**1. List the functions of OSNAP command.**

* Snaps to exact points like:
  + Endpoint
  + Midpoint
  + Center
  + Intersection
  + Perpendicular
  + Tangent

**2. List out the benefits of AutoCAD.**

* Increases drawing speed
* Ensures high accuracy
* Easy to edit and modify
* Saves time and cost
* Supports 2D and 3D designs

**3. Classify the types of coordinate system.**

* Absolute coordinate system
* Relative coordinate system
* Polar coordinate system

**4. Recall polar coordinate system.**

* Locates a point using:
  + Distance from a base point
  + Angle from a reference direction

**5. Define rectangular array command.**

* Creates multiple copies of objects in:
  + Rows
  + Columns

**6. List out the commands available in modify tool bar.**

* Move
* Copy
* Rotate
* Scale
* Mirror
* Trim
* Extend
* Offset
* Fillet
* Chamfer

**7. Differentiate between copy and mirror command.**

* **Copy:**
  + Makes a duplicate of the selected object
* **Mirror:**
  + Creates a flipped (mirrored) copy across a line

**8. Define fillet command.**

* Creates a **rounded corner** between two lines or objects

**9. Define chamfer command.**

* Creates a **beveled edge** (angled corner) between two lines

**10. Recall array command.**

* Used to make **multiple copies** of an object in a pattern:
  + Rectangular
  + Polar
  + Path

**11. Define dimensioning.**

* Process of adding:
  + **Measurements**
  + **Size information** to a drawing

**12. List out the different types of software in design.**

* AutoCAD
* SolidWorks
* CATIA
* Fusion 360
* SketchUp
* Revit
* ANSYS

### 1. ****Draw the symbol for First and Third Angle Projection:****

#### ➤ ****First Angle Projection Symbol:****

perl

CopyEdit

\_\_\_\_\_\_\_\_\_

/ /|

/\_\_\_\_\_\_\_\_/ |

| | |

| ◄ | |

|\_\_\_\_\_\_\_\_| /

|\_\_\_\_\_\_\_\_|/

#### ➤ ****Third Angle Projection Symbol:****

perl

CopyEdit

\_\_\_\_\_\_\_\_\_

/ /|

/\_\_\_\_\_\_\_\_/ |

| | |

| ► | |

|\_\_\_\_\_\_\_\_| /

|\_\_\_\_\_\_\_\_|/

### 2. ****Identify the reason for orthographic projections to be used.****

* To represent the exact shape and size of an object
* To show different views (Front, Top, Side) clearly
* Used in manufacturing and engineering drawings

### 3. ****State oblique line.****

* A line that is **inclined to both the horizontal and vertical planes**
* Appears foreshortened in orthographic views

### 4. ****Define front view.****

* View that shows the **length and height** of an object
* Seen from the **front side** of the object

### 5. ****Define first angle projection and draw the symbol.****

* Object is placed **in the first quadrant**
* **Front view is drawn above the top view**
* **Symbol:**  
  (Same as shown in Q1 - First Angle Projection Symbol)

### 6. ****Define orthographic projections.****

* A method of projection where the object is represented using **multiple views**
* Views are projected at **90° (perpendicular)** to the plane
* Common views: **Front, Top, and Side**

### 7. ****Classification of projection.****

* **Parallel Projection:**
  + Orthographic
  + Oblique
* **Perspective Projection:**
  + One-point
  + Two-point
  + Three-point

### 8. ****Compare orthographic projection and isometric projection.****

| **Orthographic Projection** | **Isometric Projection** |
| --- | --- |
| Multiple 2D views | Single 3D view |
| Shows true size and shape | Shows pictorial appearance |
| Used for detailed drawings | Used for visual understanding |

### 9. ****List out the plane of projection.****

* **Horizontal Plane (HP)**
* **Vertical Plane (VP)**
* **Profile Plane (PP)**

### 10. ****Define third angle projection and draw the symbol.****

* Object is placed **in the third quadrant**
* **Top view is drawn above the front view**
* **Symbol:**  
  (Same as shown in Q1 - Third Angle Projection Symbol)

### 11. ****State reference line.****

* A line used to separate two views in orthographic projection
* Typically labeled as **XY line**

### 12. ****Define top view.****

* View seen from **above the object**
* Shows the **length and breadth (width)**

**1. Classify the types of solids.**

* **Polyhedra (flat surfaces):**
  + Cube
  + Cuboid
  + Tetrahedron
  + Pyramid
  + Prism
* **Solids of revolution (curved surfaces):**
  + Cylinder
  + Cone
  + Sphere

**2. List out the positions in projection of solids.**

* Axis perpendicular to **Horizontal Plane (HP)**
* Axis perpendicular to **Vertical Plane (VP)**
* Axis perpendicular to **Profile Plane (PP)**
* Axis inclined to one plane and parallel to the other
* Axis inclined to both HP and VP

**3. Define truncated solids.**

* A solid that is **cut by a plane**, removing the top portion
* The cut is usually **inclined** to the base

**4. Define frustum of solids.**

* A **solid remaining** after cutting a **pyramid or cone** with a plane **parallel to the base**
* The top portion is removed, leaving a flat top

**5. State the solids of revolution.**

* Solids formed by **rotating a 2D shape** around an axis
  + Examples:
    - Cylinder (rectangle rotated)
    - Cone (triangle rotated)
    - Sphere (semicircle rotated)

