

Patterns on the Coordinate Plane

Unit 8 Lesson 2

Students will be able to:

- Learn how to locate and plot ordered pairs on coordinate systems.
- Plot number rules on the coordinate plane.
- Observe patterns on coordinate planes.
- Determine the value of ordered pairs using the given number rule.

Patterns on the Coordinate Plane

Key Vocabulary:

Number Patterns

Number Rules

Ordered Pairs

Values

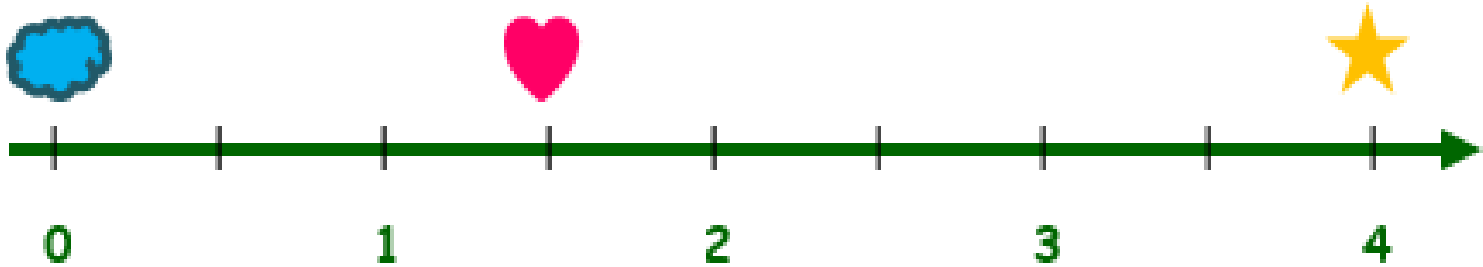
Coordinate Systems

Coordinate Plane

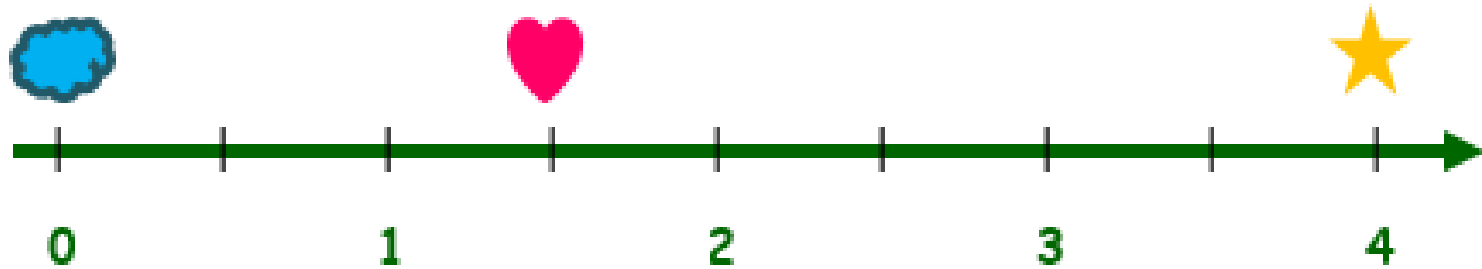
Coordinate System on a Line



Coordinate systems help us location the position of a point on a given number of dimensions. One of the most common system that we use is the **number line**.


Example:



Coordinate System on a Line







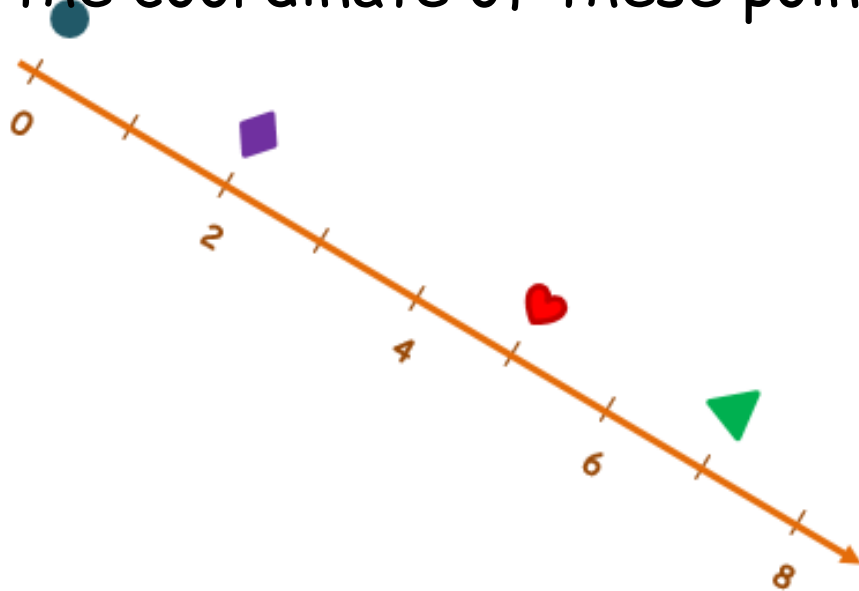
The one above is an example of what a number line would look like. This helps know that  has a value or coordinate of **1.5** and  has a value or coordinate of **4**.

