, so it can give you a general idea about the size of drawn objects. It can also be used to define the extent of your drawing. |
| 2. Snap mode<br>Shortcut key: F9<br><br>Command: SNAP or SN [enter]<br>Specify snap spacing or [ON/OFF/Aspect/Rotate/Style/ Type] <10.0000>:<br>(enter the required snap spacing indrawing units) | Snap mode takes AutoCAD one step further than the drawing board. With Snap mode turned on AutoCAD only allows you to pick points which lie on a regular grid. The Snap grid is completely independent of the display grid. |
| 3. Ortho Mode<br>Shortcut key: F8<br><br>Command: ORTHO<br>Enter mode [ON/OFF] <OFF>:<br>(typeON or OFF) | Ortho is short for orthogonal, which means either vertical or horizontal. Like the other options on the status bar, Ortho is not really a command, it is a drawing mode which can either be turned on or off. Ortho mode canbe toggled on or off in one of three ways. |

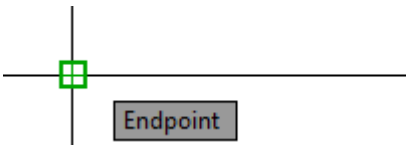
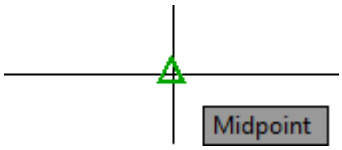
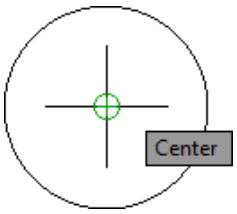
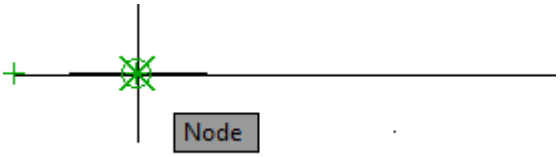
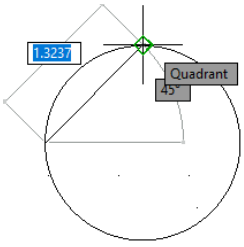
| | |
|---|---|
| 4. Polar Tracking<br>Shortcut key: F10<br><br>You can position specific angles you like in polar tracking by selecting thedrop-down arrow of polar tracking icon and select tracking settings. | Specify Polar Angles (Polar Tracking) You can use polar tracking to track along polar angle increments of 90, 60, 45, 30, 22.5, 18, 15, 10, and 5 degrees, or you can specify different angles.<br>  |
| 5 Isometric Drafting (ISODRAFT)<br>Shortcut key-F5 | The ISODRAFT command supersedes the ISOPLANE command. |
| 6. Annotation Scale | When drawing on paper you must decide to draw and say, 1:20 or 1:200 depending upon the size of the object that you are drawing so that your scaled drawing will fit on the drawing sheet, be that A3 or A1. In AutoCAD you do not need to decide upon a drawing scale until you come to print the drawing and because the scaling of your drawing takes place at the printing stage, you can create drawings at a scale of 1:1. |
| 7. Isolate Objects | Click the isolate button to choose whether you want to isolate or hide selected objects or end object isolation.<br>  |

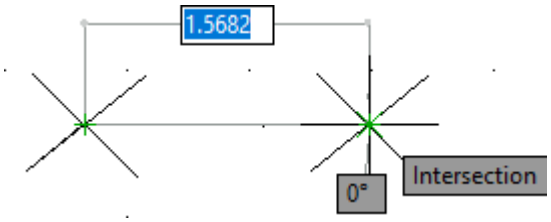
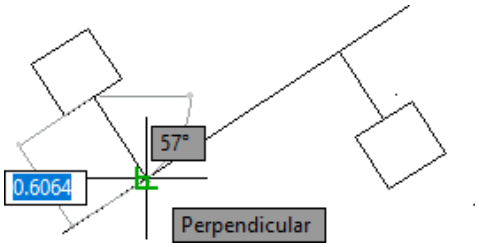
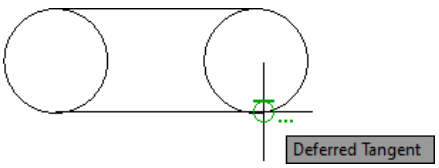
| | |
|---|---|
| | Original object Selected object like the circle and rectangle was isolated or hidden. |