**6. Define section of solids.**

* A view showing the **interior details** of a solid when it is **cut by a plane**

**7. Classify the types of section views.**

* **Full section**
* **Half section**
* **Offset section**
* **Broken-out section**
* **Revolved section**
* **Removed section**

**8. Recall cutting plane.**

* An **imaginary plane** used to **cut a solid** to reveal its inner details
* Also called **section plane**

**9. Define hatching.**

* A series of **parallel lines** drawn on the cut surface in a sectional view
* Indicates the area that has been cut

**10. Define auxiliary views.**

* Additional views drawn to show **true shape and size** of inclined or oblique surfaces
* Projected on a plane **perpendicular to the inclined surface**

**11. What is the purpose of using hidden lines in projections?**

* To show **edges and features** that are **not visible** in the current view
* Represented by **dashed lines**

**1. State isometric projection.**

* A type of **pictorial projection** where the object is drawn with all three axes (X, Y, Z) at **equal angles of 120°**
* It shows the object in **3D on a 2D plane**

**2. Difference between isometric view and isometric projection.**

| **Isometric View** | **Isometric Projection** |
| --- | --- |
| Uses **true dimensions** | Uses **isometric (reduced) scale** |
| Looks larger | Slightly smaller due to foreshortening |
| Not to scale | To scale using isometric scale |

**3. Define isometric scale.**

* A **scale used to convert true lengths** into **foreshortened lengths** for isometric projection
* Typically multiplies true length by **0.816**

**4. Recall the limitations of isometric projection.**

* Circles appear as **ellipses**
* **Angles and curves** are distorted
* Only three faces are visible at a time
* Hidden features are not clearly shown

**5. What are isometric lines?**

* Lines that are **parallel to any of the three isometric axes**
* These lines are drawn at **30°, 150°, and vertical (90°)** on the plane

**6. State the principles of isometric projection.**

* Object is viewed such that:
  + Axes are equally inclined at **120°**
  + **Equal foreshortening** along all axes
  + No perspective distortion

**7. Classify the methods of drawing an isometric projection of a circle.**

* **Four-Center Method**
* **Ellipse Template Method**
* **Using Isometric Grid or Software Tools**

**8. Define isometric length and true length.**

* **Isometric Length:**
  + A **foreshortened length** used in isometric projection
* **True Length:**
  + The **actual size** of the object in reality

**9. State the applications of isometric projection.**

* Used in:
  + Engineering and technical drawings
  + Product and machine design
  + Instruction manuals
  + Architecture

**10. How are the isometric axes represented?**

* Three axes drawn at:
  + **Vertical axis (Z-axis)**
  + **Left axis at 30°** from the horizontal (X-axis)
  + **Right axis at 30°** from the horizontal (Y-axis)

**11. Classify the types of projection used to obtain pictorial drawing.**

* **Isometric Projection**
* **Oblique Projection**
* **Perspective Projection**

**12. Write the important characteristics of isometric projection.**

* Three visible faces
* Axes are 120° apart
* All dimensions are foreshortened equally
* Circles appear as ellipses
* True shape of inclined surfaces is not shown

**1. Recall geometry and topology.**

* **Geometry:**
  + Deals with the **shape, size, and dimensions** of objects
* **Topology:**
  + Focuses on the **relationships and connections** between geometric elements regardless of shape or size

**2. Define floor plans.**

* A **2D drawing** that shows the **layout of rooms, spaces, doors, and windows** in a building from a **top view**

**3. Define Building Information Modelling (BIM).**

* A **digital process** that creates and manages building data using a **3D model**
* Integrates **architecture, engineering, and construction (AEC)** details

**4. Difference between topology and geometry.**

| **Topology** | **Geometry** |
| --- | --- |
| Focuses on **connections** | Focuses on **shape and size** |
| Concerned with **relationship** | Concerned with **measurements** |
| Example: connectivity of rooms | Example: room dimensions |

**5. Recall role of blueprints.**

* Provide **detailed architectural and engineering drawings**
* Guide construction with **dimensions, layouts, materials, and standards**

**6. Define solid modelling.**

* A type of 3D modelling that represents the **volume and shape** of solid objects
* Used for **engineering, analysis, and manufacturing**

**7. Classify the type of solid modelling.**

* **Boundary Representation (B-Rep)**
* **Constructive Solid Geometry (CSG)**
* **Sweep Representation**
* **Primitive-based modelling**
* **Feature-based modelling**

**8. Classify the different types of floor plans.**

* **2D Floor Plan**
* **3D Floor Plan**
* **Traditional Floor Plan**
* **Interactive/Virtual Floor Plan**

**9. Recall color coding.**

* Used to represent **different elements or functions** in drawings:
  + Red – Electrical
  + Blue – Plumbing
  + Green – Landscaping
  + Yellow – Gas lines
  + Grey – Structural

**10. Define sectional elevation drawing.**

* A drawing that shows the **interior details** of a building or object as if **cut along a plane**, combined with **height/elevation** view

**11. List out the importance of BIM software.**

* Enhances **collaboration**
* Improves **accuracy and visualization**
* Reduces **cost and errors**
* Helps in **lifecycle management**
* Supports **clash detection** and scheduling

**12. List out the application of a 3D solid CAD model.**

* Product design and manufacturing
* Simulation and analysis
* Architectural visualization
* CNC machining
* 3D printing
* Animation and rendering