

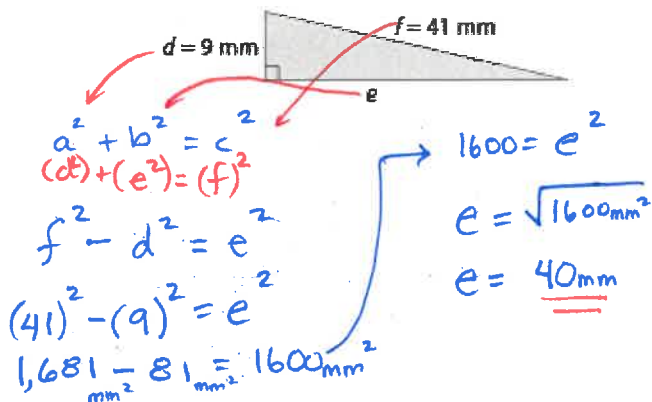
Chapter 1: Pythagorean Relationships

Section 1.3 - Applying the Pythagorean Relationship

Determine the unknown side length of a right triangle

Example

Find the length of side e.

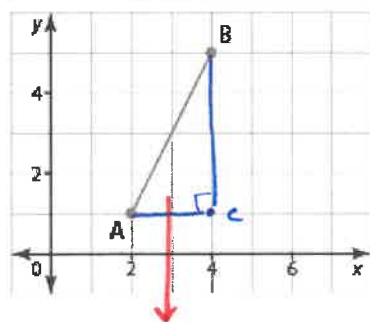


Key Points

- Square each side
- Use Pythagorean relationship
 - Will we use addition or subtraction?

Determine the length of a line segment

Example



$a^2 + b^2 = c^2$
 $(AC)^2 + (BC)^2 = (AB)^2$
 $(2)^2 + (4)^2 = (AB)^2$
 $4 + 16 = (AB)^2$
 $20 = (AB)^2$
 $\sqrt{20} = AB \rightarrow \boxed{4.47 = AB}$

Key Points

Cannot measure the line but we can break it up into its x and y parts

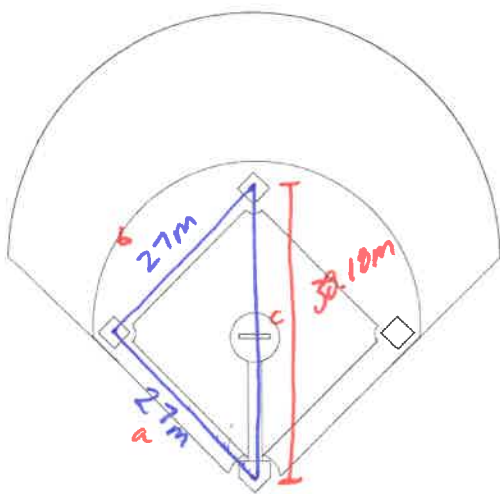
- Draw a line from point A to the right and a line down from point B so they meet. This will be point C.
- Distance from point A to C on x axis is length of side AC
 - AC = 2
- Distance from point B to C on y axis is length of side BC
 - BC = 4
- Use pythagorean relationship to find side AB

Solving problems involving unknown distances

- Some sides of the right triangle needed to solve the problem may be imaginary

Example

The bases on a baseball diamond form a square with a side length of 27m. A runner on first base is trying to steal second base and will take approximately 2.0 seconds to get there. The catcher throws the ball to second at a **velocity** of 22 m/s. Will the ball reach second base before the runner?

**Key Points**

- Use pythagoras to find distance, d , between home plate and second base
- Use formula for velocity, v , to find amount of time, t , for ball to reach second base

$$\text{Velocity } (v) = \frac{\text{Distance } (d)}{\text{Time } (t)}$$

Rearrange equation to find time

$$\text{Time } (t) = \frac{\text{Distance } (d)}{\text{Velocity } (v)}$$

$$\begin{aligned} \textcircled{1} \quad a^2 + b^2 &= c^2 \\ (27\text{m})^2 + (27\text{m})^2 &= c^2 \\ 729\text{m}^2 + 729\text{m}^2 &= c^2 \\ 1458\text{m}^2 &= c^2 \\ \sqrt{1458\text{m}^2} &= c \\ \boxed{38.18\text{m} = c} \end{aligned}$$

$$d = 38.18\text{m} \quad v = 22\text{m/s} \quad t = ?$$

$$\textcircled{2} \quad (t) v = \frac{d}{t}$$

$$\frac{t}{v} = \frac{d}{v}$$

$$t = \frac{d}{v}$$

$$t = \frac{38.18\text{m}}{22\text{m/s}}$$

$$t = 1.74\text{s. for throw to reach 2nd base from back catcher.}$$

Runner takes 2s, though the ball will beat the runner and the runner will be called out.

Practice assignment - page 26 #1, 3, 6, 9, 10, choose two apply questions (challenge: # 22).