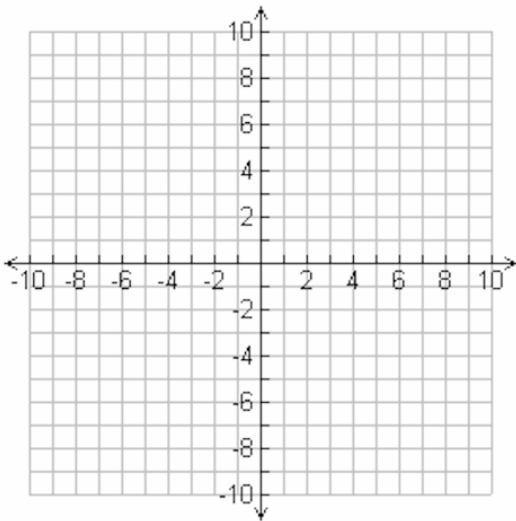# Chapter 1: Coordinates and Designs

**Cartesian Plane**

- A plane containing two perpendicular axes: x (the **horizontal axis**) and y (the **vertical axis**) which intersect at a point called the **origin** (0,0).
- It is also called a **coordinate plane**.
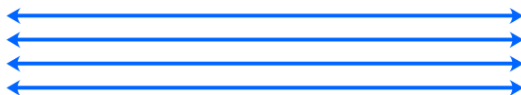- Each dot on the graph, called an **ordered pair**, uses an x and a y coordinate.



**Coordinate Plane**
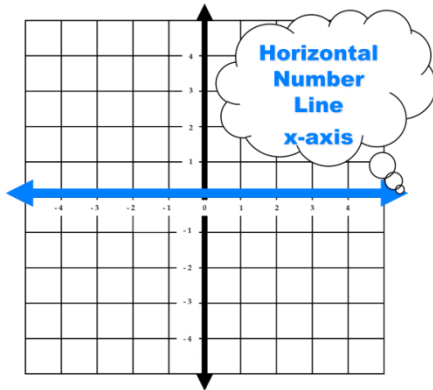
- Same as Cartesian Plane

**Horizontal**

- A line that is drawn that goes left to right (parallel to the horizon).



horizontal lines

### X-axis (Horizontal Axis)

- The line on a graph that runs left to right (side to side) through zero.
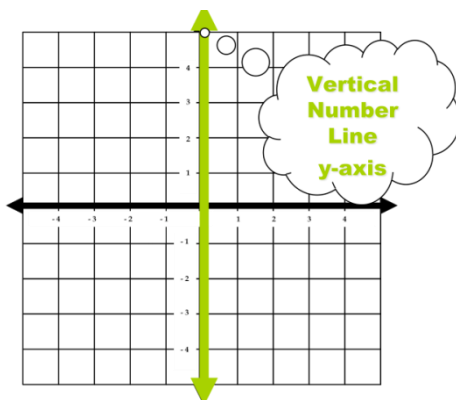- It is used as a reference line so you can measure from it.



### Vertical

- A line that is drawn that goes up and down.



vertical lines

### Y-axis (Vertical Axis)

- The line on a graph that runs vertically (up-down) through zero.
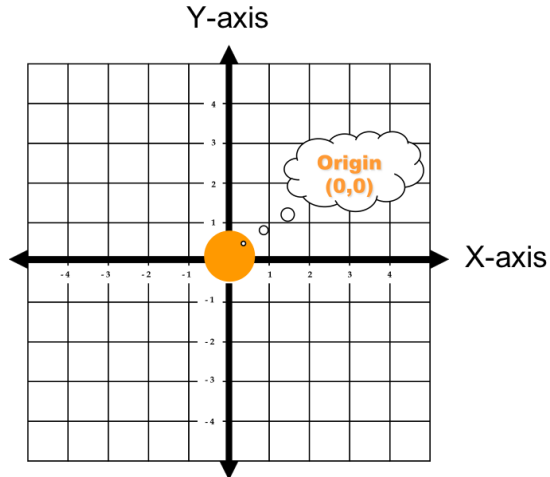- It is used as a reference line so you can measure from it.



### Axes

- Plural form of axis.

**Origin**

- The point on a Cartesian plane where the x-axis and the y-axis cross.
- It is labeled (0, 0).

**Y-axis**

**Origin (0,0)**

**X-axis**

**Ordered Pair**

- A pair of numbers used to locate a point on the coordinate plane.
- The 1$^{st}$ number is the horizontal movement on the x-axis, and the 2$^{nd}$ number is the vertical movement on the y-axis.

