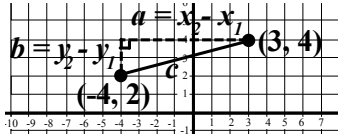


### Distance Formula

There are two ways to determine the length of a segment (or distance between two points): the Pythagorean Theorem or the Distance Formula. The truth, though, is that those two ways are actually the same process. It's only the setup that is different.

The Pythagorean Theorem states that, if a triangle is right, then the sum of the squares of the legs will equal the square of the hypotenuse. Or, more simply put:  $a^2 + b^2 = c^2$ , where **c** is the **hypotenuse** (longest side), and a & b are the other two sides.



Since  $a^2 + b^2 = c^2$ , that means that  $\sqrt{a^2 + b^2} = c$  (I just square-rooted both sides to cancel the square for c).

And because  $a = x_2 - x_1$  &  $b = y_2 - y_1$ , that means that  $\sqrt{a^2 + b^2} = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ . And that is the distance formula. If you prefer to use the Pythagorean Theorem by drawing a picture of the length and its triangle you can. However, if you memorize the distance formula, then you have a few less steps that you'll have to worry about.

Distance Formula
<b>Distance</b> = $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

<p><b>EXAMPLE</b> Find the length of the line segment with endpoints (3, 5) and (9, 2). Write your answer in the simplest radical form.</p> $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ $\sqrt{(9 - 3)^2 + (2 - 5)^2}$ $= \sqrt{(6)^2 + (-3)^2} = \sqrt{36 + 9} = \sqrt{45}$ <p><i>To simplify, look for perfect squares...</i></p> $\sqrt{45} = \sqrt{9 \cdot 5} = \boxed{3\sqrt{5}}$	<p><b>EXAMPLE</b> Find the length of the line segment with endpoints (4, -1) and (8, 7). Write your answer in the simplest radical form.</p> $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ $\sqrt{(8 - 4)^2 + (7 - (-1))^2}$ $= \sqrt{(4)^2 + (8)^2} = \sqrt{16 + 64} = \sqrt{80}$ <p><i>To simplify, look for perfect squares...</i></p> $\sqrt{80} = \sqrt{4 \cdot 20} = 2\sqrt{4 \cdot 5} = 2 \cdot 2\sqrt{5}$ $= \boxed{4\sqrt{5}}$	<p><b>EXAMPLE</b> Find the length of the line segment with endpoints (11, 4) and (5, 4). Write your answer in the simplest radical form.</p> $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ $\sqrt{(5 - 11)^2 + (4 - 4)^2}$ $= \sqrt{(-6)^2 + (0)^2} = \sqrt{36 + 0} = \sqrt{36}$ $= \boxed{6}$
<p>1. Find the length of the line segment with endpoints (0, 5) and (-8, 8). Write your answer in the simplest radical form.</p>	<p>2. Find the length of the line segment with endpoints (4, 12) and (6, 4). Write your answer in the simplest radical form.</p>	<p>3. Find the length of the line segment with endpoints (-5, -3) and (5, -1). Write your answer in the simplest radical form.</p>
<p>4. Find the length of the line segment with endpoints (8, 8) and (3, 3). Write your answer in the simplest radical form.</p>	<p>5. Find the length of the line segment with endpoints (-2, 9) and (4, 1). Write your answer in the simplest radical form.</p>	<p>6. Find the length of the line segment with endpoints (-7, 2) and (-2, -10). Write your answer in the simplest radical form.</p>

<p>7. Find the length of the line segment with endpoints <math>(5, 2)</math> and <math>(13, 17)</math>. Write your answer in the simplest radical form.</p>	<p>8. Find the length of the line segment with endpoints <math>(-1, 6)</math> and <math>(8, 4)</math>. Write your answer in the simplest radical form.</p>	<p>9. Find the length of the line segment with endpoints <math>(7, 2)</math> and <math>(15, 6)</math>. Write your answer in the simplest radical form.</p>
<p>10. Determine the distance between the points <math>(1, 2)</math> and <math>(3, 4)</math>. Write your answer in the simplest radical form.</p>	<p>11. Determine the distance between the points <math>(-5, -3)</math> and <math>(1, -1)</math>. Write your answer in the simplest radical form.</p>	<p>12. Determine the distance between the points <math>(4, 6)</math> and <math>(-3, 7)</math>. Write your answer in the simplest radical form.</p>
<p>13. Determine the distance between the points <math>(-6, 5)</math> and <math>(-3, 14)</math>. Write your answer in the simplest radical form.</p>	<p>14. Determine the distance between the points <math>(7, 4)</math> and <math>(7, 2)</math>. Write your answer in the simplest radical form.</p>	<p>15. Determine the distance between the points <math>(8, 6)</math> and <math>(-1, 15)</math>. Write your answer in the simplest radical form.</p>