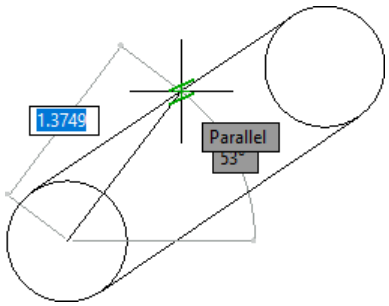
8. Object Snap/OSNAP
   Shortcut key: F3 or press SHIFT while right-clicking in the drawing area and choose OSNAP setting.




There are fourteen (14) Osnaps in all, and although they are all useful in certain situations you will probably find yourself using about half of them on a regular basis and the other half in special circumstances.

| | |
|---|---|
| **a. Endpoint Osnap**<br>The Endpoint Osnap breaks to the end points of lines and arcs and to polyline vertices. This is one of the most useful and commonly used Osnaps.<br><br>Command: END<br>Short-cut: Shift + Right Click Endpoint |  |
| **b. Midpoint Osnap**<br>The Midpoint Osnap breaks to the midpoints of lines and arcs and to the mid-point of polyline segments.<br>Command: **MID**<br>Short-cut: **Shift + Right Click Midpoint** |  |
| **c. Center Osnap**<br>Snaps to the center of a circle, arc or polyline arc segment. The cursor mustpass over the circumference of the circle or the arc so that the center canbe found.<br><br>Command: **CEN Short-cut: Shift + Right Click Center** |  |
| **d. Node**<br>The Node Osnap snaps to the center ofa Point object. This Osnap can be useful if you have created several Points with the Measure or Divide commands.<br>Command: **NODE**<br>**Short-cut: Shift + Right Click Node** |  |
| **e. Quadrant**<br>Snaps to one of the four circle quadrant points located at north, south, east, and west or 90, 270, 0 and 180 degreesrespectively. |  |

| | |
|---|---|
| Command: QUAD<br>**Short-cut: Shift + Right Click quadrant** | |
| **f. Intersection**<br>Snaps to the physical intersection ofany two drawing objects (i.e., where lines, arcs or circles etc. cross eachother) and to Polyline vertices.<br>Extended intersections as shown beloware available only as overrides during acommand, not as a running object snap.<br><br>Command: INTERSECTION<br>**Short-cut: Shift + Right Click intersection** |  |
| **g. Perpendicular**<br>Snaps to a point which forms a perpendicular with the selected object. As with the Tangent Osnap, Perpendicular can be used to draw a lineto a perpendicular point, as in the illustration or from a perpendicular point, known as the "Deferred Perpendicular"snap mode.<br><br>Command: PERPENDICULAR<br>**Short-cut: Shift + Right Click Perpendicular** |  |
| **h. Tangent**<br>Snaps to a tangent point on a circle. This Osnap works in two ways. You can either draw a line from a point to the tangent point or you can draw a line from a tangent point, the latter is referred to as the "Deferred Tangent" snap mode.<br><br>Command: **TAN Short-cut: Shift + Right Click TAN** |  |

| | |
|---|---|
| **i. Parallel**<br>Used to draw a line parallel to any other line in your drawing. In operation, this Osnap is slightly less intuitive than someof the others. To draw a parallel line, first start the Line command, specify the firstpoint when prompted and then start the Parallel Osnap. Hover the cursor over anexisting line until you see the Parallel snap marker. |  |

## *What's More*

**Functional Parts**
**Directions.** Match each word on the left column with its definition or function on the right. Write your answer on the answer sheet provided.