**y-coordinate**

**(2 , 8)**

**x-coordinate**

**Coordinates**

- The values in an ordered pair (x, y).
- The 1$^{st}$ coordinate always refers to the X-axis.
- The 2$^{nd}$ coordinate always refers to the Y axis.

**y-coordinate**

**(2 , 4)**
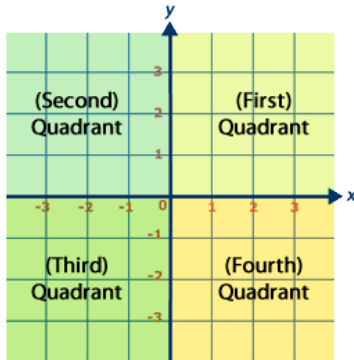
**x-coordinate**

**Y-axis**

**X-axis**

**2**
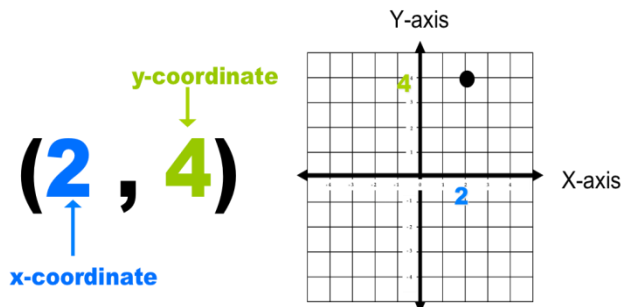
**Roman Numerals**

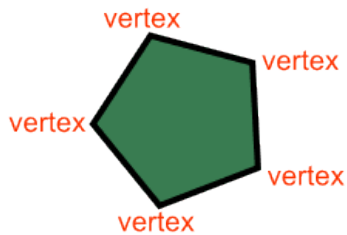- I, II, III, IV are Roman numerals that represent 1, 2, 3 and 4.

**Quadrants**

- The four regions on the coordinate grid.



**Vertex**

- The point where two sides of a figure meet up.



**Vertices**

- The plural form of vertex.

**Transformation**

- Moves a geometric figure. The shape still has the same size, area, angles and line lengths.
- It can move as a:
    1. slide (translation)
    2. flip (reflection)
    3. turn (rotation)

**Translation**

- A slide along a straight line. It can go up/down and left/right.
- Each point of the shape must move the same:
    1. Direction
    2. Distance
- After you have redrawn the object, remember to rename each vertex using "prime".
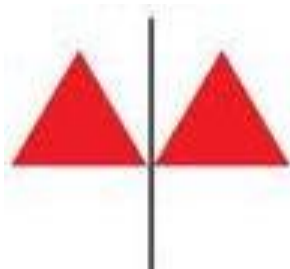- It moves the shape without rotating, resizing or anything else!
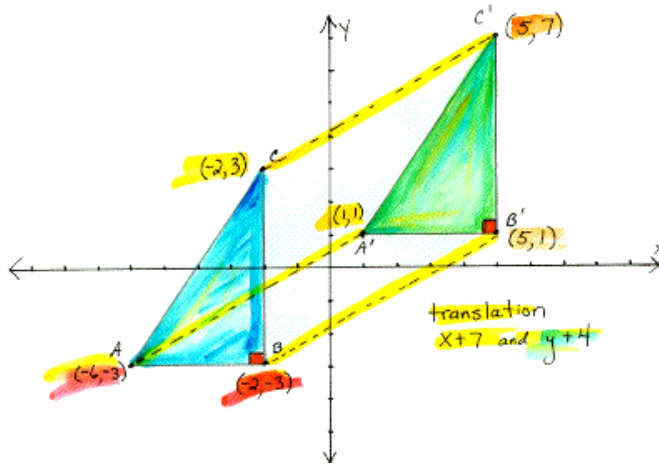


**Reflection**

- An image or shape as it would be seen in a mirror.
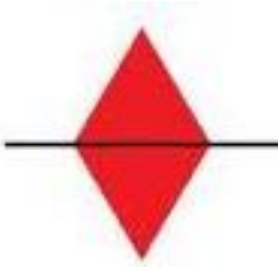- The mirror line is called the **line of reflection.**
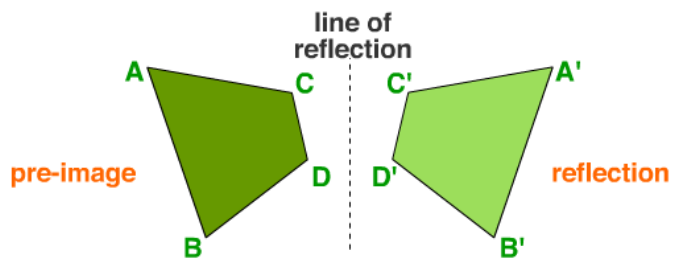


