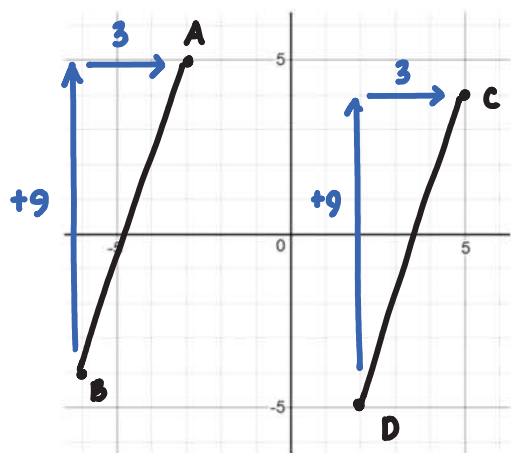


6.2 Slope of Parallel and Perpendicular Lines

Example 1: Graph the line segment AB with endpoints $A (-3, 5)$ and $B (-6, -4)$. Graph the line segment CD with endpoints $C (5, 4)$ and $D (2, -5)$. Are the two lines parallel?



$$\text{slope } AB = \frac{\text{rise}}{\text{run}} = \frac{9}{3} = 3$$

$$\text{slope } CD = \frac{9}{3} = 3$$

same slope

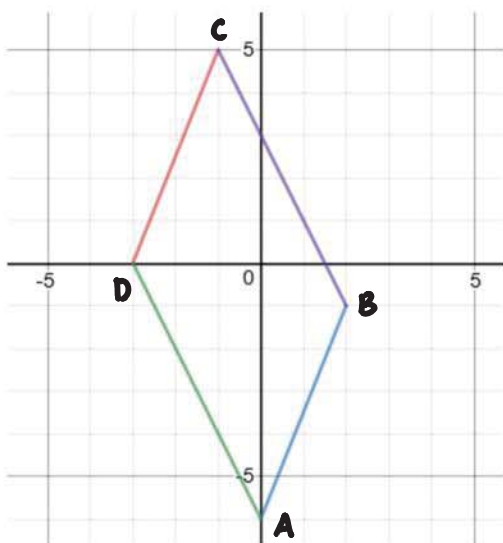
Parallel Lines

Parallel lines are lines that never intersect (cross)

Lines and line segments are parallel if they have the same slope.

symbol for parallel is
 \parallel

Example 2: Determine whether the quadrilateral is a parallelogram.



Quadrilateral: a polygon with four sides

Parallelogram: a quadrilateral with opposite sides parallel

$$\left. \begin{array}{l} \text{slope } AB = \frac{5}{2} \\ \text{slope } CD = \frac{5}{2} \end{array} \right\} \text{same!}$$

So, $AB \parallel CD$
(AB and CD are parallel)

$$\left. \begin{array}{l} \text{slope } AD = \frac{-6}{3} = -2 \\ \text{slope } BC = \frac{-6}{3} = -2 \end{array} \right\} \text{same!}$$

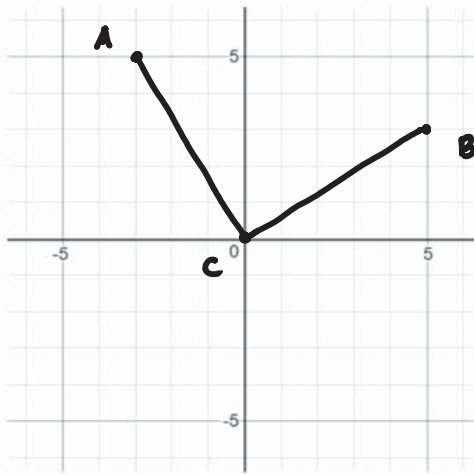
So, $AD \parallel BC$

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Since opposite sides are parallel, $ABCD$ is a parallelogram.

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Example 3: Line segment CA passes through the points $A (-3, 5)$ and $C (0, 0)$. The line segment passes through the points $B (5, 3)$ and $C (0, 0)$. Graph each line segment. What relationship is there between the slopes?



$$\text{slope } AB = -\frac{5}{3}$$

$$\text{slope } BC = \frac{3}{5}$$

- one slope is positive, one is negative
- numerator and denominator values are opposite

$$\text{ex: } -\frac{5}{3} \times \frac{3}{5} = -\frac{15}{15} = -1$$

Perpendicular Lines

Perpendicular lines and line segments meet (or will meet) at right angles. (90°)

The slopes of perpendicular lines and line segments will have a product of -1.

The slopes of perpendicular lines are also referred to as negative reciprocals

In other words, a line with slope a , $a \neq 0$, is perpendicular to a line with slope of $-\frac{1}{a}$:

symbol for perpendicular is \perp

Example 4: State the slope that would be perpendicular to the slopes given.

$$\text{a) } \frac{2}{3} \xrightarrow{\perp} -\frac{3}{2}$$

negative reciprocal of original slope

$$\text{b) } \frac{-5}{1} \xrightarrow{\perp} \frac{1}{5}$$

$$\text{c) } \frac{-3}{4} \xrightarrow{\perp} \frac{4}{3}$$

$$\text{d) } \frac{1}{1} \xrightarrow{\perp} = -\frac{1}{1} = -1$$

Practice: p.348 #3 – 6, 8 – 10, 13
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