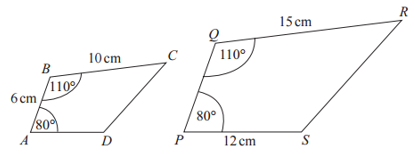
**GCSE Similarity**

**Test Your Understanding**

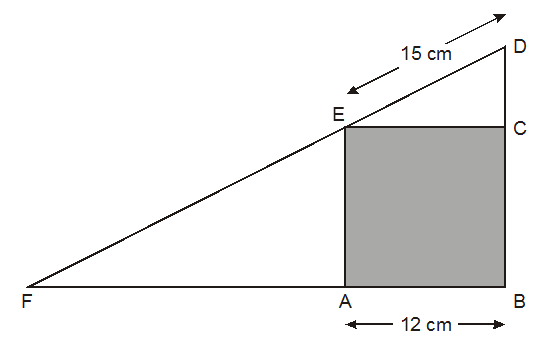
*[Nov 2008 4H Q22]*  and are mathematically similar*.*

1. Find the length of .
2. Find the length of .



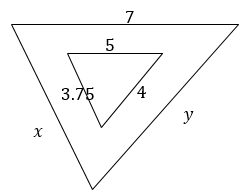
**Test Your Understanding**

The diagram shows a square inside a triangle. DEF is a straight line. What is length EF?

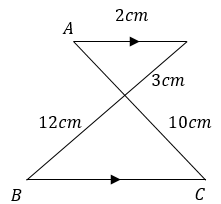


**Exercise 1**

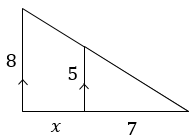
**Question 1**: The two triangles are mathematically similar. Find and .



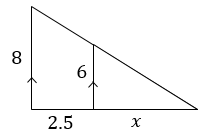
**Question 2**: Find:



**Question 3**: Determine .

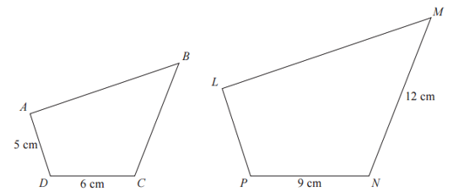


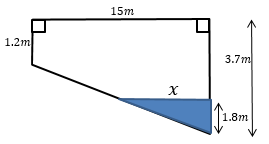
**Question 4**: Determine .



**Question 5**: *[June 2014 2H Q17]* Quadrilaterals and are mathematically similar.

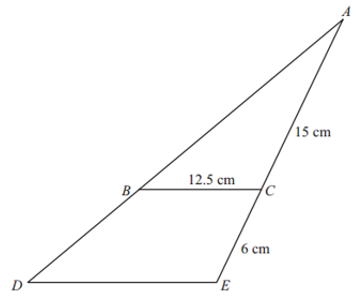
(a) Determine the length of .  
(b) Determine the length of .



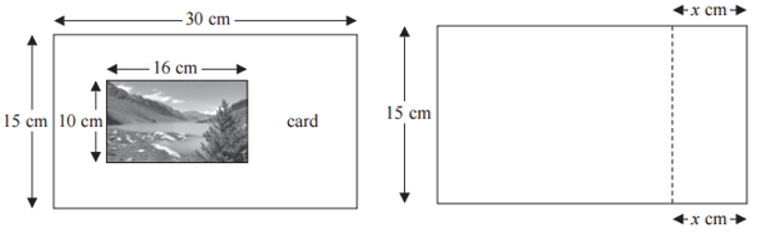
**Question 6**: A swimming pool is filled with water. Find .

**Question 7**: [*November 2011 4H Q17]*

Triangle is similar to triangle . Work out the length of .



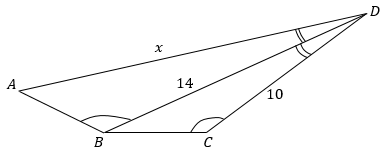
**Question 8**: [June 2014 1H Q20] Steve has a photo and a rectangular piece of card.



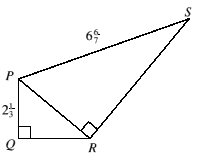
Steve cuts the card along the dotted line shown in the second diagram.

Steve throws away the piece of card that is 15cm by cm. The piece of card he has left is mathematically similar to the photo. Work out the value of .

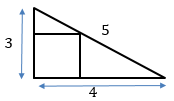
**Question 9**: In the following diagram and . Determine .



