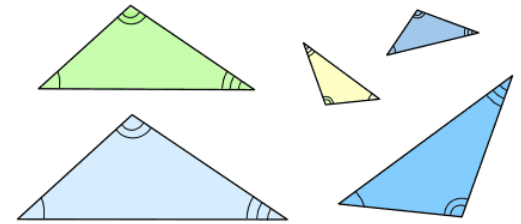


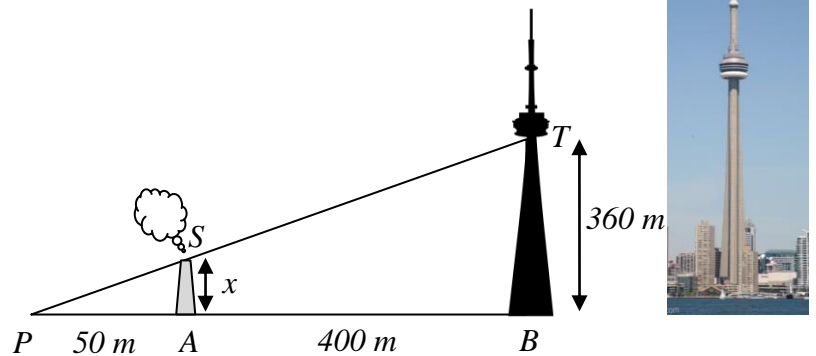
Similar Triangles

Two triangles are **similar** if the only difference is size (and possibly the need to turn or flip one around).

- Equal angles have been marked with the same label or same number of arcs)
- Some of them have different sizes and some of them have been turned or flipped.
- Similar triangles have all their angles equal and their corresponding sides have the same ratio.



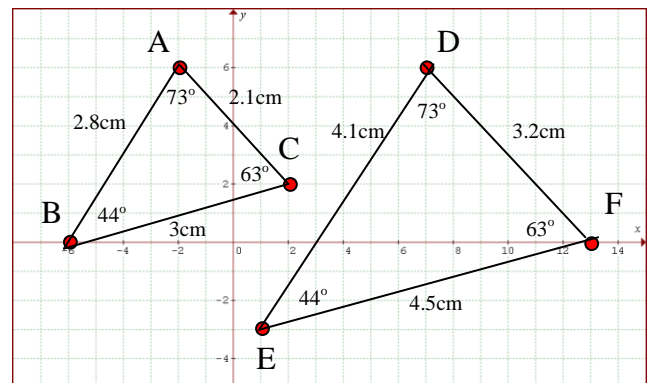
Example 1: A photographer took this photograph by standing 50 m from a smokestack and aligning it with the 360 m level of the CN tower. How high is the smokestack if it is 400 m from the tower?



Example 2:

Two triangles have vertices $A(-2, 6)$, $B(-6, 0)$, $C(2, 2)$ and $D(7, 6)$, $E(1, -3)$, $F(13, 0)$.

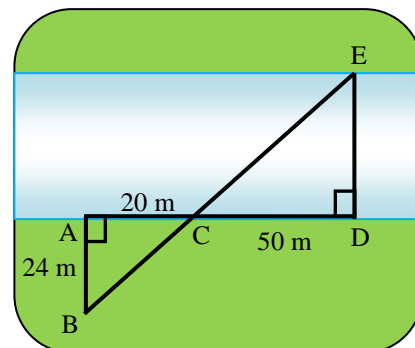
- Graph the triangles and measure (or calculate) the lengths of all their sides. (Given)
- Determine the ratios of corresponding sides. Are the triangles similar?
- Use a protractor to measure the angles in each triangle. Are corresponding angles equal?



NOTE: Think about verifying the length using the distance formula. $S = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

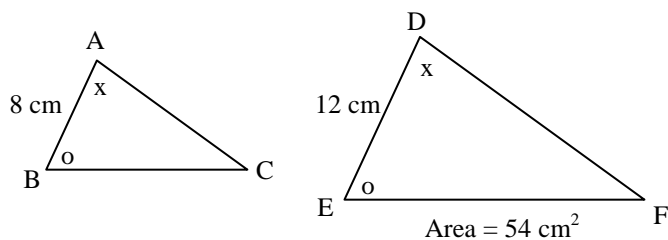
Example 3:

The diagram shows how surveyors can lay out two triangles to find the width of a river. Use the triangles to calculate the width of the river, DE.



Example 4:

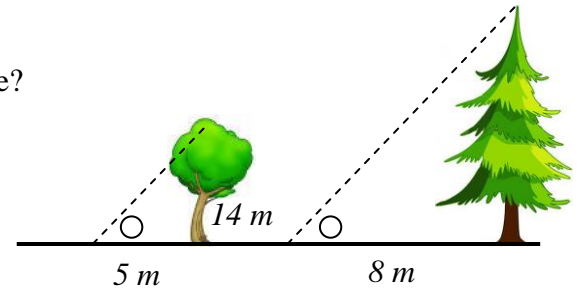
$\triangle ABC \sim \triangle DEF$. $AB = 8\text{ cm}$, and $DE = 12\text{ cm}$. The area of $\triangle DEF$ is 54 cm^2 . Find the area of $\triangle ABC$.



