

Answers

200711150815 Ladder Problem

A ladder has a length of 10.50 meters. It is leaning up against a vertical wall. The base of the ladder makes a 70.00 degree angle with the horizontal ground.

- How far up the wall will the top of the ladder reach?
- What is the angle that the top of the ladder makes with the wall?
- How far is the base of the ladder from the bottom of the wall?

Step 1 - Make a diagram

Step 2 - List what is known

We have a right triangle

Hypotenuse = Ladder = 10.50 m

Wall = ? Ground = ?

a) use definition of sine to get "a"

$$\sin \phi = \frac{\text{OPP}}{\text{HYP}}$$

$$\sin 70^\circ = \frac{\text{wall}}{\text{Ladder}}$$

$$\text{wall} = (\text{Ladder})(\sin 70^\circ)$$

$$\text{wall} = (10.50\text{m})(.93969)$$

$$\text{wall} = 9.866745\text{m Round to 4SF}$$

$$\text{wall} = 9.867\text{m}$$

b) $A+B+C=180^\circ$

$$B = 180^\circ - 90^\circ - 70^\circ$$

$$B = 20^\circ$$

c) use Cosine to get "b"

$$\cos \phi = \frac{\text{ADJ}}{\text{HYP}}$$

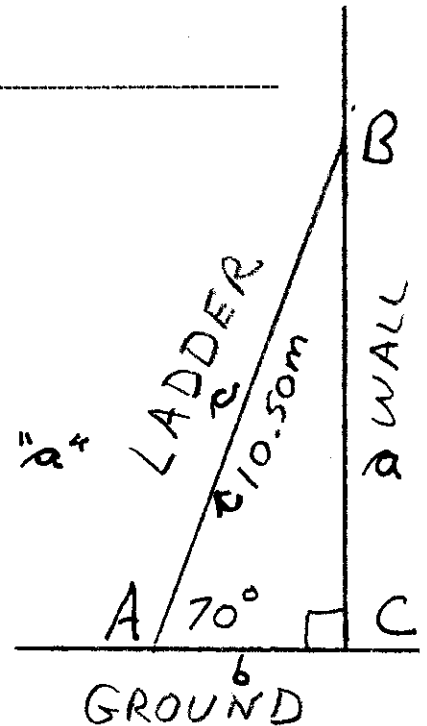
$$\cos 70^\circ = \frac{\text{GROUND}}{\text{Ladder}}$$

$$\text{Ground} = (\text{Ladder})(\cos 70^\circ)$$

$$\text{Ground} = (10.50\text{m})(.34202)$$

$$\text{Ground} = (3.59121)\text{m Round to 4SF}$$

$$\text{Ground} = 3.591\text{m}$$



Answers

$$\text{Wall} = 9.867\text{m}$$

$$B = 20.00^\circ$$

$$\text{Ground} = 3.591\text{m}$$