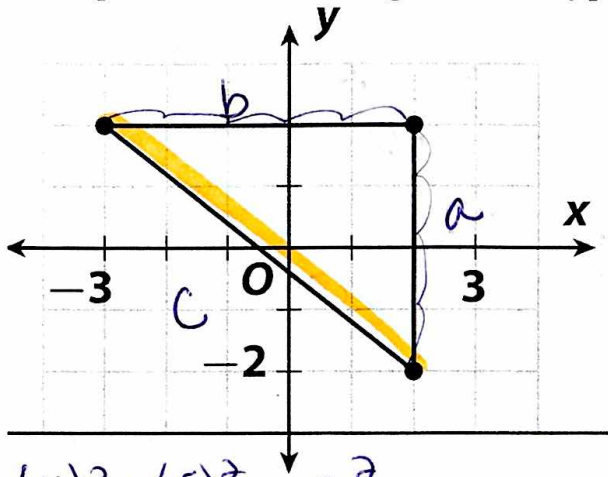


Determining the Distance between Two Points on a Coordinate Plane using the Pythagorean Theorem

Example 1: Find the length of the hypotenuse without using a calculator



Step 1: Highlight hypotenuse → it is the missing side!

Step 2: Find lengths of legs
Count!

Step 3: Use Pythagorean Theorem to find length of hypotenuse

$$a^2 + b^2 = c^2$$

$$(4)^2 + (6)^2 = c^2$$

$$16 + 36 = c^2$$

$$\sqrt{52} = \sqrt{c^2}$$

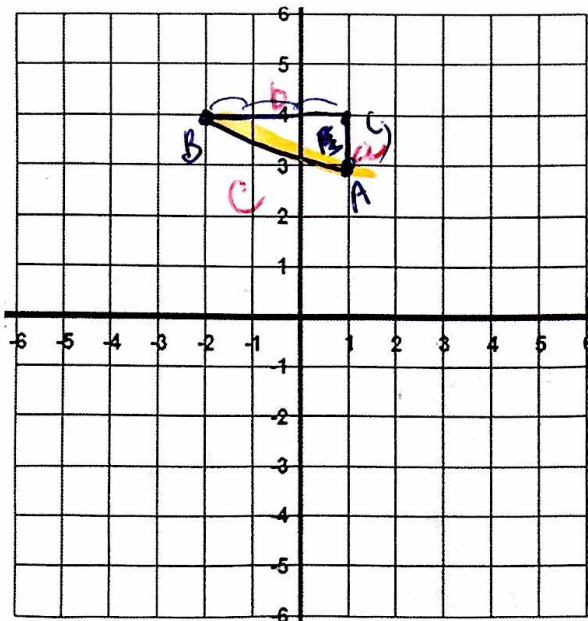
$$c = \sqrt{52}, \approx 7.21$$

$$a = 4$$

$$b = 6$$

$$c = \sqrt{52}, \text{ or } \approx 7.21 \text{ units}$$

Example 2: Assuming that the three points A(1, 3), B(-2, 4) and C(1, 4) form a right triangle, how far apart are points A and B?



Step 1: Plot given points

Step 2: Connect points

Step 3: Highlight hypotenuse → it is the missing side!

Step 4: Find lengths of legs
Count!

Step 5: Use Pythagorean Theorem to find distance between points A and B.

$$a^2 + b^2 = c^2$$

$$(1)^2 + (3)^2 = c^2$$

$$a = 1$$

$$1 + 9 = c^2$$

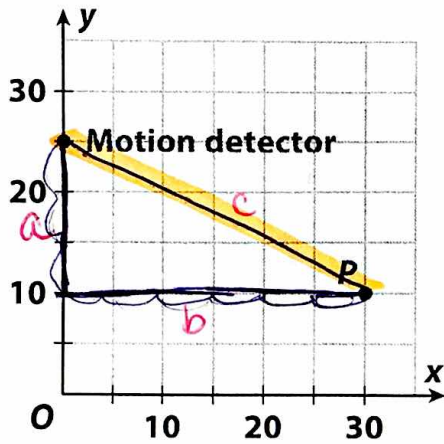
$$b = 3$$

$$\sqrt{10} = \sqrt{c^2}$$

$$c = \sqrt{10}, \text{ or } \approx 3.16 \text{ units}$$

$$c = \sqrt{10}, \approx 3.16$$

Example 3: The graph shows the location of a motion detector that has a maximum range of 34 feet. A peacock at point P displays its tail feathers. Will the motion detector sense this motion? Explain.



$$a^2 + b^2 = c^2$$

$$a = 30 \quad (30)^2 + (15)^2 = c^2$$

$$b = 15 \quad 900 + 225 = c^2$$

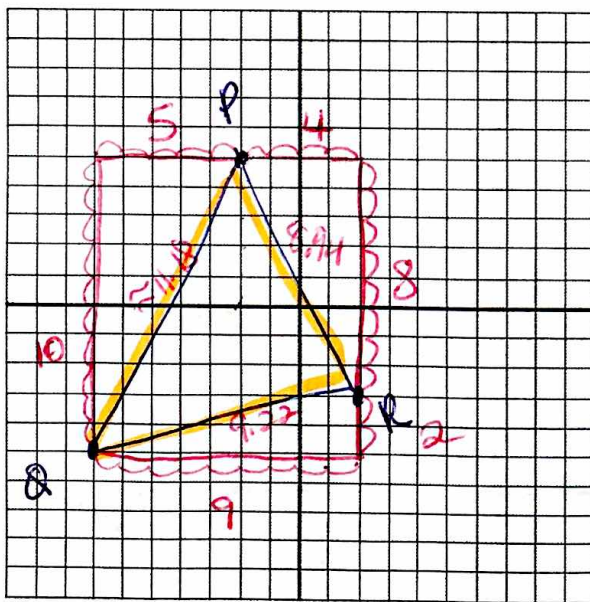
$$c = 33.54 \text{ ft} \quad \sqrt{1125} = \sqrt{c^2}$$

~~Will the detector sense the motion?~~

$$\sqrt{1125} \approx 33.54 = c$$

Yes, the detector will sense the motion b/c it is ≈ 33.54 feet (within the 34 feet range)

Example 4: The locations of 3 ships are represented on a coordinate grid by the following points: P(-2, 5), Q(-7, -5), and R(2, -3). Which ships are farthest apart?



$$a^2 + b^2 = c^2$$

$$P \rightarrow Q$$

$$a = 5$$

$$b = 10$$

$$(5)^2 + (10)^2 = c^2$$

$$25 + 100 = c^2$$

$$\sqrt{125} = \sqrt{c^2}$$

$$c \approx 11.18 \text{ units apart}$$

$$P \rightarrow R$$

$$a = 4$$

$$b = 8$$

$$(4)^2 + (8)^2 = c^2$$

$$16 + 64 = c^2$$

$$\sqrt{80} = \sqrt{c^2}$$

$$8.94 \approx c$$

units

$$Q \rightarrow R$$

$$a = 9 \quad (9)^2 + (2)^2 = c^2$$

$$b = 2 \quad 81 + 4 = c^2$$

$$\sqrt{85} = \sqrt{c^2}$$

$$c \approx 9.22 \text{ units apart}$$

Ships P+Q
are farthest
apart