 has a value of **0** and any point located at 0 is called the origin.

Sample Problem 1:

- Each of the shapes is placed on the number line as shown below. Find the coordinate of these points.

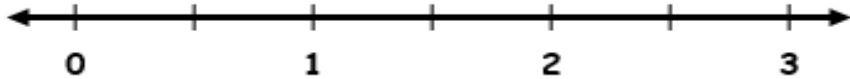
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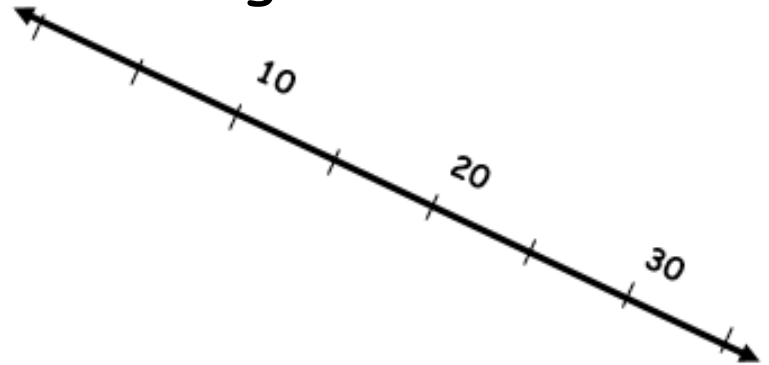
Sample Problem 1:

2. Plot the following points on the number lines.

a. Plot B so that it has a coordinate of 1.5.







b. Plot M so that it has a distance of 25 from the origin.



Patterns on the Coordinate Plane

Solution:

- Each of the shapes is placed on the number line as shown below. Find the coordinate of these points.

-  = 5
-  = 0
-  = 2
-  = 7

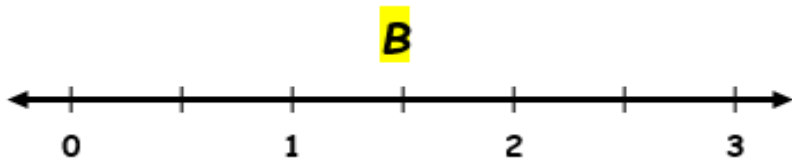


Patterns on the Coordinate Plane

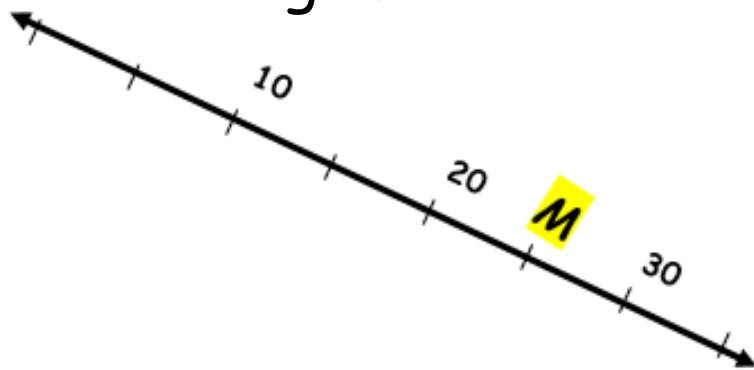
Solution:

2. Plot the following points on the number lines.

a. Plot B so that it has a coordinate of 1.5.



b. Plot M so that it has a distance of 25 from the origin.