_____1. Parallel

_____2. Tangent

_____3. Midpoint

_____4. Nearest

_____5. Node

_____6. Center

_____7. Endpoint

A. Used to draw a line parallel toany other line in your drawing.

B. Snaps to the center of a circle,arc or polyline arc segment.

C. Snaps to the physical intersection of any two drawing objects (i.e. where lines, arcs or circles etc. cross each other) andto Polyline vertices.

D. Snaps to a tangent point on acircle.

E. Snaps to a point which forms a perpendicular with the selected object.

F. Snaps to one of the four circle quadrant points located at north, south, east and west or 90, 270, 0 and 180 degrees respectively.

G. Nearest Snaps to the nearest point on an object such as an arc,circle, ellipse, elliptical arc, line, point, polyline, ray, spline, or xline.

_____8. Intersection

_____9. Perpendicular

_____10. Quadrant

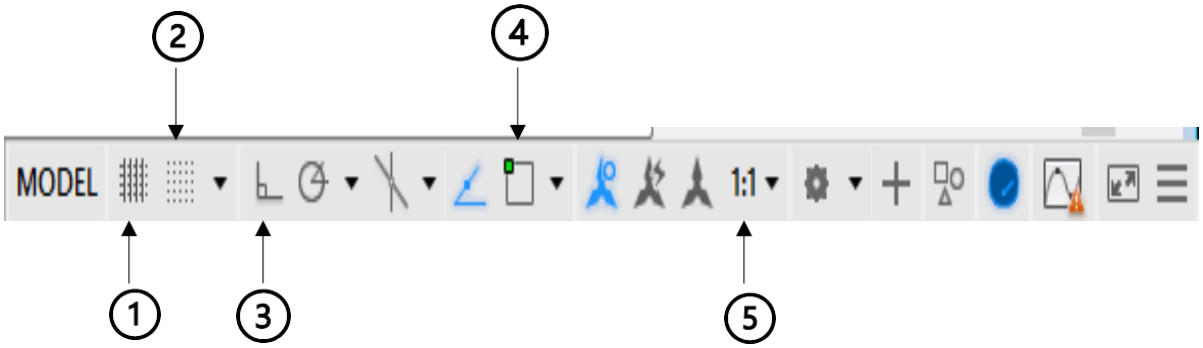
H. Breaks to the end points oflines and arcs and to polylinevertices.

I. This Osnap can be useful if you have created several Points with the measure or divide commands.

J. Breaks to the mid points of lines and arcs and to the mid-point of polyline segments

## *What I Have Learned*

**Names and Functions**
**Directions.** Identify the commands in the status bar and explain its functions in your own words. Write your answer on the answer sheet provided.