**Vertical Line of Reflection**
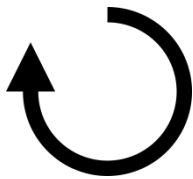
- The mirror line goes in an up-down direction.

**Horizontal Line of Reflection**
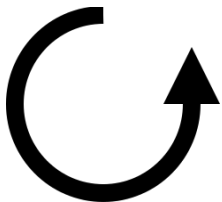
- The mirror line goes in a side-to-side direction.

**Clockwise**

- Moving in the direction of the hands on a clock.

**Counterclockwise**

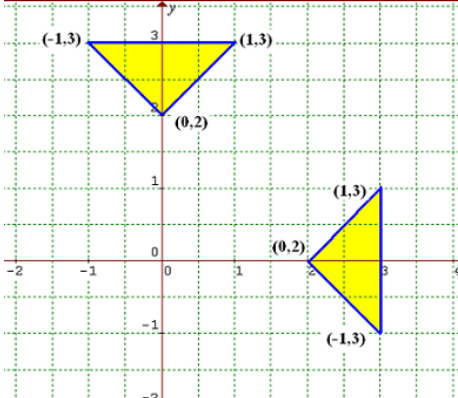- Moving in the opposite direction from the hands on a clock.

**Rotation**

- A turn about a fixed point (called the **centre of rotation**).
- The **angle of rotation** is measured in degrees.
- A full rotation is 360 degrees. This would bring the object back to its starting position!
- Hint: You can use a piece of tracing paper to help you rotate the figure.

before rotation

angle = 90°

after rotation
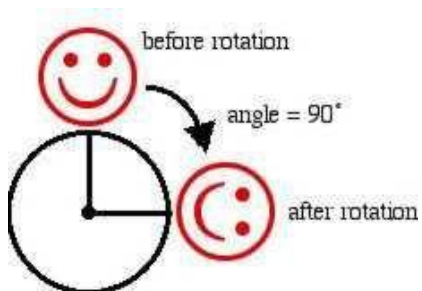
**Centre of Rotation**

- The point around which an object is rotated.

| Example 1 | Example 2 |
|---|---|
| An object is rotated 90 degrees around the origin (0, 0). | An object is rotated 10 times around the middle of itself. |

**Angle of Rotation**

- The number of degrees that something is rotated about a fixed point.
- This example shows an angle of rotation of 90 degrees in a **clockwise** direction about the **origin** (0, 0).
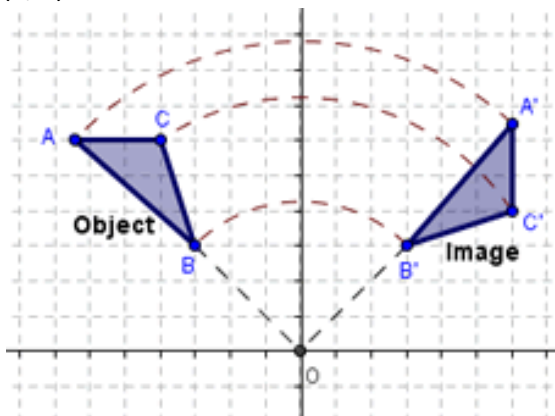
**Reading Prime**

- A' is read **A prime**. It is used to label the point that matches point A after it has been transformed (moved). Remember, a figure can slide, reflect or turn!



This figure slides 7 units to the left and 3 units down.
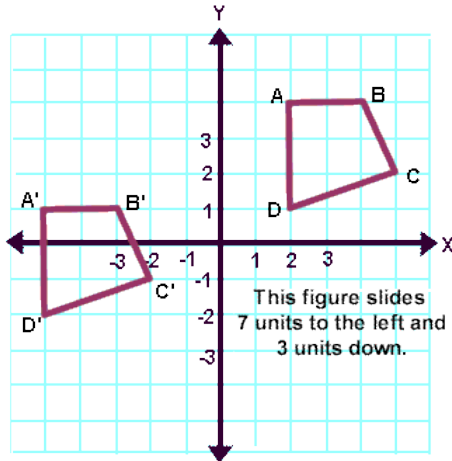
**Reading Double Prime**

- A" is read **A double prime**. It is used to label the point that matches point A after it has been transformed (moved) two times.

**Reading the Translation Arrow**

- The translation arrow → shows the distance and direction a figure has moved.