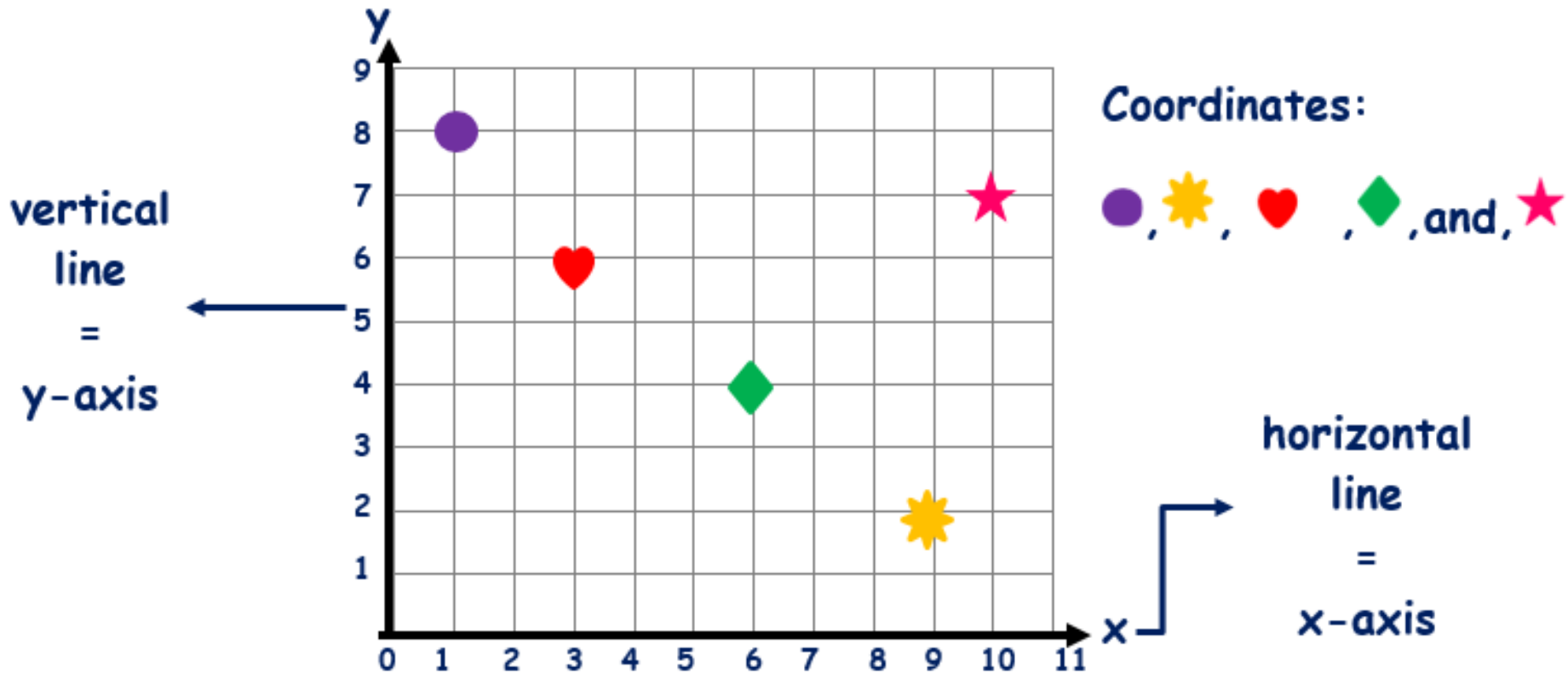


Coordinate System on a Plane

The coordinate system that we'll be focusing on is actually the **coordinate planes**. The coordinate plane is made up of two number lines perpendicular to each other as shown below.

