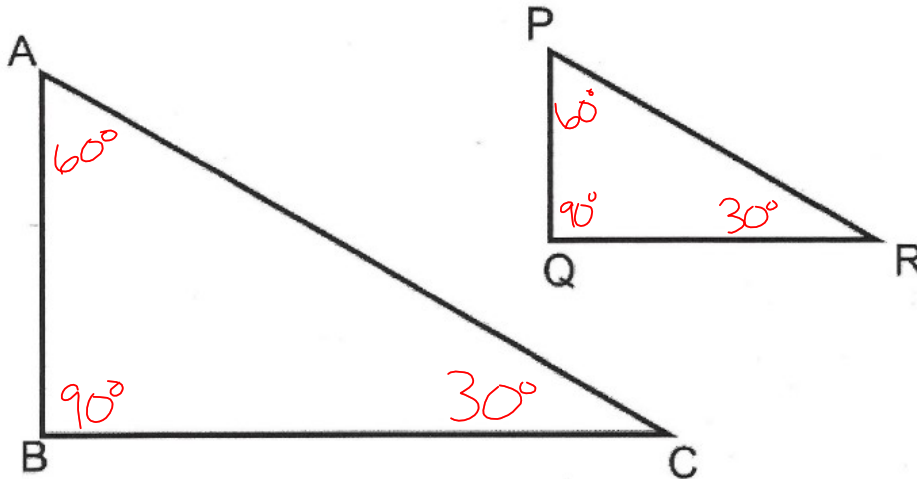




# 1.1 Similar Triangles

Investigate Similar Triangles



- Using a protractor, measure the angles in  $\triangle ABC$  and  $\triangle PQR$ . Record your measurements in the table below.
- Using a ruler measure the lengths of each side. Record your measurements in the table below.

$\triangle ABC$		$\triangle PQR$		Ratios
Angles	Lengths	Angles	Lengths	
$\angle A = 60^\circ$	$\overline{AB} = 4.5\text{cm}$	$\angle P = 60^\circ$	$\overline{PQ} = 2.4\text{cm}$	$\frac{\overline{AB}}{\overline{PQ}} = \frac{4.5}{2.4} \approx 1.9$
$\angle B = 90^\circ$	$\overline{BC} = 7.7\text{cm}$	$\angle Q = 90^\circ$	$\overline{QR} = 4.1\text{cm}$	$\frac{\overline{BC}}{\overline{QR}} = \frac{7.7}{4.1} \approx 1.9$
$\angle C = 30^\circ$	$\overline{AC} = 9\text{cm}$	$\angle R = 30^\circ$	$\overline{PR} = 4.7\text{cm}$	$\frac{\overline{AC}}{\overline{PR}} = \frac{9}{4.7} \approx 1.9$

3. How are the angles in the triangles related? *All the same!*

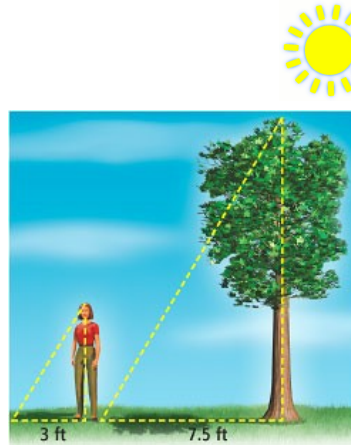
4. Evaluate the ratios in the third column of the table. What do you notice?

*Big  $\triangle$*   
*Small  $\triangle$*       *Same! (When accounting for measurement error)*

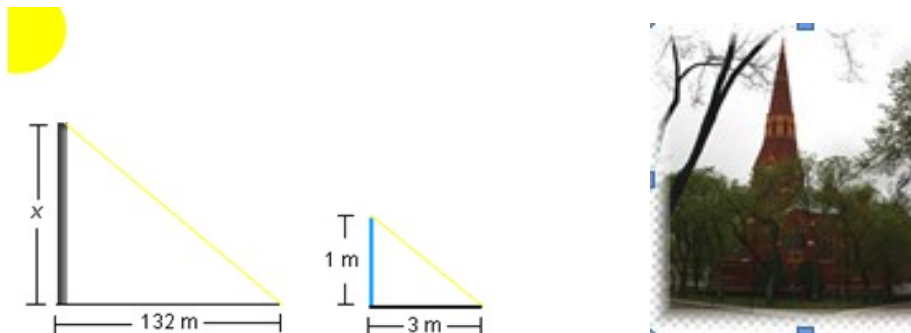
Shadows and Similar Triangles



At any given time of day, the sun's rays meet objects on earth at the same angle, forming shadows. Similar triangles are formed as shown in the diagram.



