Points → ordered pairs

A(x, y) Plot A(3, 5)

Plot B(-4, 1)

Given A(-5, 0), B(2, -4)

Draw \( \overline{AB} \)
Draw $\overline{AB}$ where $A(-3,-5)$, $B(4,0)$

$A(-2,4)$, $B(3,4)$, $C(3,-4)$ Draw $\overline{AB}$, $\overline{AC}$, and $\overline{BC}$.

$\overrightarrow{AB}$ is a line that contains $A$ & $B$ and extends in both directions.

$A(0,5)$, $B(6,0)$ Draw $\overrightarrow{AB}$

$\overline{AB}$ line segment

$\overleftrightarrow{AB}$ line
A(0,-4), B(5,3), Draw $\overrightarrow{AB}$, and shade above it.

Distance between two points $A(x_1,y_1)$ and $B(x_2,y_2)$:

$$d = \sqrt{(x_1-x_2)^2 + (y_1-y_2)^2}$$

ex: $A(7,3), B(0,8)$ Find distance from $A$ to $B$.

$$d = \sqrt{(7-0)^2 + (3-8)^2} = \sqrt{7^2 + (-5)^2} = \sqrt{49 + 25} = \sqrt{74} \approx 8.60 \text{ units}$$
Find the distance between $A(-3,1)$ and $B(0,5)$.

\[
d = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}
\]
\[
= \sqrt{(-3 - 0)^2 + (1 - 5)^2} = \sqrt{(-3)^2 + (-4)^2}
\]
\[
= \sqrt{9 + 16} = \sqrt{25} = 5
\]

$A(-4,2)$ $B(-4,-6)$ Find distance from $A$ to $B$.

\[
d = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}
\]
\[
= \sqrt{(-4 - (-4))^2 + (2 - (-6))^2} = \sqrt{(-4+4)^2 + (2+6)^2}
\]
\[
= \sqrt{0^2 + 8^2} = \sqrt{64} = 8
\]
Midpoint of \( \overline{AB} \) where \( A(x_1, y_1) \),
and \( B(x_2, y_2) \):
\[
M \left( \frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)
\]

ex: Find the midpoint of \( \overline{AB} \) where
\( A(3, 7) \) & \( B(-5, 1) \).
\[
M \left( \frac{3 + (-5)}{2}, \frac{7 + 1}{2} \right) = M \left( \frac{-2}{2}, \frac{8}{2} \right) = M \left( -1, 4 \right)
\]

Find the midpoint of \( \overline{AB} \) where
\( A(-6, 0) \) & \( B(4, 8) \)
\[
M \left( \frac{-6 + 4}{2}, \frac{0 + 8}{2} \right) = M \left( \frac{-2}{2}, \frac{8}{2} \right) = M \left( -1, 4 \right)
\]
Slope of a line is the ratio of \[ \frac{\text{rise}}{\text{run}} \] 

Find \( m \) for segment \( \overline{AB} \) where \( A(-3,2) \) and \( B(5,4) \) 

\[
m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{2 - 4}{5 - (-3)} = \frac{-2}{8} = -\frac{1}{4}
\]

A \((-2,5)\) B \((2,0)\) 

Draw \( \overline{AB} \), show rise \& run of the slope, then find its slope.

\[
m = \frac{\text{rise}}{\text{run}} = \frac{-5}{4}
\]

\[
m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{0 - 5}{2 - (-2)} = \frac{-5}{4}
\]

\[
m = \frac{5 - 0}{-2 - (-2)} = \frac{5}{-4}
\]
Suppose $A(-6,2), B(4, -4)$

Find

1) distance from $A$ to $B$

\[ d = \sqrt{(x_1-x_2)^2 + (y_1-y_2)^2} = \sqrt{(-6-4)^2 + (2-(-4))^2} = \sqrt{(-10)^2 + 6^2} \]

2) Midpoint of $\overline{AB}$

\[ M\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right) = M\left(\frac{-6+4}{2}, \frac{2-(-4)}{2}\right) \approx (1.66, 3) \]