Patterns on the Coordinate Plane

Coordinate System on a Plane



Patterns on the Coordinate Plane

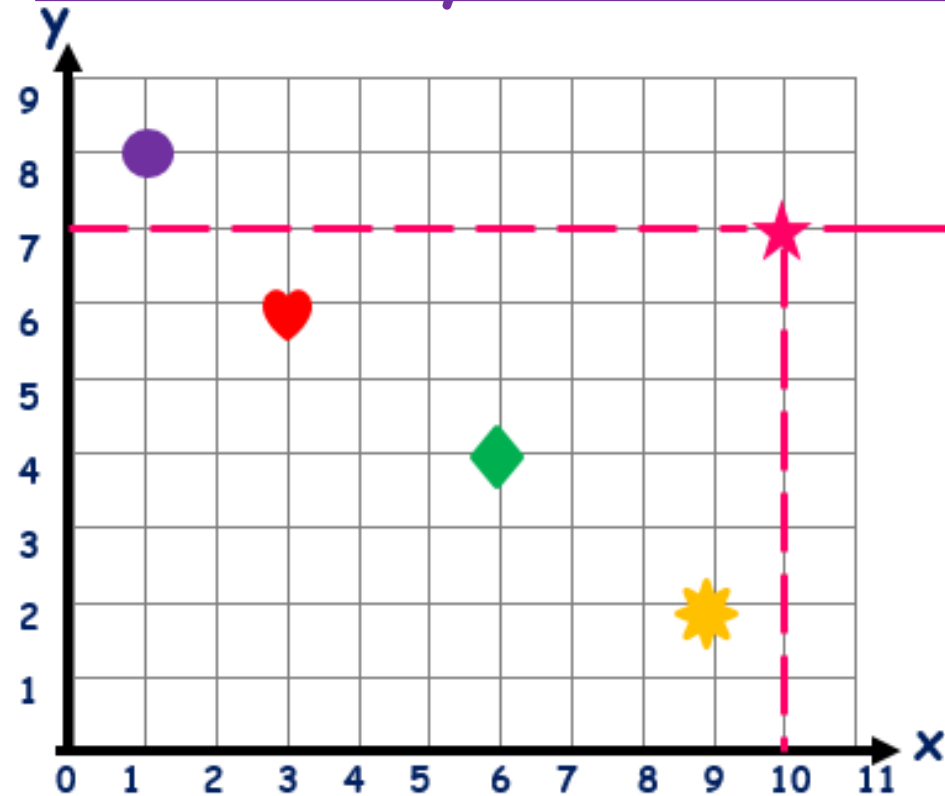
Coordinate System on a Plane

Since there are two lines or axes now, we also use two values for the coordinates: (x, y) .

So when writing or locating the coordinate, we first use the value of the x or the point parallel to x -axis followed by the y value or the point parallel to the y -axis.

Patterns on the Coordinate Plane

Coordinate System on a Plane



Value of $x = 10$

Value of $y = 7$

So, value of the
coordinate:

$(10, 7)$

● = $(1, 8)$

♥ = $(3, 6)$

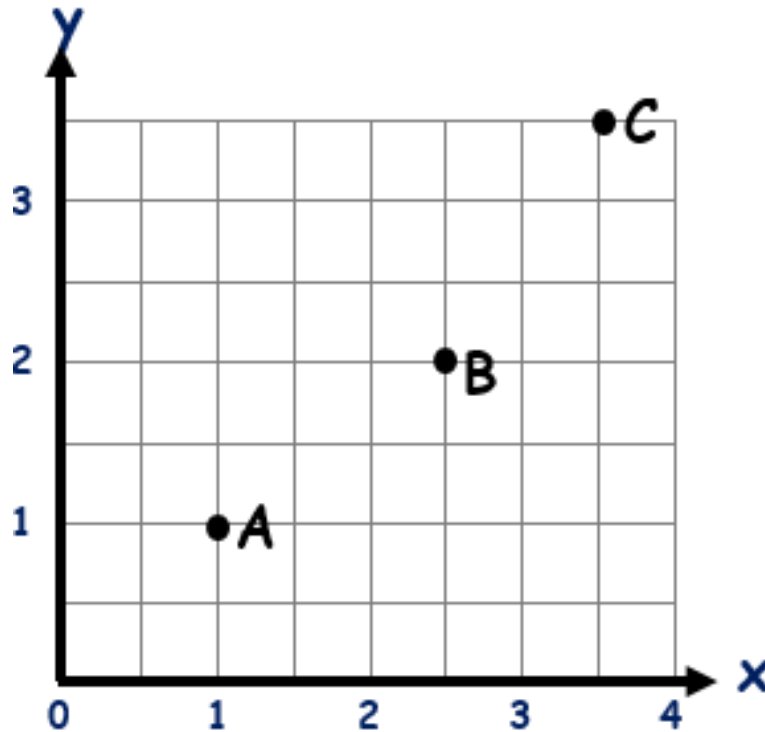
★ = $(9, 2)$

◆ = $(6, 4)$

Patterns on the Coordinate Plane

Sample Problem 2:

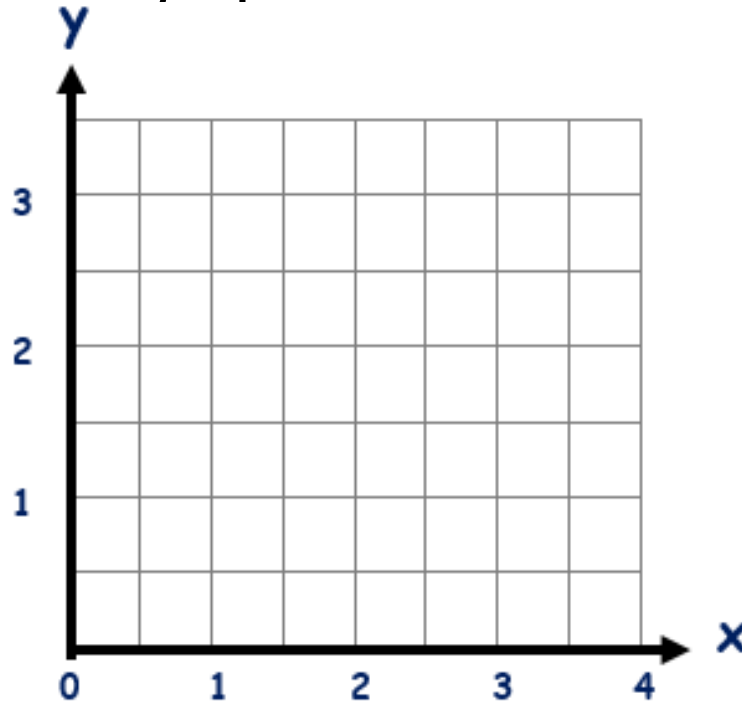
1. Find the coordinates of A , B , and C using the graph shown below.



Patterns on the Coordinate Plane

Sample Problem 2:

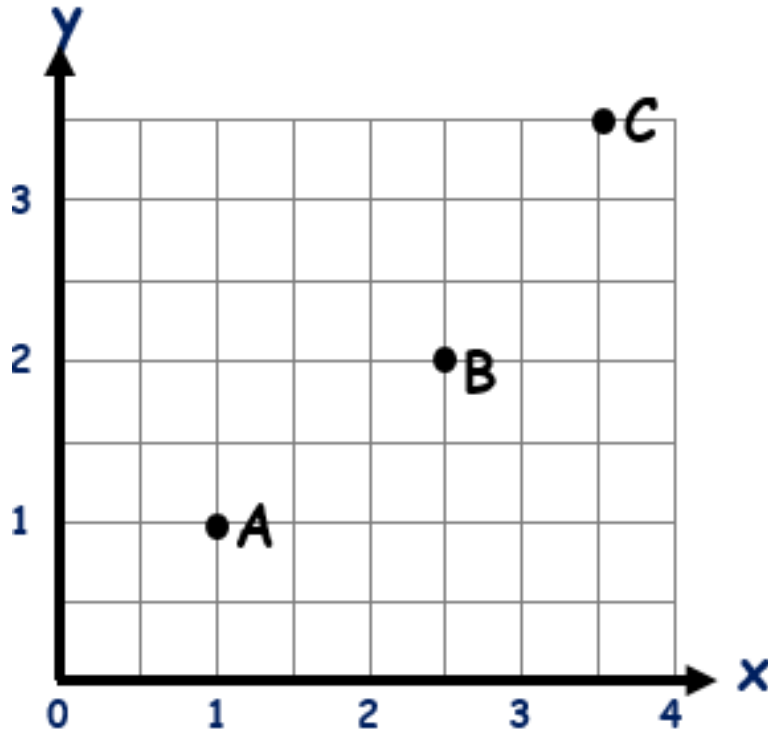
2. Given that $L = (3, 1.5)$, $M = (0, 2)$, and $N = (2.5, 3)$, plot L , M , and N on the graph below.



