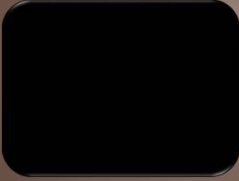
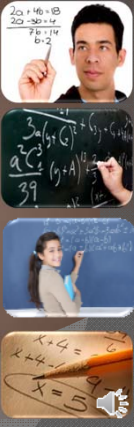


Algebra 1

Distance and Midpoint Formulas

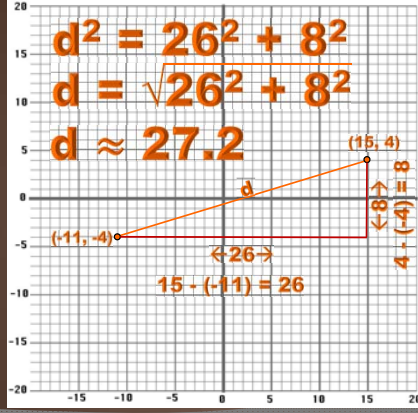
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Distance Formula

Midpoint Formula

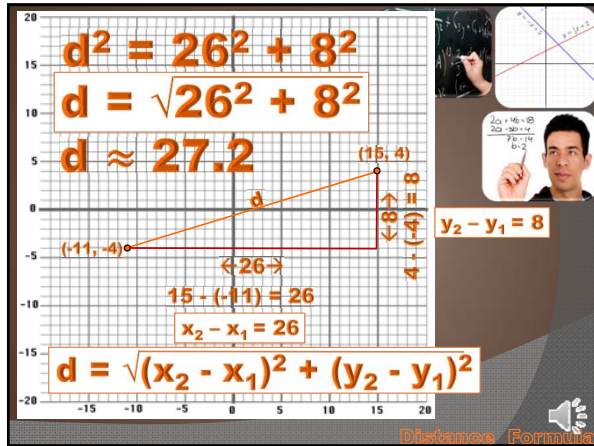
Overview



$d^2 = 26^2 + 8^2$
 $d = \sqrt{26^2 + 8^2}$
 $d \approx 27.2$

Horizontal distance: $15 - (-11) = 26$
 Vertical distance: $4 - (-4) = 8$

Distance Formula



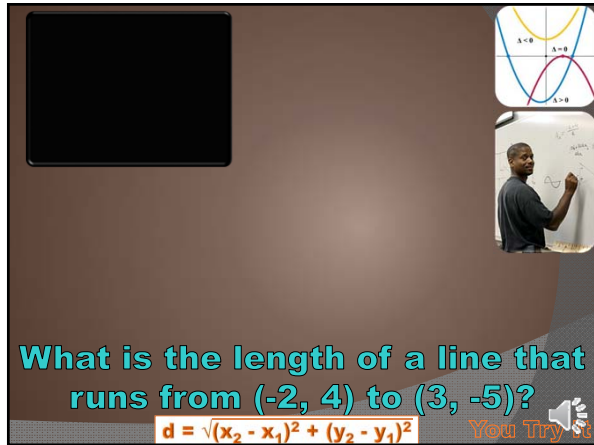
A slide illustrating the distance formula. It features a coordinate plane with a line segment connecting the points $(-11, -4)$ and $(15, 4)$. A right triangle is formed with a horizontal leg of length 26 and a vertical leg of length 8. The hypotenuse is labeled d . The calculations shown are: $d^2 = 26^2 + 8^2$, $d = \sqrt{26^2 + 8^2}$, and $d \approx 27.2$. The formula $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ is displayed at the bottom. A small inset shows a man pointing at a whiteboard with the quadratic formula $\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ and $b = -2$.

$d^2 = 26^2 + 8^2$
 $d = \sqrt{26^2 + 8^2}$
 $d \approx 27.2$

$(-11, -4)$ $(15, 4)$
 $\leftarrow 26 \rightarrow$ $15 - (-11) = 26$
 $x_2 - x_1 = 26$
 $\leftarrow 8 \rightarrow$ $4 - (-4) = 8$
 $y_2 - y_1 = 8$

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

Distance Formula

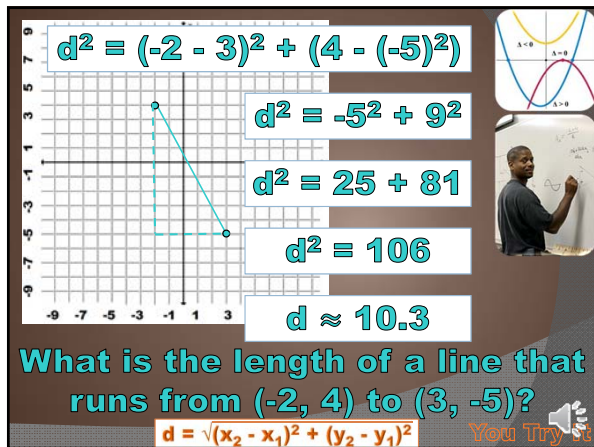


A slide posing a distance problem. It features a coordinate plane with a line segment connecting the points $(-2, 4)$ and $(3, -5)$. The question asks for the length of this line. The formula $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ is shown. A small inset shows a man pointing at a whiteboard with a graph of a parabola and the discriminant $b^2 - 4ac$ with cases $\Delta > 0$, $\Delta = 0$, and $\Delta < 0$.

What is the length of a line that runs from $(-2, 4)$ to $(3, -5)$?

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

You Try It!



A slide showing the solution to the distance problem. It features a coordinate plane with a line segment connecting the points $(-2, 4)$ and $(3, -5)$. The calculations shown are: $d^2 = (-2 - 3)^2 + (4 - (-5))^2$, $d^2 = -5^2 + 9^2$, $d^2 = 25 + 81$, $d^2 = 106$, and $d \approx 10.3$. The formula $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ is shown at the bottom. A small inset shows a man pointing at a whiteboard with a graph of a parabola and the discriminant $b^2 - 4ac$ with cases $\Delta > 0$, $\Delta = 0$, and $\Delta < 0$.

$d^2 = (-2 - 3)^2 + (4 - (-5))^2$
 $d^2 = -5^2 + 9^2$
 $d^2 = 25 + 81$
 $d^2 = 106$
 $d \approx 10.3$

What is the length of a line that runs from $(-2, 4)$ to $(3, -5)$?

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

You Try It!

$$\frac{(x_1 + x_2)}{2}, \frac{(y_1 + y_2)}{2}$$

$$\frac{(-5 + 15)}{2}, \frac{(9 + -1)}{2} = \frac{10}{2}, \frac{8}{2} = (5, 4)$$

Midpoint Formula

Find the midpoint of a line that runs between (2, 9) and (14, -5).

You Try It

$$\frac{(x_1 + x_2)}{2}, \frac{(y_1 + y_2)}{2}$$

$$\frac{(2 + 14)}{2}, \frac{(9 - 5)}{2}$$

$$= \frac{16}{2}, \frac{4}{2} = (8, 2)$$

Find the midpoint of a line that runs between (2, 9) and (14, -5).

You Try It

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

Are these three points the vertices of a right triangle? (Hint: if you knew the distance between the points, and understood the Pythagorean Theorem, you can solve this).
 (3, 5), (3, -1), (-2, -1) **You Try It!**

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

Are these three points the vertices of a right triangle? (Hint: if you knew the distance between the points, and understood the Pythagorean Theorem, you can solve this).
 (3, 5), (3, -1), (-2, -1) **You Try It!**

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