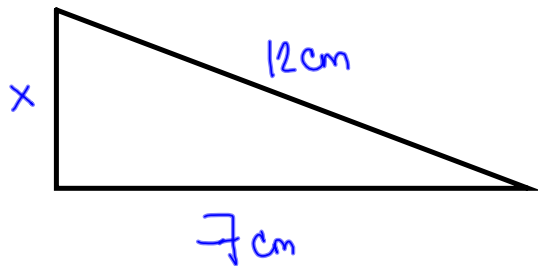


Solutions for Practice of Section 1.1

Pythagorean Theorem	Given a right triangle with the length of the hypotenuse 12 cm and a leg 7 cm, determine the length of the other leg.
Distance	Determine the distance between these points: (-5,12) and (5, -18)
Midpoint	Determine the midpoint of the segment with endpoints (-5,12) and (5, -18)
Word problem	In a city set out on a grid (N,S,E,W) with each unit a block, a helicopter takes off from the intersection of 2 E and 5 N and flies to the hospital at 5 W and 10 S. How far does he fly ? (Each block is 0.1 mile)

Given a right triangle with the length of the hypotenuse 12 cm and a leg 7 cm, determine the length of the other leg.



$$(12\text{ cm})^2 = x^2 + (7\text{ cm})^2$$

$$x^2 = (12\text{ cm})^2 - (7\text{ cm})^2$$

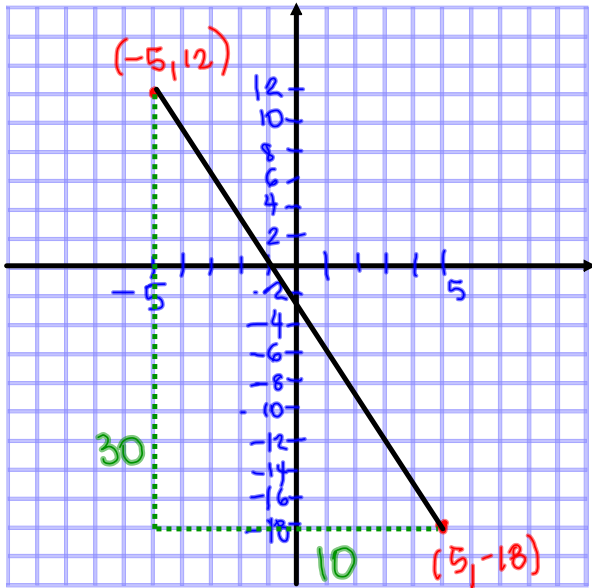
$$x^2 = 144\text{ cm}^2 - 49\text{ cm}^2$$

$$x^2 = 95\text{ cm}^2$$

$$x = \sqrt{95\text{ cm}^2}$$

$$x = \sqrt{95}\text{ cm}$$

Determine the distance between these points: $(-5, 12)$ and $(5, -18)$



There are two methods for solving this problem:

1. Graph the points, draw right angle triangle and use Pythagorean theorem:

$$\begin{aligned}d &= \sqrt{30^2 + 10^2} = \\ &= \sqrt{900 + 100} = \\ &= \sqrt{1000} = 10\sqrt{10}\end{aligned}$$

2. Use distance formula:

$$\begin{aligned}d &= \sqrt{(5 - (-5))^2 + (-18 - 12)^2} \\ &= \sqrt{(5 + 5)^2 + (-30)^2} \\ &= \sqrt{10^2 + 900} = \\ &= \sqrt{100 + 900} \\ &= \sqrt{1000} \\ &= 10\sqrt{10}\end{aligned}$$

Determine the midpoint of the segment with endpoints $(-5,12)$ and $(5, -18)$

Again, there are several different ways in which you could have found the answer.

1. You could have observed on the graph on the previous page that to go half way from $(-5,12)$ to $(5,-18)$ you would have to go half the horizontal distance and half the vertical distance. 0 is half way between 5 and -5, and from 12 to -18 we have to go 30 units, so half way is 15 units. That means that we have to go 15 down from 12, which takes us to -3, and the midpoint is **$(0,-3)$** .

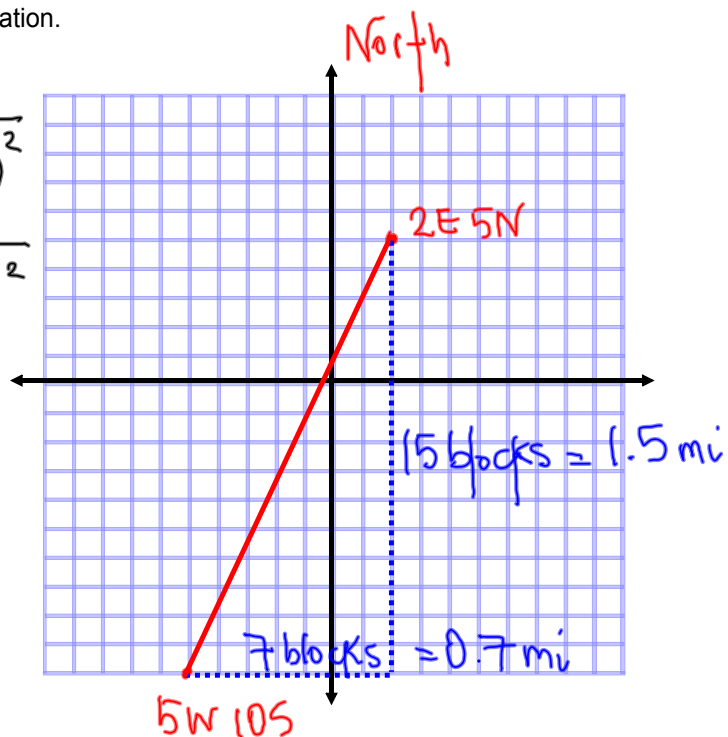
2. You can use midpoint formula, which is really a shortcut for a consideration such as the above.

$$M\left(\frac{5+(-5)}{2}, \frac{-18+12}{2}\right) = \left(0, \frac{-6}{2}\right) = (0,-3)$$

In a city set out on a grid (N,S,E,W) with each unit a block, a helicopter takes off from the intersection of 2 E and 5 N and flies to the hospital at 5 W and 10 S. How far does he fly ? (Each block is 0.1 mile)

It will help to draw a picture of this situation.

$$\begin{aligned}
 d &= \sqrt{(1.5 \text{ mi})^2 + (0.7 \text{ mi})^2} \\
 &= \sqrt{2.25 \text{ mi}^2 + 0.49 \text{ mi}^2} \\
 &= \sqrt{2.74 \text{ mi}^2} \\
 &\approx 1.6553 \text{ mi}
 \end{aligned}$$



$$\begin{aligned}
 1 \text{ block} &= 0.1 \text{ mi} \\
 7 \text{ blocks} &= 0.1 \text{ mi} \cdot 7 = 0.7 \text{ mi} \\
 15 \text{ blocks} &= 0.1 \text{ mi} \cdot 15 = 1.5 \text{ mi}
 \end{aligned}$$