Patterns on the Coordinate Plane

Solution:

1. Find the coordinates of A, B, and C using the graph shown below.



$$A = (1, 1)$$

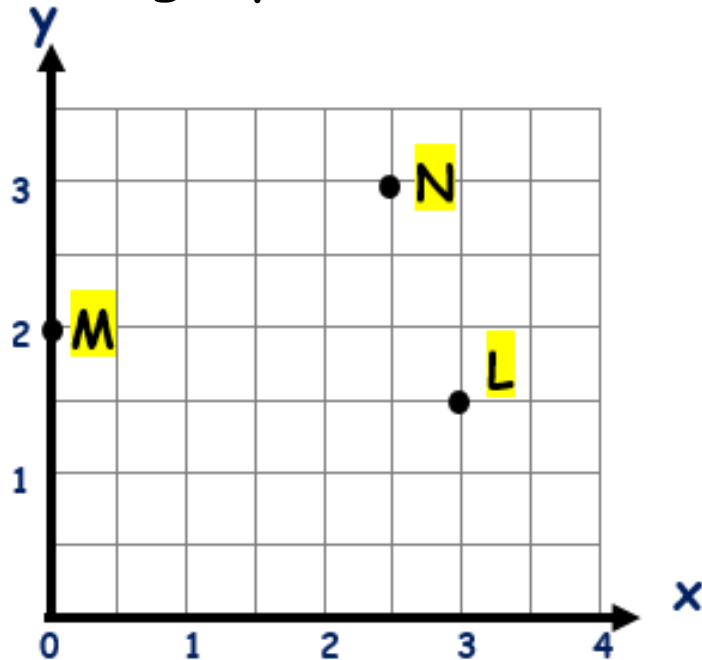
$$B = (2.5, 2)$$

$$C = (3.5, 3.5)$$

Patterns on the Coordinate Plane

Solution:

2. Given that $L = (3, 1.5)$, $M = (0, 2)$, and $N = (2.5, 3)$, plot L , M , and N on the graph below.



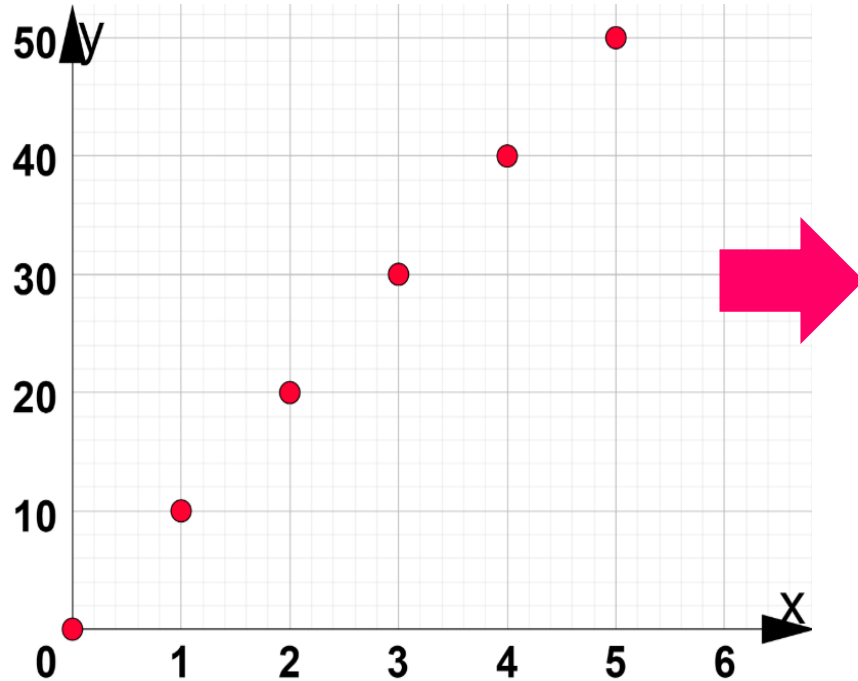
Number Patterns on Coordinate Planes

We can also observe number patterns for a given set of points on the coordinate plane. What we can do is construct a table showing the values of x and y values.

Patterns on the Coordinate Plane

Number Patterns on Coordinate Planes

Example:



x	y
0	0
1	10
2	20
3	30
4	40
5	50

$$0 = 10(0)$$

$$10 = 10(1)$$

$$20 = 10(2)$$

$$30 = 10(3)$$

$$40 = 10(4)$$

$$50 = 10(5)$$

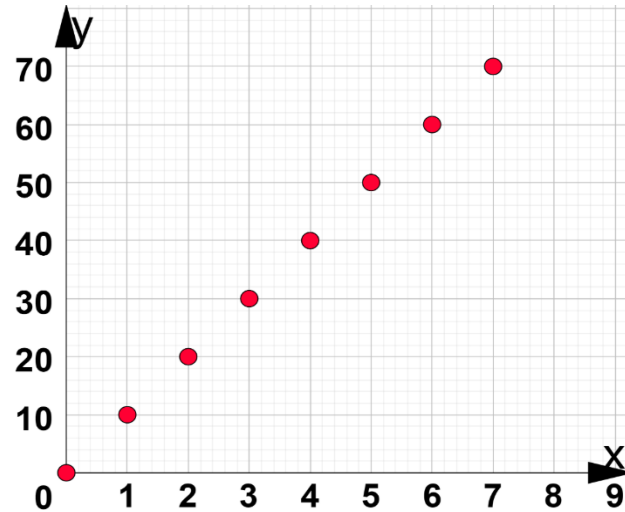
Patterns on the Coordinate Plane

Number Patterns on Coordinate Planes



This means that for every x , y is ten times bigger or $y = 10(x)$

This also means that $(6, 6(10)) = (6, 60)$ and

$(7, 7(10)) = (7, 70)$ follow the same pattern.

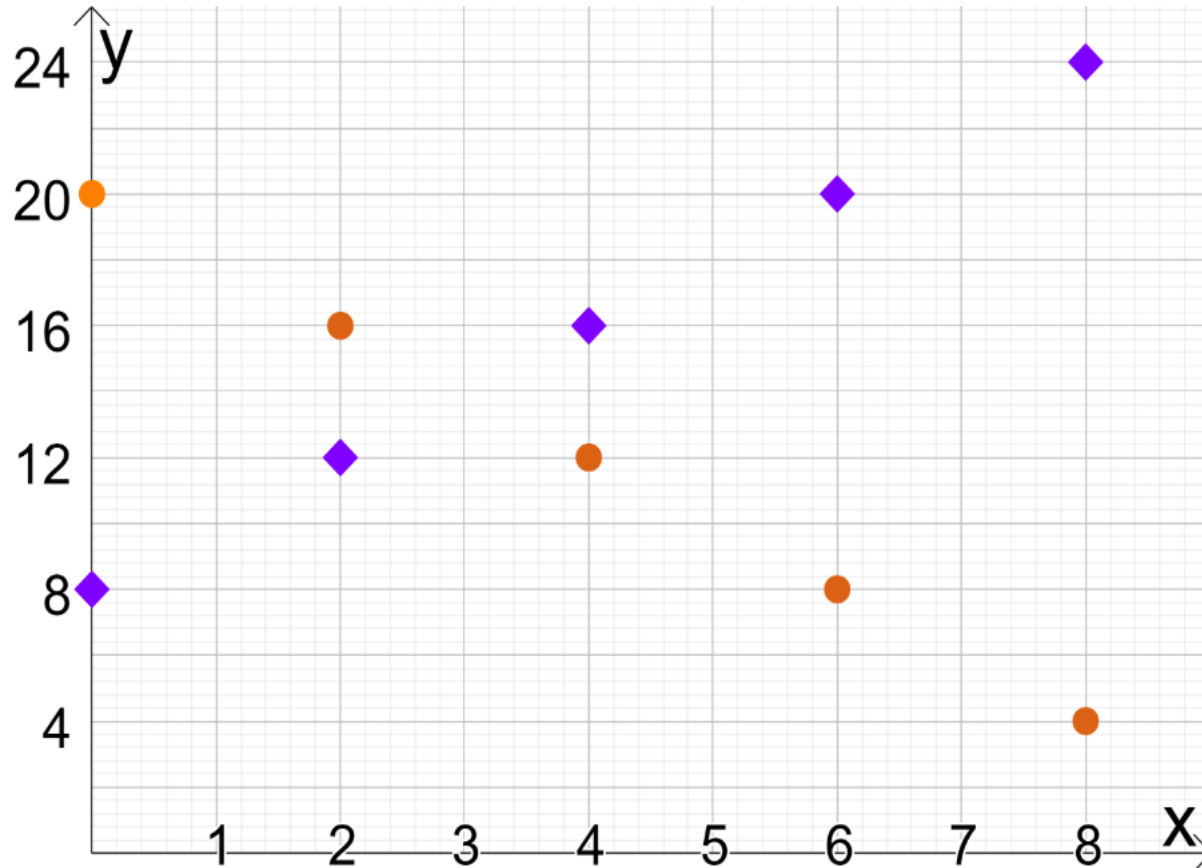


Sample Problem 3:

Construct tables representing the sets of coordinates represented by  and  as shown in the graph below. Then find the rule for each set of coordinates and determine the respective values at $x = 10$.

