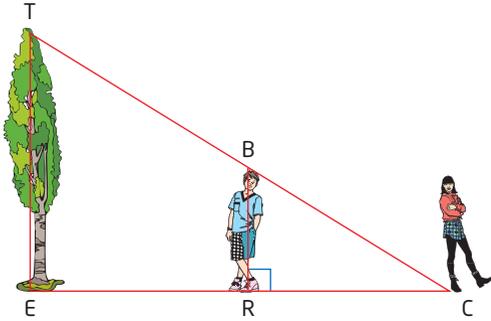


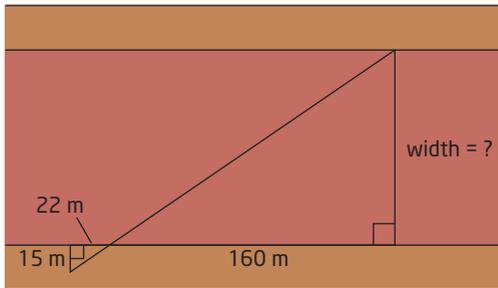
## Connect and Apply

9. To measure the height of a tree, Cynthia has her little brother, BR, stand so that the tip of his shadow coincides with the tip of the tree's shadow, at point C.

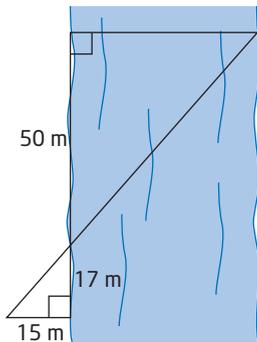


Cynthia's brother, who is 1.2 m tall, is 4.2 m from Cynthia, who is standing at C, and 6.5 m from the base of the tree. Find the height of the tree, TE.

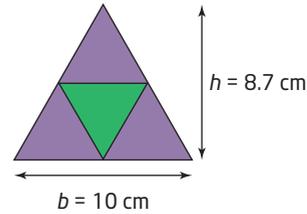
10. Find the width of the canyon.



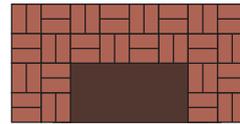
11. Use the dimensions of the surveyors' triangles to find the width of the river, to the nearest metre.



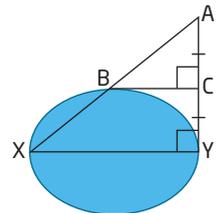
12. Melanie is designing a crest for her hockey team, the Trigazoids. Her prototype consists of four congruent equilateral triangles.



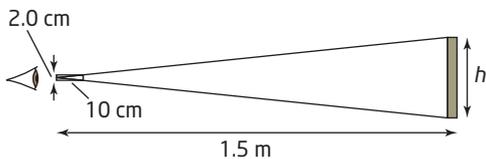
- What is the total area of this crest?
  - What is the area of
    - the green section?
    - the purple sections?
  - What is the area of a giant similar crest with base 30 cm?
  - What is the height of a similar crest with area  $500 \text{ cm}^2$ ?
13. The front of each brick in the fireplace measures 10 cm by 20 cm.



- How many similar rectangles of different sizes can you find? Sketch a diagram to illustrate them. Label their dimensions (length and width).
  - What is the area of the front of one brick?
  - Find the area of the entire fireplace, including the opening.
  - Find the area of the opening.
  - Find the area of the fireplace, excluding the opening.
14. Find the length and width of the pond. The following measures are known:  
 $AB = 14 \text{ m}$   
 $BC = 11 \text{ m}$   
 Assume that XY is a line of symmetry for the pond.



15. Determine the height of a tall tree, a flagpole, or the side of a building in your schoolyard using similar triangles. Explain your method using words and diagrams.
16. While looking through a cylindrical tube, Rita moves to a point where the height of a picture just fits within her field of view, as shown.



Rita is standing 1.5 m from the picture. The length and diameter of the viewing tube are as shown. Find the height of the picture.

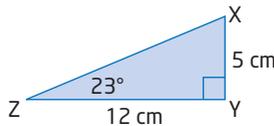
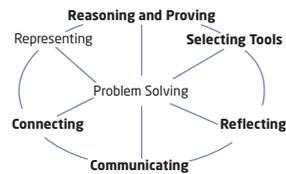
17. Use algebraic and geometric reasoning to show how the areas of two similar right triangles are related by the square of the scale factor,  $k^2$ .
18. a) Sketch several pairs of similar acute triangles with different scale factors,  $k$ .  
 b) Find the areas of the triangles in each pair.  
 c) Find the ratio of the areas of the triangles in each pair. How is this ratio related to the scale factor,  $k$ ?
19. The areas of two similar triangles are  $72 \text{ cm}^2$  and  $162 \text{ cm}^2$ . What is the ratio of the lengths of their corresponding sides?
20.  $\triangle ABC$  and  $\triangle DEF$  are similar. The ratio of their corresponding sides is 3:5. What is the ratio of their perimeters? Explain.
21. Use similar triangles to measure the height of the building in which you live. Write a brief report on how you solved this problem. Include diagrams. Discuss how accurate you think your answer is. Suggest ways to improve your method to get a more accurate height.

