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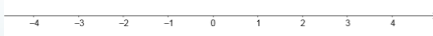
Coordinate Geometry – Outcomes

- Plot and read points on the coordinate plane.
- Solve problems about midpoints of line segments.
- Solve problems about slopes of lines.

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Plot and Read Points

- Recall number lines:

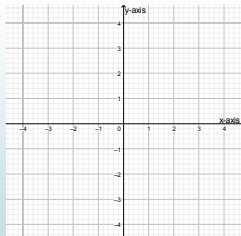


- Zero in the middle.
- Positive numbers increasing on the right.
- Negative numbers decreasing on the left.
- All real numbers exist somewhere on this line.

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Plot and Read Points

- Two number lines make the **coordinate plane**:
- The **x-axis** is a horizontal number line with positive numbers to the right and negative numbers to the left.
- The **y-axis** is a vertical number line with positive numbers towards the top and negative numbers towards the bottom.



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Plot and Read Points

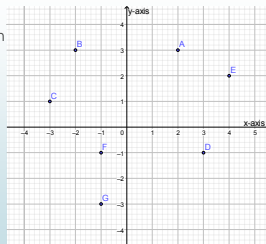
- Points on the coordinate plane have two parts – an x -coordinate and a y -coordinate.
- The x -coordinate is how far left / right the point is.
- The y -coordinate is how far up / down the point is.
- Points are always written (x, y) .

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Plot and Read Points

- Write down the coordinates of each point shown in the diagram:

- $A = (2, 3)$
- $B = (-2, 3)$
- $C = (-3, 1)$
- $D = (3, -1)$
- $E = (4, 2)$
- $F = (-1, -1)$
- $G = (-1, -3)$



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Plot and Read Points

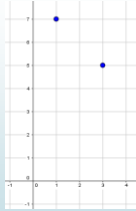
- Draw a coordinate plane. Plot and label each of the following points on it:

- $A = (2, 5)$
- $B = (2, 0)$
- $C = (3, 1)$
- $D = (-3, 1)$
- $E = (-4, -2)$
- $F = (4, -2)$
- $F = (0, 2)$

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Solve Problems about Midpoints

- A midpoint of a line segment is exactly halfway between its ends.
- Its coordinates are the average of the end coordinates.
- e.g. Find the midpoint of (3,5) and (1,7).
- Midpoint = $\left(\frac{3+1}{2}, \frac{5+7}{2}\right)$
- = $\left(\frac{4}{2}, \frac{12}{2}\right)$
- = (2,6)



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Solve Problems about Midpoints

- Plot the following pairs of points on their own coordinate diagrams. Find their midpoints and plot them on the coordinate diagrams.
1. $A(5,0)$, $B(1,4)$
 2. $C(4,2)$, $D(7,6)$
 3. $E(-9,3)$, $F(7,-7)$
 4. $G(8,1)$, $H(-2,-5)$
 5. $I(4,-1)$, $J(-5,9)$

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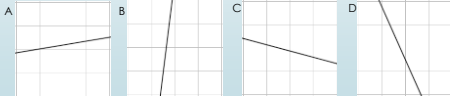
Solve Problems about Midpoints

- Given one endpoint and the midpoint, find the other endpoint:
1. Endpoint (0,0), midpoint (2,4)
 2. Endpoint (1,3), midpoint (3,6)
 3. Endpoint (-6,9), midpoint (2,-4)
 4. Endpoint (6,-4), midpoint (5,-1)
 5. Endpoint (3,-8), midpoint (1,-6)

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Solve Problems about Slopes

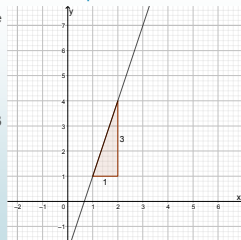
- The slope of a line is how steep it is.
- Bigger slopes are steeper.
- Positive slopes go up and right.
- Negative slopes go down and right.
- Describe each of these slopes as big or small, and positive or negative.



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Solve Problems about Slopes

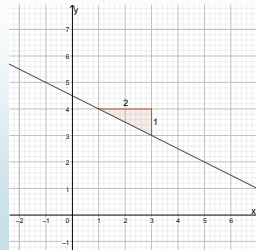
- The slope of a line is the ratio of its vertical change to its horizontal change, aka $\frac{\text{rise}}{\text{run}}$
- e.g. the line shown increases vertically by 3 when it increases horizontally by 1, so its slope is $\frac{3}{1} = 3$



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Solve Problems about Slopes

- e.g. the line opposite decreases vertically by 1 when it increases horizontally by 2, so its slope is $-\frac{1}{2}$



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Solve Problems about Slopes

■ Using the previously drawn coordinate diagrams for the points below, calculate the slope of each of the lines joining the pairs of points].

1. $A(5,0)$, $B(1,4)$
2. $C(4,2)$, $D(7,6)$
3. $E(-9,3)$, $F(7,-7)$
4. $G(8,1)$, $H(-2,-5)$
5. $I(4,-1)$, $J(-5,9)$