Ex. 1 Saskatoon's St. John's Anglican Cathedral has the highest church spire in Western Canada. The illustration shown below gives you some of the necessary dimensions to determine the unknown height of the church steeple and spire.



Same angles! (Sun always considered to be at the same angle)

$$\frac{\text{Big } \Delta}{\text{Small } \Delta} \quad \frac{132}{3} = \frac{x}{1}$$

$$\frac{132}{3} = x$$

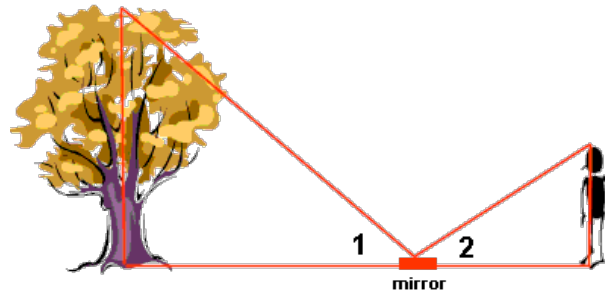
$$44 = x$$

∴ Church spire is 44m tall

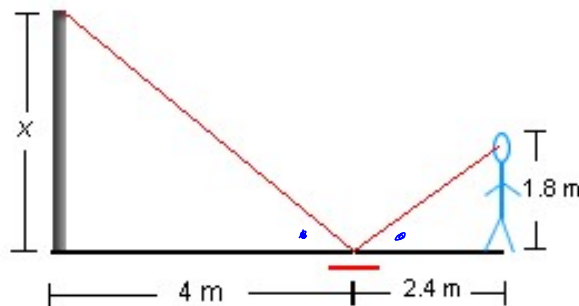
## Mirrors, Reflections and Similar Triangles



When you see an image in a mirror, two equal angles are formed.  
Similar triangles are formed as shown in the diagram.



Ex. 2 This statue can be found in Saskatoon. Use the information below to determine the unknown height of the statue (including base).



$$\frac{\text{Big } \Delta}{\text{Small } \Delta} \quad (1.8) \frac{4}{2.4} = \frac{x}{1.8} \quad (\cancel{1.8})$$

$$x = \frac{4}{2.4} (1.8)$$

$$= 3$$

∴ The statue is  
3m tall

Ex. 3 A small mirror is placed flat on the ground between a student and a flagpole.

She walks backward until she can see the top of the flagpole reflected in the mirror.

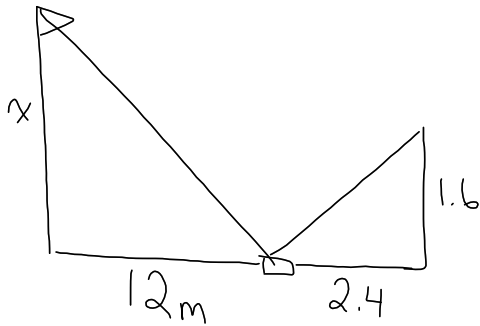
Distance from the mirror to the base of the flagpole: 12.0 m

Distance from the student to the mirror: 2.4 m

Height of the student's eyes above the ground: 1.60 m

Determine the height of the flagpole.

Draw a sketch!



$$\frac{12}{2.4} = \frac{x}{1.6}$$

$$(1.6) \frac{12}{2.4} = x$$

$$8 = x$$

∴ The flagpole is 8 m tall.

Practice work:

Set 1: p. 348 #6abc,7a

Set 2: p. 348 #6ad,7ab

(find the textbook pages on my website! [emmell.org](http://emmell.org) )