22. **Chapter Problem** The first leg of your race will begin on the southern shore of James Bay, at Moosonee. From there you will travel to Regina, then to Churchill, located on the eastern shore of Hudson Bay. Take note of your journey. The triangle formed by these three locations is similar to the triangle formed by Pittsburgh, Repulse Bay (located near the Arctic Circle), and your next destination. Identify the similar triangles and determine your next destination. *Hint: Move quickly, and you will be glad that you beat the rest of the flock!*



**Achievement Check**

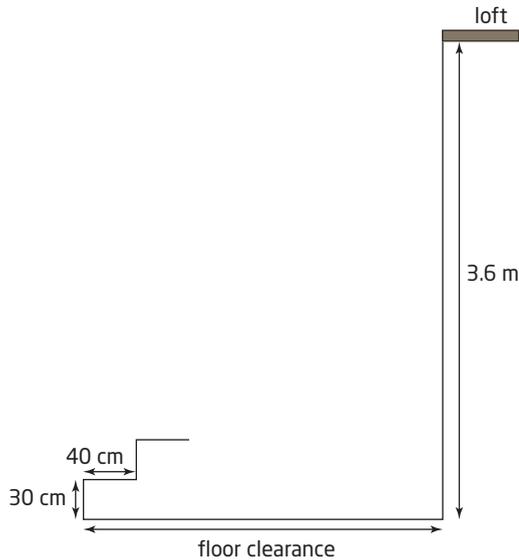
23. Teschia is making a scale drawing to help her redesign her flower garden.



- a) Calculate the length of  $ZX$  and the measure of  $\angle ZXY$ .
- b) If the hypotenuse of the actual flower garden measures 6.5 m, what is the perimeter of the actual garden?
- c) What is the scale factor of Teschia's drawing?
- d) What is the ratio of the area of the flower garden to the area of the scale drawing?

## Extend

24. Carol is building a staircase from the floor of her barn to the loft, which is 3.6 m above the floor. She is using steps that are each 30 cm high and 40 cm deep.

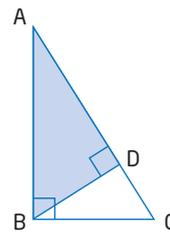


- a) How much floor clearance will Carol need in order to fit the staircase?  
 b) How many steps will be required?
25. The scale on a map is 1 cm represents 5 km. A provincial park has an area of  $6 \text{ cm}^2$  on the map. What is the actual area of the park, to the nearest square kilometre?
26. Krista used her Global Positioning System (GPS) device to obtain information on the distance and direction from Niagara Falls to London, England, and to Miami, Florida. She drew a triangle, and calculated the angles in the triangle from the GPS data. She noticed that the sum of the angles was not  $180^\circ$ , as expected.
- a) Why did this occur?  
 b) Would you expect the sum to be more or less than  $180^\circ$ ? Explain.

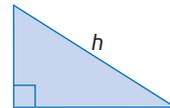
27. **Math Contest** A naturalist's study in Northern Ontario finds that 25% of the area is water and 60% of the remaining area is forest. The rest, 12 000 ha, is rock. How large is the study area, in hectares?

- A 36 000 ha  
 B 40 000 ha  
 C 68 000 ha  
 D 80 000 ha  
 E 100 000 ha

28. **Math Contest** In  $\triangle ABC$ ,  $AB = 24 \text{ cm}$  and  $BC = 10 \text{ cm}$ .  $BD$  is perpendicular to  $AC$ . Find the ratio of the shaded area to the unshaded area.



29. **Math Contest** Express the length of the hypotenuse of a right triangle in terms of its area,  $A$ , and its perimeter,  $P$ .



30. **Math Contest** Two neighbouring houses are located at  $A$  and  $B$ , near a straight section of a rural road,  $RD$ . The electric company plans to place a pole,  $P$ , at the roadside and connect wires from the pole to the two houses. How far from point  $R$  should the pole be located so that the minimum length of wire is needed?

