

Chapter 1

Basic Classes of Functions

Checkpoint Solution

Checkpoint 1.19: Placing a Ladder

Instruction

A house painter wants to lean a 20-ft ladder against a house. If the angle between the base of the ladder and the ground is to be 60° , how far from the house should she place the base of the ladder?

Solution

The ladder, ground, and house wall will form a right triangle. The hypotenuse of the triangle is the length of the ladder, 20-ft. We are also told that the angle between the ground and the ladder is 60° . And we want to know how far from the house the base of the ladder is placed, this will be length of the leg adjacent to the 60° angle in our triangle.

Let H be the length of the hypotenuse, A the length of the adjacent leg, and θ be the angle. Then using the relationship $\cos\theta = A/H$ we can find the distance from the base of the ladder to the house as,

$$A = \cos(\theta) \cdot H = \cos(60^\circ) \cdot 20 = \frac{1}{2} \cdot 20 = 10.$$

Where the information that $\cos(60^\circ)$ equals $1/2$ is stated in the book, but can also be found in other ways such as by using a scientific calculator.

Answer

10 ft.