FREQUENTLY ASKED Questions

Q: **What are the primary trigonometric ratios, and how do you use them?**

A: The primary trigonometric ratios for $\angle A$ in $\triangle ABC$ are

$$\sin A = \frac{\text{opposite}}{\text{hypotenuse}} \qquad \cos A = \frac{\text{adjacent}}{\text{hypotenuse}} \qquad \tan A = \frac{\text{opposite}}{\text{adjacent}}$$

To calculate an angle or a side using a trigonometric ratio, follow these steps:
- Label the sides of the triangle relative to either an acute angle you know or the angle you want to calculate.
- Use the appropriate trigonometric ratio to write an equation that involves the angle or side you want to calculate.
- Solve your equation.

Q: **How do you know when to use the inverse trigonometric ratios?**

A: Use $\sin^{-1}$, $\cos^{-1}$, or $\tan^{-1}$ when you need to determine the measure of an angle and you know the value of a ratio of two sides in a right triangle.

Q: **What strategies can you use to solve a problem that involves a right triangle model?**

A1: Draw a diagram to model the problem. If you know the measure of one acute angle and the length of one side, follow these steps:
- Determine the third angle by subtracting the right angle and the other known angle from 180°.
- Calculate the two unknown side lengths using trigonometric ratios. Alternatively, calculate one unknown side length using a trigonometric ratio and solve for the last side length using the Pythagorean theorem.

A2: Draw a diagram to model the problem. If you know two side lengths but neither acute angle, follow these steps:
- Use inverse trigonometric ratios to calculate one of the missing angles.
- Calculate the third angle by subtracting the angle you found and the right angle from 180°.
- Calculate the third side using a trigonometric ratio or the Pythagorean theorem.

Study | **Aid**
- See Lesson 7.4, Examples 1 to 3.
- Try Chapter Review Questions 5 to 10.
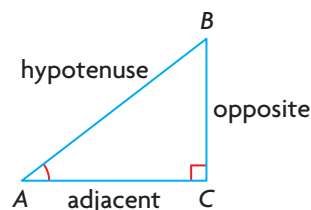
Study | **Aid**
- See Lesson 7.4, Example 3, and Lesson 7.5, Example 3.
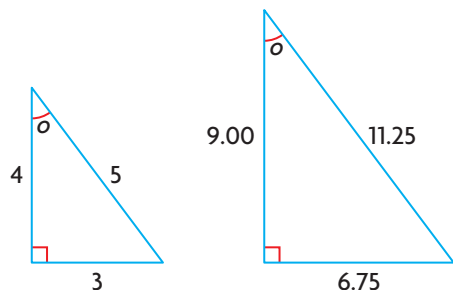- Try Chapter Review Questions 5 b), 7, and 8 b).

Study | **Aid**
- See Lesson 7.5, Examples 1 to 4, and Lesson 7.6, Examples 1 to 4.
- Try Chapter Review Questions 11 to 17.
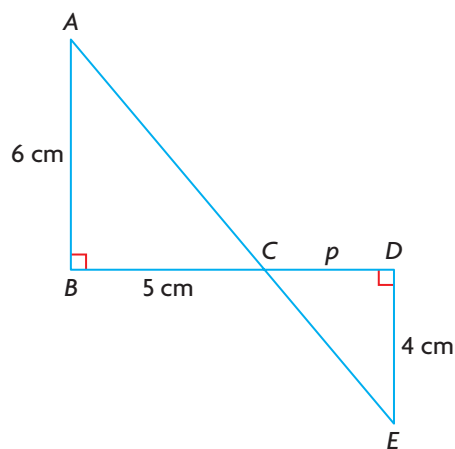
PRACTICE *Questions*

1. Determine whether these triangles are similar. If they are similar, write a proportion statement and determine the scale factor.
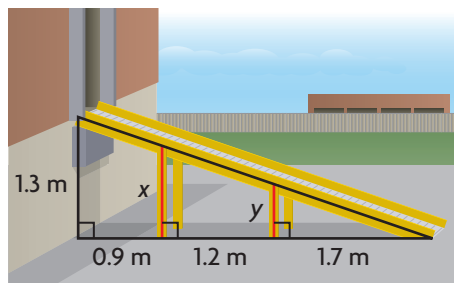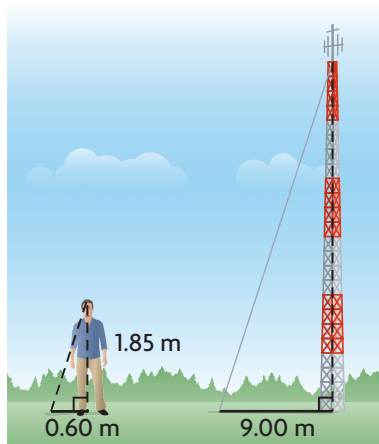