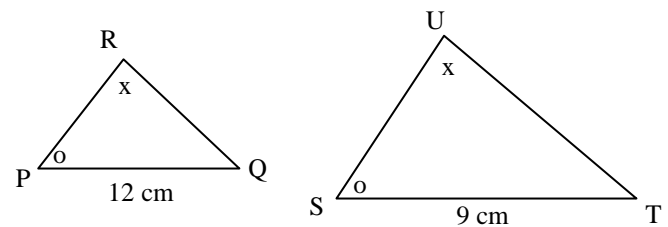
Exercise

1. A metre stick held vertically casts a shadow that is 1.5 metres long. How tall is a building that casts a shadow that is 90 metres long?

2. Two trees cast shadows as shown. How tall is the evergreen tree?

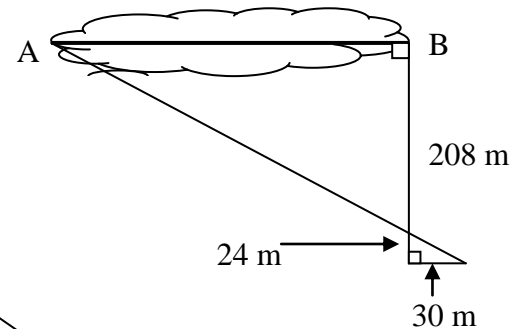


3. $\triangle PQR \sim \triangle STU$. $PQ = 12\text{cm}$, and $ST = 9\text{ cm}$. The area of $\triangle STU$ is 72 cm^2 . Find the area of $\triangle PQR$.

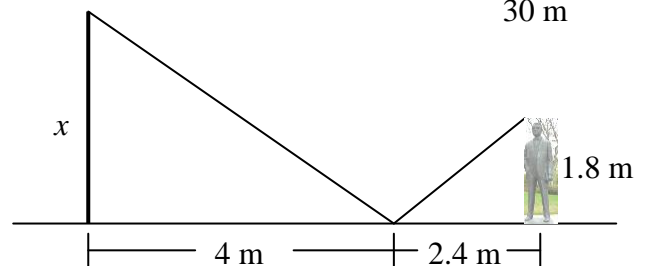


4. To find the height of a tree, a boy scout placed a mirror on the ground at a spot that was 15 metres from the base of the tree. He walked backward until he could see the top of the tree in the centre of the mirror. At that position he was 1.2 metres from the mirror and his eyes were 1.4 metres above the ground. How tall was the tree?

5. To find the length of a lake, surveyors have laid out triangles as shown in the diagram. Determine the length of the lake. (AB)



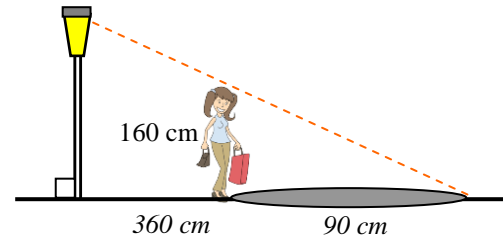
6) A statue, honoring Ray Hnatyshyn (1934 - 2002), can be found on Spadina Crescent East, near the University Bridge in Saskatoon. Use the information below to determine the unknown height of the statue.



7) A tree 24 feet tall casts a shadow 12 feet long. Brad is 6 feet tall. How long is Brad's shadow?

- 8) Triangles EFG and QRS are similar. The length of the sides of EFG are 144, 128 and 112. The length of the smallest side of QRS is 280, what is the length of the longest side of QRS?
- 9) A 40-foot flagpole casts a 25-foot shadow. Find the shadow cast by a nearby building 200 feet tall.

- 10) A girl 160 cm tall, stands 360 cm from a lamp post at night. Her shadow from the light is 90 cm long. How high is the lamp post?



- 11) A tower casts a shadow 7 m long. A vertical stick casts a shadow 0.6 m long. If the stick is 1.2 m high, how high is the tower? (Draw a diagram and solve)
- 12) Triangle IJK and TUV are similar. The length of the sides of IJK are 40, 50, and 24. The length of the longest side of TUV is 275, what is the perimeter of TUV? (Draw a diagram and solve)
- 13) A tree with a height of 4m casts a shadow 15 m long on the ground. How high is another tree that casts a shadow which is 24 m long? (Draw a diagram and solve)
- 14) Triangles CDE and NOP are similar. The perimeter of smaller triangle CDE is 133. The lengths of two corresponding sides on the triangles are 53 and 212. What is the perimeter of NOP?

Answers:

- 1) 60 m 2) 22.4 m 3) 128 cm^2 4) 17.5 m 5) 260 m
6) 3 m 7) 3 ft 8) 360 9) 125 ft 10) 800 cm
11) 14 m 12) 627 13) 6.4 m 14) 532