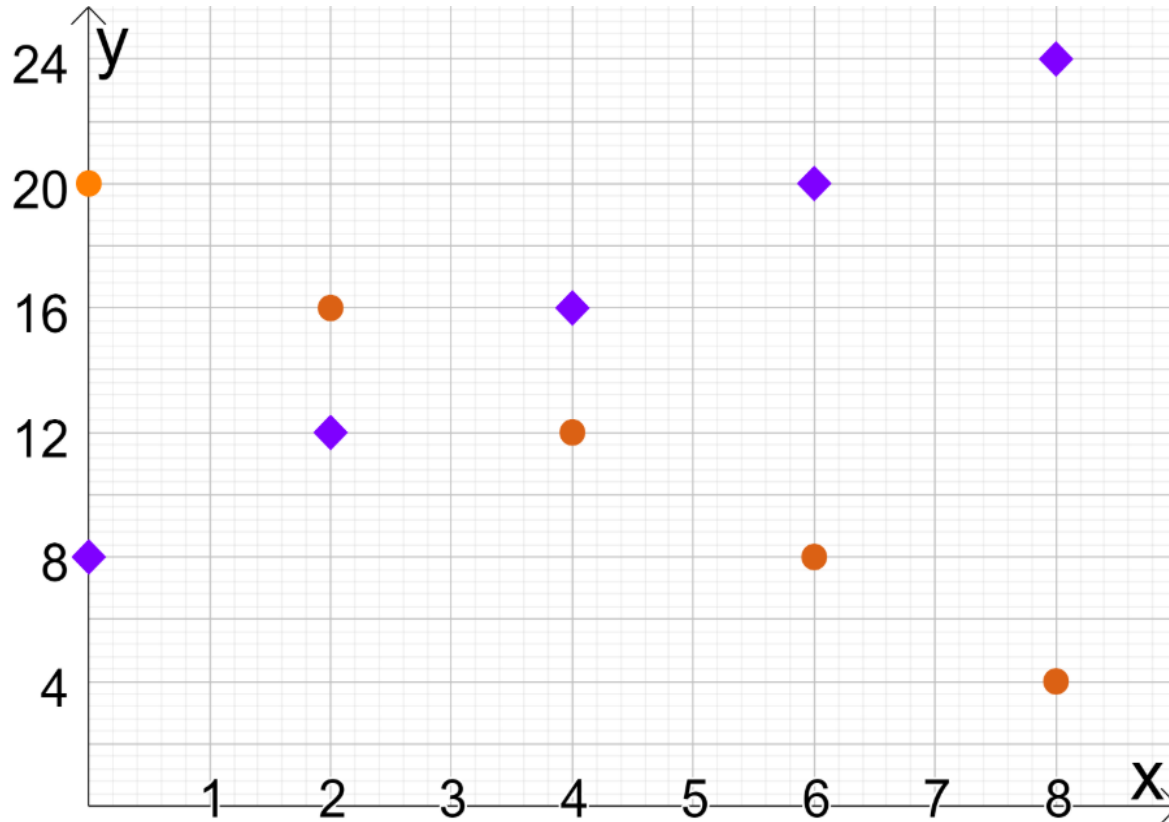
Patterns on the Coordinate Plane

Sample Problem 3:



Patterns on the Coordinate Plane

Solution:



Patterns on the Coordinate Plane

Solution:

x	y
0	8
2	12
4	16
6	20
8	24

$$8 = 0(2) + 8$$

$$12 = 2(2) + 8$$

$$16 = 4(2) + 8$$

$$20 = 6(2) + 8$$

$$24 = 8(2) + 8$$

x	y
0	20
2	16
4	12
6	8
8	4

$$20 = 20 - 0(2)$$

$$16 = 20 - 2(2)$$

$$12 = 20 - 2(4)$$

$$8 = 20 - 2(6)$$

$$4 = 20 - 2(8)$$

$$y = 2x + 8$$

$$y = 20 - 2x$$

$$\text{At } x = 10, y = 2(10) + 8 = 28$$

$$\text{At } x = 10, y = 20 - 2(10) = 0$$