Lesson 7.2

2. State whether the triangles in the diagram are similar. Then determine p.

3. Calculate the heights of the two ramp supports, x and y. Round your answers to the nearest tenth of a metre.
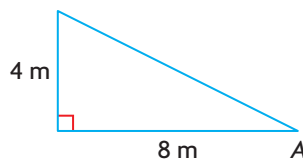

4. Brett needs to support a radio tower with guy wires. Each guy wire must run from the top of the tower to its own anchor 9.00 m from the base of the tower. When the tower casts a shadow that is 9.00 m long, Brett's shadow is 0.60 m long. Brett is 1.85 m tall. What is the length of each guy wire that Brett needs?

Lesson 7.4

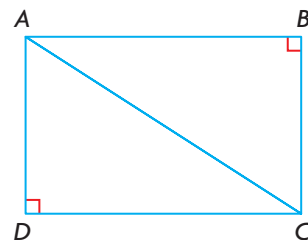**5. a)** Determine the three primary trigonometric ratios for $\angle A$.

b) Calculate the measure of $\angle A$ to the nearest degree.

6. Determine x to one decimal place.

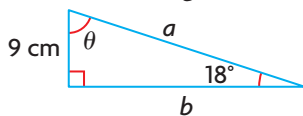**a)** $\tan 46° = \dfrac{x}{14.2}$ **b)** $\cos 29° = \dfrac{17.3}{x}$

Lesson 7.5

7. $ABCD$ is a rectangle with $AB = 15$ cm and $BC = 10$ cm. What is the measure of $\angle BAC$ to the nearest degree?

8. In $\triangle PQR$, $\angle R = 90°$ and $p = 12.0$ cm.
   a) Determine r, when $\angle Q = 53°$.
   b) Determine $\angle P$, when $q = 16.5$ cm.

9. Solve this triangle.

10. Maria needs to load cars onto a transport truck. She is planning to drive up a ramp, onto the truck bed. The truck bed is 1.5 m high, and the maximum angle of the slope of the ramp is 35°.
   a) How far is the rear of the truck from the point where the ramp touches the ground?
   b) How long should the ramp be? Round your answer to one decimal place.

Lesson 7.6

11. A search-and-rescue airplane is flying at an altitude of 1200 m toward a disabled ship. The pilot notes that the angle of depression to the ship is 12°. How much farther does the airplane have to fly to end up directly above the ship?
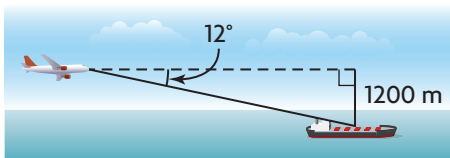
**12.** The angle of elevation from the top of a 16 m building to the top of a second building is 48°. The buildings are 30 m apart. What is the height of the taller building?

13. A cyclist pedals his bike 6.5 km up a mountain road, which has a steady incline. By the time he has reached the top of the mountain, he has climbed 1.1 km vertically. Calculate the angle of elevation of the road.

14. Two watch towers at an historic fort are located 375 m apart. The first tower is 14 m tall, and the second tower is 30 m tall.
   a) What is the angle of depression from the top of the second tower to the top of the first tower?
   b) The guards in the towers simultaneously spot a suspicious car parked between the towers. The angle of depression from the lower tower to the car is 7.7°. The angle of depression from the higher tower is 6.3°. Which guard is closer to the car? Explain how you know.

15. Calculate the length of AB using the information provided. Show all your steps.
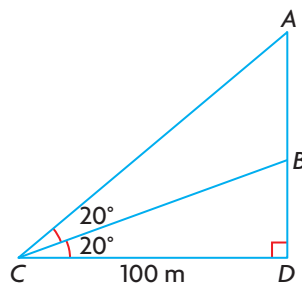
16. A swimmer observes that from point A, the angle of elevation to the top of a cliff at point D is 30°. When the swimmer swims toward the cliff for 1.5 min to point B, he estimates that the angle of elevation to the top of the cliff is about 45°. If the height of the cliff is 70.0 m, calculate the distance the swimmer swam.
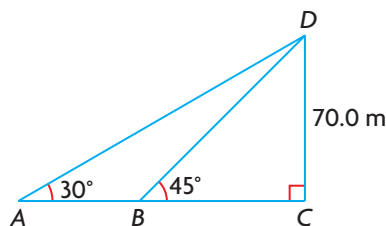
17. A plane takes off in a straight line and travels along this line for 10 s, when it reaches a height of 300 m. If the plane is travelling at 60 m/s, at what angle is the plane ascending?