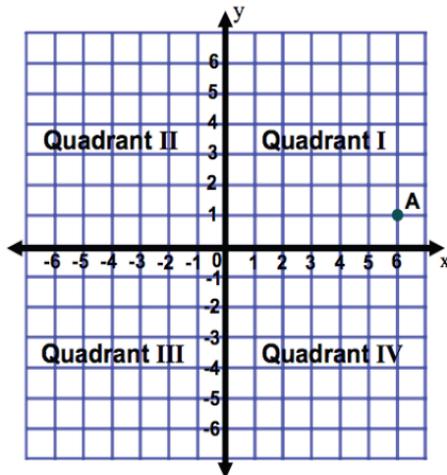


## Math Worksheet 2 – Cartesian Coordinate system

The Cartesian coordinate system was developed by the mathematician Descartes during an illness. In 1637. As he lay in bed sick, he saw a fly buzzing around on the ceiling, which was made of square tiles. As he watched he realized that he could describe the position of the fly by the ceiling tile he was on. After this experience he developed the coordinate plane to make it easier to describe the position of objects.



A **Cartesian coordinate plane** has two intersecting number lines that form axes.

The horizontal axis is called the **x-axis** and the vertical axis is called the **y-axis**.

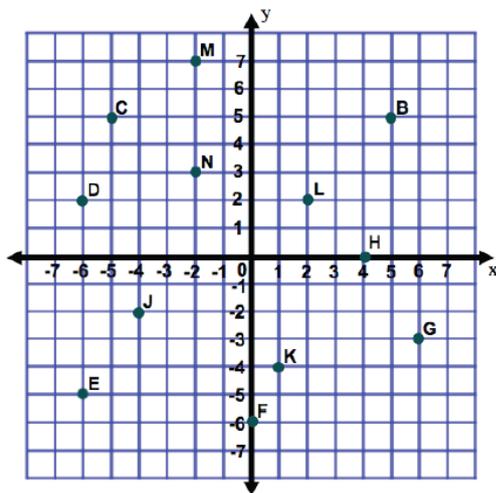
The axes intersect at the point called the **origin**.

The axes divide the coordinate plane into four **quadrants**.

A point on the plane can be described by its **x** and **y** coordinates. These coordinates are written as an ordered pair:  $(x, y)$ .

- The coordinates of the origin are  $[0, 0]$
- The coordinates of point A are  $[6, 1]$  where 6 and 1 is an **ordered pair**

### Exercises



1. Name the point that has the coordinates.

- a.  $(2, 2)$       b.  $(-6, 2)$       c.  $(1, -4)$   
 d.  $(0, -6)$       e.  $(-4, -2)$

2. Write the coordinates of each point.

- a. B      b. G      c. E  
 d. N      e. H

3. In what quadrant is each point located?

- a. C      b. J      c. L  
 d. M      e. K

3. Plot each set of points on a different plane and join them in order to form a quadrilateral. Identify the quadrilateral.

- a.  $A(1, 1), B(1, 5), C(3, 5), D(3, 1)$   
 b.  $J(1, 3), K(5, 1), L(8, 1), M(4, 3)$   
 c.  $P(3, 0), Q(6, 2), R(5, 2), S(2, 0)$   
 d.  $W(1, 1), X(0, 3), Y(4, 1), Z(3, 1)$

4. In which quadrant would the following points be found:

- 1)  $(1, 1)$  **Quadrant:** \_\_\_\_      2)  $(1, 2)$  **Quadrant:** \_\_\_\_      3)  $(2, 1)$  **Quadrant:** \_\_\_\_  
 4)  $(-1, 2)$  **Quadrant:** \_\_\_\_      5)  $(439, -890)$  **Quadrant:** \_\_\_\_      6)  $(-1, -1)$  **Quadrant:** \_\_\_\_

A **dilatation** is a transformation that changes the size of an object.

If the image is larger than the original, the dilatation is an **enlargement**.

If the lengths have been doubled, the scale factor is 2.

If the image is smaller than the original, the dilatation is a **reduction**.

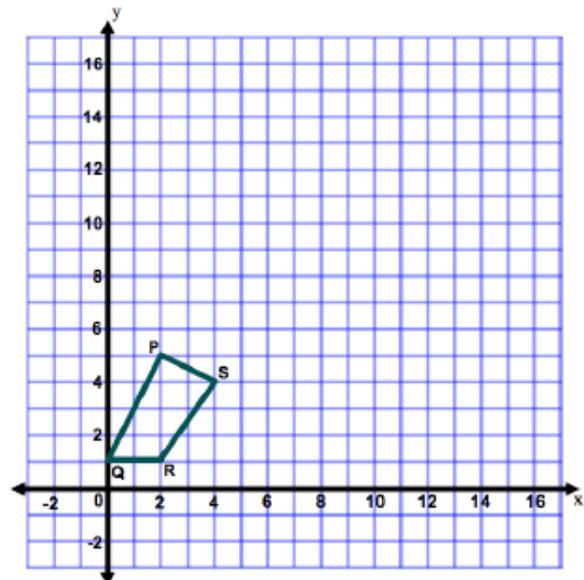
If the lengths have been halved, the scale factor is  $\frac{1}{2}$ .

The **dilatation centre** is usually the origin, (0, 0)

5. Draw a rectangle that has vertices A(2, 4), B(2, 2), C(3, 2) and D(3, 4).

- Multiply the  $x$  and  $y$  coordinate of each ordered pair by 2. So the image of the point A(2, 4) is A'(4, 8) . Plot the rectangle that has those vertices on the same grid.
- Draw a line from the origin, O, through A. Does the line pass through A'?
- Does the line from the origin that passes through B pass through B'? C and C'? D and D'?
- Using a ruler, compare the lengths of OA and OA'. Do the same for OB and OB', OC and OC', and OD and OD'.
- e)

6. Enlarge the figure by a scale factor of 3, with the dilatation centre (0, 0) . Write the coordinates of the vertices of the image. (Hint: Find the coordinates of the image points first, and use them to draw the enlarged figure.)



## Homework

- Draw a grid of squares with sides twice as long as in the grid below or use graphical paper to do it
- Make an enlargement of the whale by copying the contents of each square in the grid into corresponding squares in the grid you made in part a.
- Make a reduction of the whale by using a grid of squares with sides half as long as in the grid below.

