Nat 5/Credit/Int 2: Similarity

Nat 5 2018 P2 Q18

18. A cinema sells popcorn in two different sized cartons.

The small carton is 16 centimetres deep and has a volume of 576 cubic centimetres.

The large carton is 24 centimetres deep and has a volume of 1125 cubic centimetres.

(a) Show that the two cartons are **not** mathematically similar. **3** 3

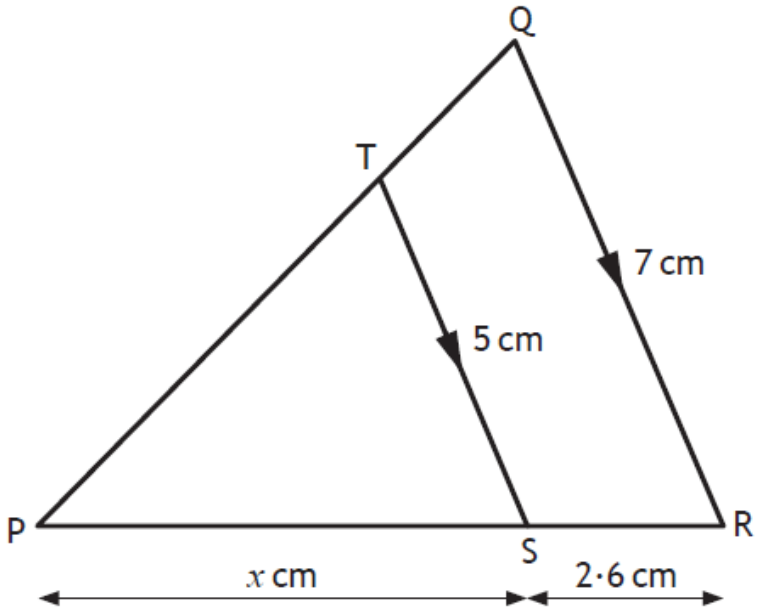
The large carton is redesigned so that the two cartons are **now** mathematically similar.

The volume of the redesigned large carton is 1500 cubic centimetres.

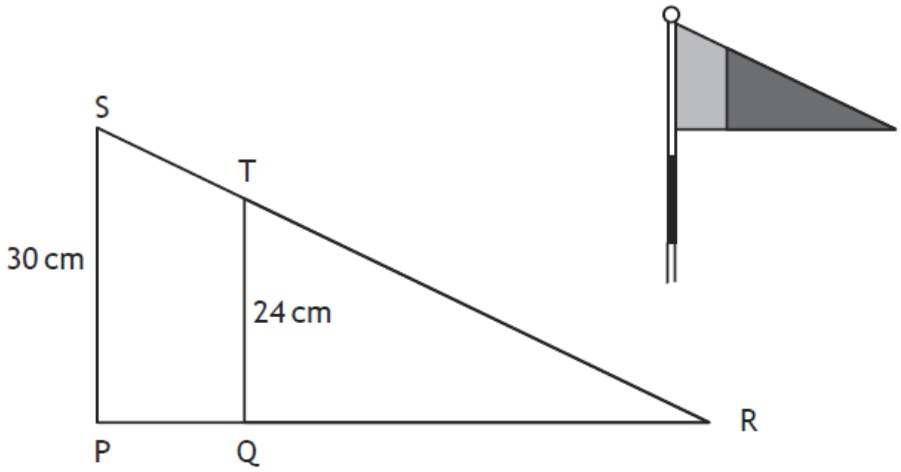
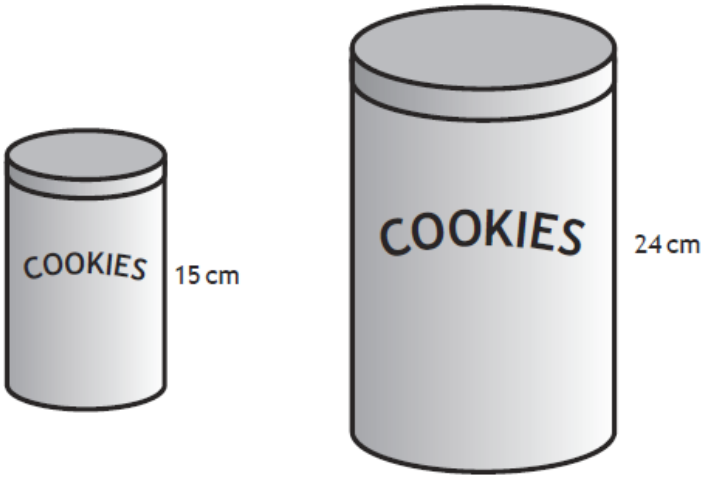
(b) Calculate the depth of the redesigned large carton. **2** 2

