## Lesson 11: Points on the Coordinate Plane

Let’s explore and extend the coordinate plane.

### 11.1: Guess My Line

1. Choose a horizontal or a vertical line on the grid. Draw 4 points on the line and label each point with its coordinates.
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1. Tell your partner whether your line is horizontal or vertical, and have your partner guess the locations of your points by naming coordinates.
* If a guess is correct, put an X through the point. If your partner guessed a point that is on your line but not the point that you plotted, say, “That point is on my line, but is not one of my points.”
* Take turns guessing each other’s points, 3 guesses per turn.

### 11.2: The Coordinate Plane

1. Label each point on the coordinate plane with an ordered pair.
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1. What do you notice about the locations and ordered pairs of $B$, $C$, and $D$? How are they different from those for point $A$?
2. Plot a point at $\left(-2,5\right)$. Label it $E$. Plot another point at $\left(3,-4.5\right)$. Label it $F$.
3. The coordinate plane is divided into four **quadrants**, I, II, III, and IV, as shown here.
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* $G=\left(5,2\right)$
* $H=\left(-1,-5\right)$
* $I=\left(7,-4\right)$
1. In which quadrant is point $G$ located? Point $H$? Point $I$?
2. A point has a positive $y$-coordinate. In which quadrant could it be?

### 11.3: Coordinated Archery

Here is an image of an archery target on a coordinate plane. The scores for landing an arrow in the colored regions are shown.



* Yellow: 10 points
* Red: 8 points
* Blue: 6 points
* Green: 4 points
* White: 2 points

Name the coordinates for a possible landing point to score:

1. 6 points
2. 10 points
3. 2 points
4. No points
5. 4 points
6. 8 points

#### Are you ready for more?

Pretend you are stuck in a coordinate plane. You can only take vertical and horizontal steps that are one unit long.

1. How many ways are there to get from the point $\left(-3,2\right)$ to $\left(-1,-1\right)$ if you will only step down and to the right?
2. How many ways are there to get from the point $\left(-1,-2\right)$ to $\left(4,0\right)$ if you can only step up and to the right?
3. Make up some more problems like this and see what patterns you notice.

### Lesson 11 Summary

Just as the number line can be extended to the left to include negative numbers, the $x$- and $y$-axis of a coordinate plane can also be extended to include negative values.



The ordered pair $\left(x,y\right)$ can have negative $x$- and $y$-values. For $B=\left(-4,1\right)$, the $x$-value of -4 tells us that the point is 4 units to the left of the $y$-axis. The $y$-value of 1 tells us that the point is one unit above the $x$-axis.

The same reasoning applies to the points $A$ and $C$. The $x$- and $y$-coordinates for point $A$ are positive, so $A$ is to the right of the $y$-axis and above the $x$-axis. The $x$- and $y$-coordinates for point $C$ are negative, so $C$ is to the left of the $y$-axis and below the $x$-axis.



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