**Question 10**: [IMC 2006 Q23] In the figure, , and . How long is ?

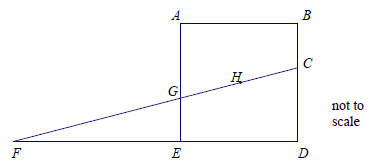


**Question 1**: [IMO] A square is inscribed in a 3-4-5 right-angled triangle as shown. What is the side-length of the square?

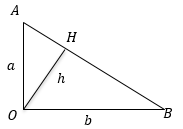


**Question 2**: [STMC Regional 2009/10 Q10] is a square with centre . The base of the square DE is extended so that it meets the straight line CF which passes through H.

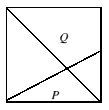
If BC = 3 cm and CD = 4 cm find the area of the triangle CDF.



**Question 3**: [Source: IMO] Let and be the lengths of the two shorter sides of a right-angled triangle, and let be the distance from the right angle to the hypotenuse. Prove

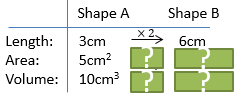


**Question 4**: [Source: IMC] The diagram shows a square, a diagonal and a line joining a vertex to the midpoint of a side. What is the ratio of area to area ?

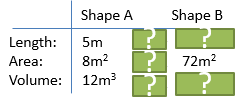


**Exercise 2 – Scale Factor of Surface Area and Volume**

**Question 1**: Shapes and are mathematically similar. Determine the missing values.

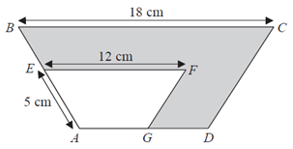


**Question 2:**



**Question 3**: [Edexcel 2003] Cylinder A and cylinder B are mathematically similar. The length of cylinder A is 4 cm and the length of cylinder B is 6 cm.  
The volume of cylinder A is 80cm3.  
Calculate the volume of cylinder B.

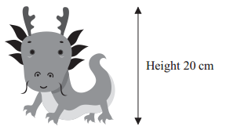
**Question 4**: [Edexcel Nov 2014] and are mathematically similar trapeziums.  
Trapezium has an area of . Work out the area of the shaded region.



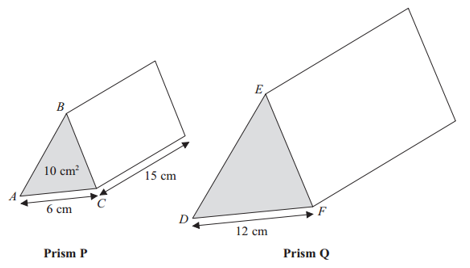
**Question 5**: [2007] Two cones, P and Q, are mathematically similar. The total surface area of cone P is 24cm2.  
The total surface area of cone Q is 96cm2.  
The height of cone P is 4 cm.

(a) Work out the height of cone Q.  
(b) The volume of cone P is 12 cm3. Work out the volume of cone Q.

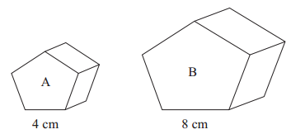
**Question 6**: [Nov 2013 1H Q16] A company makes monsters. The company makes small monsters with a height of 20cm. A small monster has a surface area of 300cm2. The company also makes large monsters with a height of 120cm.  
A small monster and a large monster are mathematically similar. Work out the surface area of a large monster.



**Question 7**: [June 2013 1H Q22] and are two triangular prisms that are mathematically similar.  
The area of the cross section of is 10cm2. The length of is 15cm. Work out the volume of prism .



**Question 8**: [Nov 2012 Q25] The diagram shows two similar solids, and . Solid has a volume of 80cm3.  
(a) Work out the volume of solid .  
(b) If solid has a total surface area of 160cm2, work out the total surface area of .

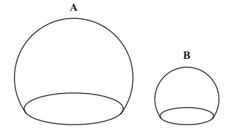


**Question 9**: [June 2010 Q23] and are two solid shapes which are mathematically similar. The shapes are made from the same material.

The surface area of is 50cm2, and of is 18cm2. The mass of is 500 grams.

Calculate the mass of .

Note that given a fixed density, mass scales in the same way as volume.



**Question **: The surface area of shapes A and B are and respectively. Given that the length of shape B is , write an expression (in terms of , and ) for the length of shape A.

**Exercise 3 – Converting Metric Units of Area and Volume**

Convert:

1. 42 cm2 to mm2
2. 2 m2 to mm2
3. 3 m3 to cm3
4. 13 cm3 to mm3
5. 5.1 cm2 to mm2
6. 2 km3 to m3
7. 4.25 cm3 to mm3
8. 10.01 km2 to mm2