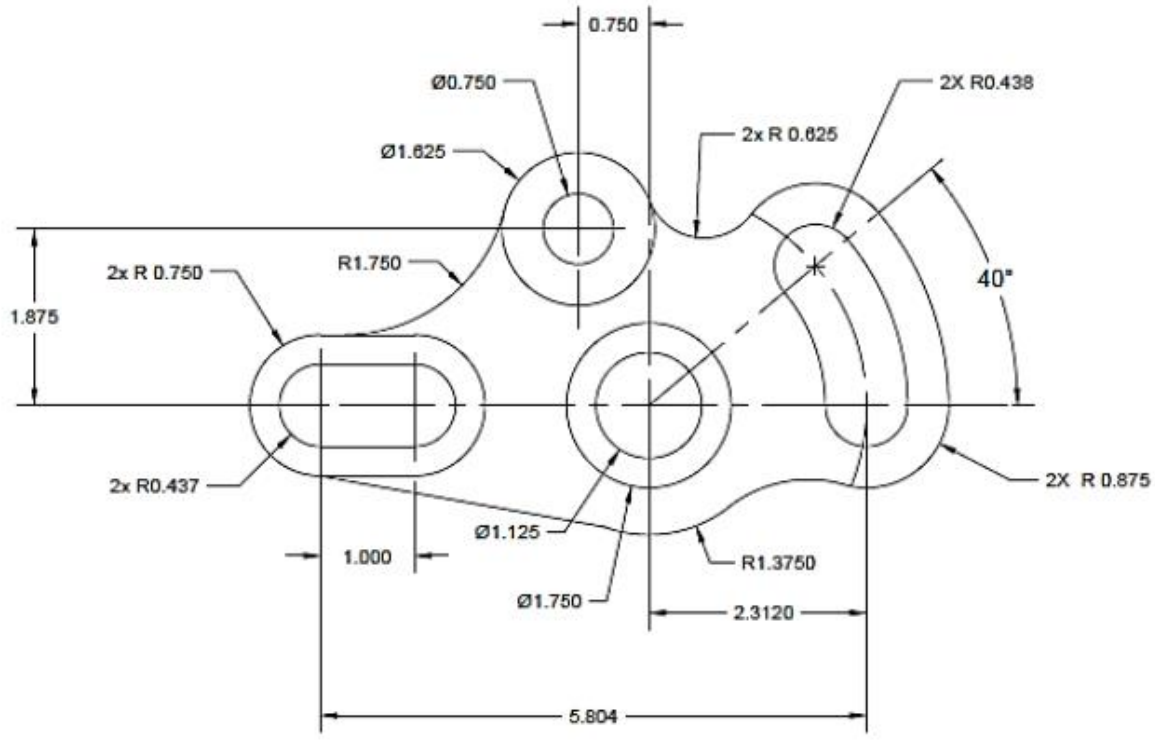

| Drawing Aids | Functions |
|---|---|
| 1. | |
| 2. | |
| 3. | |
| 4. | |
| 5. | |

## *What I Can Do*

Hello learners! There are two (2) sets of activity. **Activity 1** is for those who have computer devices and AutoCAD software. **Activity 2** is for those who don't have any computer devices. You can choose any activity that is applicable to you.

**Activity 1: Hands-on Activity**
**Directions.**

1. Redraw the given object and follow the dimensions.
2. Use the appropriate Object Snap to draft accurate and precise drawing output.
3. Apply proper dimensioning in your drawing. Make sure you follow the rules for dimensioning.
4. Save your work as <lastName_FirstName_Exer2>.dwg