3) Slope of $\overline{AB}$

\[ m = \frac{y_1-y_2}{x_1-x_2} = \frac{2-(-4)}{-6-4} = \frac{6}{-10} = \frac{-3}{5} \]

Equation of lines

1) Standard Form

\[ Ax + By = C \]

\[ 3x - 2y = 6 \]

2) Slope-Intercept Form

\[ y = mx + b \]

\[ y = \frac{-3}{4}x + 4 \]

3) Point-Slope Form

\[ y - y_1 = m(x - x_1) \]

\[ y - 6 = \frac{1}{2}(x + 4) \]

4) Vertical Line

\[ x = a \]

\[ x = 5 \]

5) Horizontal Line

\[ y = b \]

\[ y = -3 \]
Graph $x = 5 \land y = -3$.

Graph $x = -2$, $y = 3$, Shade to the right of $x = -2$ and below $y = 3$. 
Graph $4x - 3y = 12$ by intercept method.

\[
\begin{array}{c|c}
 x & y \\
\hline
0 & -4 \\
3 & 0 \\
\end{array}
\]

$m = \frac{-4}{3}$

Graph $2x + 5y = -10$ by intercept method.

\[
\begin{array}{c|c}
 x & y \\
\hline
0 & -2 \\
-5 & 0 \\
\end{array}
\]

$m = \frac{-2}{5}$

$m = \frac{2}{-5}$
Graph \( y = \frac{2}{3}x + 4 \) by using

- \text{Y-Int} \((0,4)\)
- \text{Slope} \( m = \frac{2}{3} \)

Graph \( y = \frac{-3}{4}x + 5 \) by using \text{Y-Int} and \text{Slope}, then shade below it.

- \text{Y-Int} \((0,5)\)
- \text{Slope} \( m = \frac{-3}{4} \)
Graph \( y = \frac{3}{5}x \) by using Y-Int, and Slope.

Y-Int \((0, 0)\) Origin

\( m = \frac{3}{5} \)

Graph \( y - 2 = \frac{1}{2}(x - 4) \) by using Point and Slope. \( y - y_1 = m(x - x_1) \)

Point - Slope Formula

Slope \( m = \frac{1}{2} \)

Rise

Run

Point \((4, 2)\)
Graph \( y - 4 = \frac{-3}{2} (x + 2) \) by using point and slope.

- **Slope**, \( m = \frac{-3}{2} \)
- **One Point** \((-2, 4)\)

**Slope** properties:
- \( m > 0 \)
- \( m < 0 \)

**No slope**
- Undefined slope

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**Some Beg. Algebra review:**

**Solve** \( 2(x - 3) + 1 = x - 5 \)

\[
2x - 6 + 1 = x - 5
\]

\[
2x - 5 = x - 5
\]

\[
2x - x = -5 + 5
\]

\[
x = 0
\]

\(
\{0\}
\)

*Do not use \( \emptyset \) for zero.*
Solve and graph

\[-2x + 5 \leq x + 26\]
\[-2x - x \leq 26 - 5\]
\[-3x \leq 21\]
\[-\frac{3}{3}x \geq \frac{21}{3}\]
\[-x \geq 7\]
\[x \leq -7\]

Interval notation
\[-7, \infty)\]

Simplify

1. \(x^7 \cdot x^3 = x^{7+3} = x^{10}\)

2. \((x^7)^3 = x^{7 \cdot 3} = x^{21}\)

3. \(\frac{x^7}{x^3} = x^{7-3} = x^4\)

4. \((-4x^5)^3 \cdot x^7 = (-4)^3(x^5)^3 \cdot x^7 = -64x^{15} \cdot x^7\)
Use FOIL to simplify:

1) \((2x - 3)(x - 2) = 2x^2 - 4x - 3x + 6 = 2x^2 - 7x + 6\)

2) \((3x + 5)(3x - 5) = 9x^2 - 15x + 15x - 25 = 9x^2 - 25\)

Trinomial

8 weeks
M-Th
9:10 - 12:00

Binomial