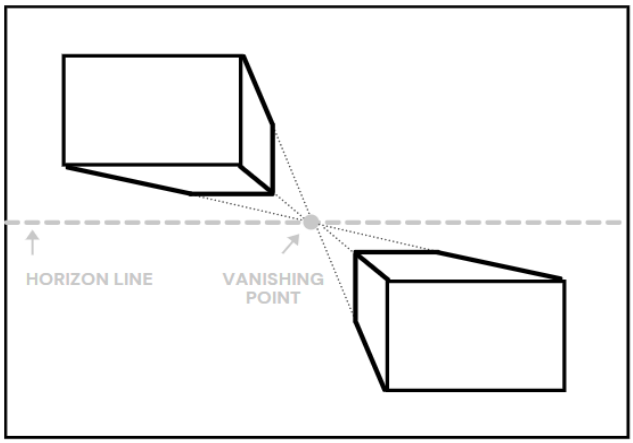
**Performance Criteria**

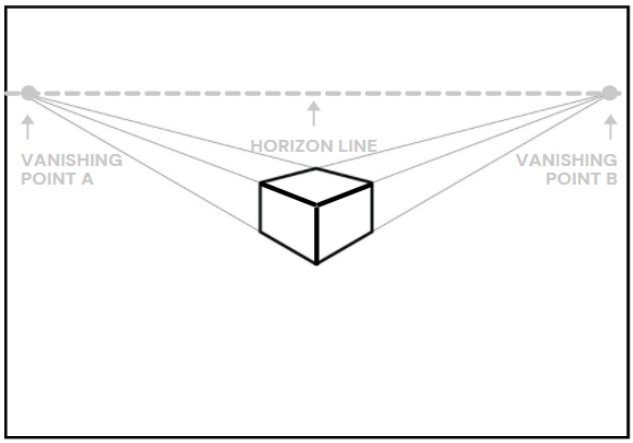
| Criteria | Levels of Assessment | | | | Score |
|---|---|---|---|---|---|
| | Excellent (10 pts) | Very satisfactory (8 pts) | Satisfactory (5 pts) | Needs Improvement (3 pt) | |
| **Followed the instructions** Followed the given instructions/procedure from start to finish, observed correct usage of command tools | | | | | |
| **Proficiency** Perform task with competence and exceptional performance | | | | | |
| **Accuracy** Perform the task with no errors | | | | | |
| **Use of AutoCAD command tools** Demonstrate high degree of competency with AutoCAD commands. Can prioritize commands and tools usage to create and modify objects. | | | | | |
| **Completeness** Drawings are completed quickly and efficiently with no errors | | | | | |
| Total | | | | | |

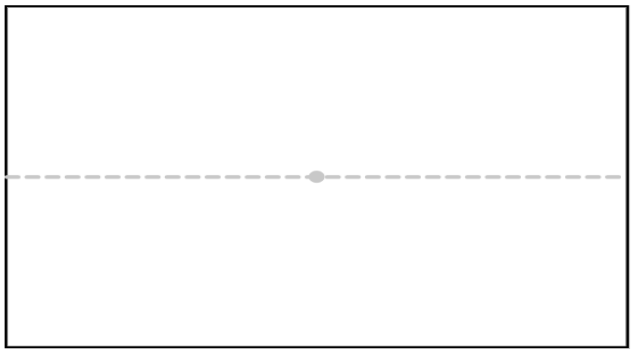
**Activity 2: An Exercise on Perspective**

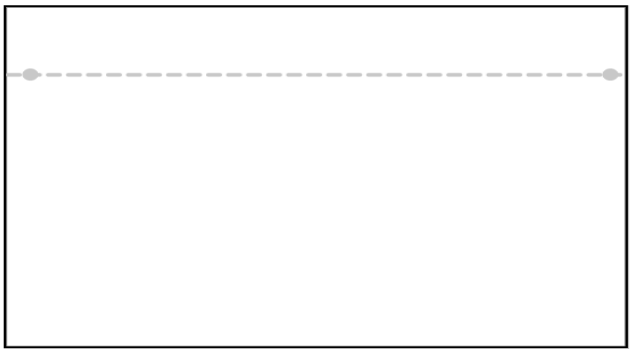
**Direction**. Perspective is an important part of visual art. It gives flat drawings a sense of depth and immerses viewers in your work. Copy the illustration from the first row to the second row. Observe the horizon line and vanishing points. Then, pick an object near you. Draw it in two perspectives using the boxes on the last row. Use the right drawing tool to create accurate and precise drawing output.

**One Point Perspective** **Two Point Perspective**





## Performance Criteria

| Criteria | Levels of Assessment | | | | Score |
|---|---|---|---|---|---|
| | Excellent (10 pts) | Very satisfactory (8 pts) | Satisfactory (5 pts) | Needs Improvement (3 pt) | |
| **Followed the instructions** Followed the given instructions/procedure from start to finish, observed correct usage of command tools | | | | | |
| **Accuracy** Draw the two perspectives accurately | | | | | |
| **Neatness** Has no visible erasures and unnecessary marks | | | | | |
| **Layout and Proportion** All drawings were drawn proportionately and was layout properly | | | | | |
| **Completeness** Drawings are completed quickly and efficiently with no errors | | | | | |
| Total | | | | | |

## *Post-Assessment*

**Multiple Choice.**

**Directions:** Choose the letter of the best answer. Write the chosen letter on the answer sheet provided.

1. What will you do if you want to open the Osnap settings?
   A. Ask you teacher.
   B. Press F2 and choose OSNAP setting.
   C. Go to the status bar and left click on Object Snap.
   D. Press SHIFT while right-clicking in the drawing area and choose OSNAP setting.
2. What is the shortcut key of Ortho Mode?
   A. F5 C. F7
   B. F6 D. F8
3. Which of the following will you press if you want to have a straight line either in horizontal or vertical?
   A. Object Snap C. Snap Mode
   B. Ortho Mode D. Polar Tracking
4. Which of the following allows you to snap a point which forms a perpendicular with the selected object?
   A. Intersection C. Parallel
   B. Nearest D. Perpendicular
5. It snaps to the center of a circle, arc or polyline arc segment.
   A. Center C. Tangent
   B. Intersection D. Quadrant
6. Which of the following is the shortcut key of Isodraft?
   A. F4 C. F6
   B. F5 D. F7
7. Which of the following Osnap breaks to the midpoints of lines and arcs and to the mid-point of polyline segments?
   A. Endpoint C. Perpendicular
   B. Midpoint D. Quadrant
8. Which of the following snaps to one of the four circle quadrant points?
   A. Center C. Intersection
   B. Intersection D. Quadrant
9. What will you select if you want to hide part of your drawing in AutoCAD?
   A. Click CTRL + New.
   B. Click the hide button.
   C. Click the setting button.
   D. Click the isolate button.

10. What Osnap can be useful if you have created a number of Points with the use of measure or divide commands?
    A. Display Grid
    B. Object Snap
    C. Node Osnap
    D. Snap Mode
11. You want to create drawings at a scale of 1:1. Which commands in status bar will you use?
    A. Annotation
    B. Annotation Scale
    C. Scaling
    D. Plot
12. What will you press if you want to specify angles in your drawing?
    A. F9
    B. F10
    C. F11
    D. F12
13. If you want to disable the grid of your workplace, which of the following shortcut key will you press?
    A. F4
    B. F5
    C. F6
    D. F7
14. Which of the following Osnap is used to draw a line parallel to any other line in your drawing?
    A. Intersection
    B. Nearest
    C. Parallel
    D. Perpendicular
15. Which of the following Osnap breaks to the end points of lines, arcs and to polyline vertices?
    A. Center
    B. Endpoint
    C. Midpoint
    D. Quadrant

## *Additional Activity*

Critical thinking Skills
**Directions.** Answer the questions briefly on a separate sheet of paper.

1. What will you do if the computer you are using suddenly bagged down while preparing architectural drawing?

# *Answer Key*

**What I Know**

1. B
2. B
3. D
4. A
5. B
6. C
7. D
8. B
9. D
10. D
11. B
12. C
13. A
14. D
15. D

**What's In**

1. Visible
2. Dimensions
3. Jogged
4. Unidirectional
5. Phantom
6. Linear
7. Section
8. Leader
9. Angular
10. ordinate

**What's New**

Fast is Fine, but
Accuracy is
Everything

**What's More**

1. A
2. D
3. J
4. G
5. I
6. B
7. H
8. C
9. E
10. F

**What I Have Learned**

1. Drawing grid
2. Snap mode
3. Ortho mode
4. Object snap
5. Annotation scale

**What I Can Do**

Performance output
will be evaluated
through given
rubrics

**Assessment**

1. D
2. D
3. B
4. D
5. A
6. B
7. B
8. D
9. D
10. C
11. B
12. B
13. D
14. C
15. B

**Additional Activity**

Answers may vary

# References

Tanael, Jessie James. 2019. "ICT Technical Drafting 10 Learning Material". Slideshare.Net. https://www.slideshare.net/JessieJamesTanael/ict-technical-drafting-10-learning-material.

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