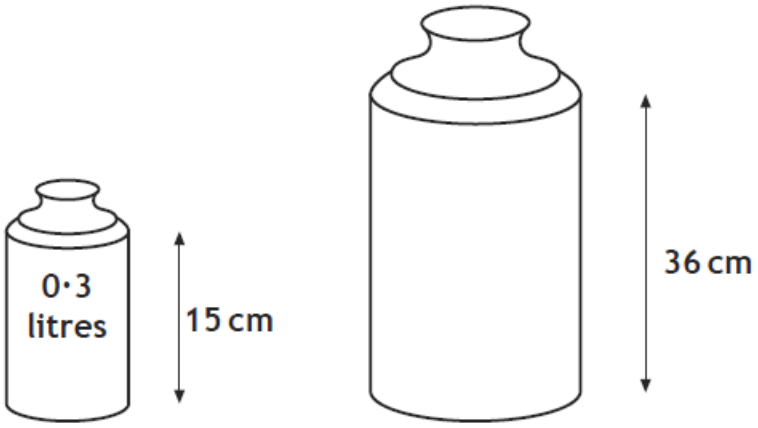
Ans

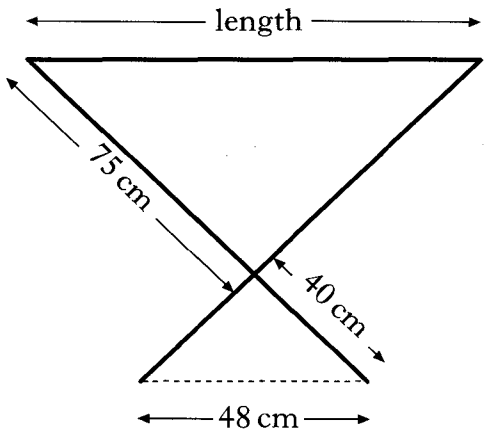
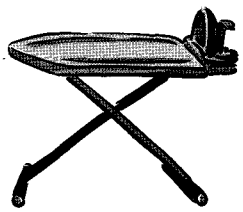
(a) Proof
(b) 22 cm

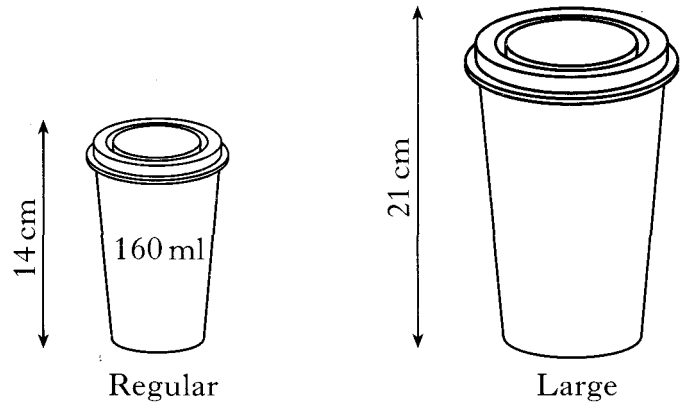
Nat 5 2017 P1 Q15	In the diagram below: • TS is parallel to QR • TS = 5 centimetres • QR = 7 centimetres • SR = 2·6 centimetres  The length of PS is x centimetres. Calculate the value of x.	3
Ans	6·5	

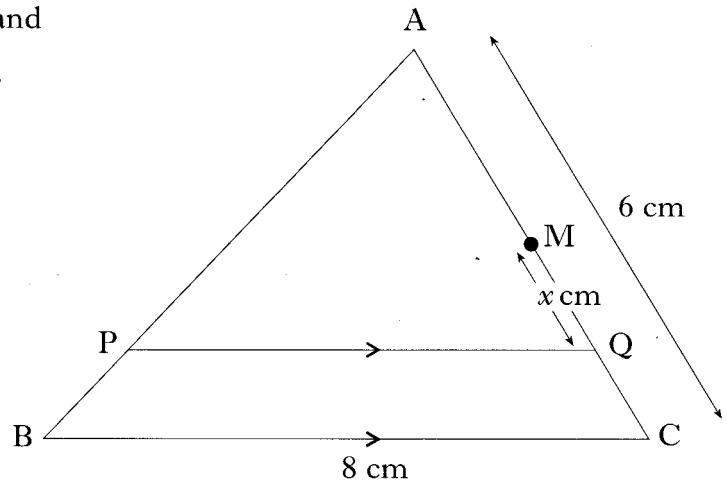
Nat 5 2016 P2 Q11	Two pictures are mathematically similar in shape.  100 cm  60 cm The cost of each picture is proportional to its area. The large picture costs £13·75. Find the cost of the small picture.	3
Ans	£4·95	

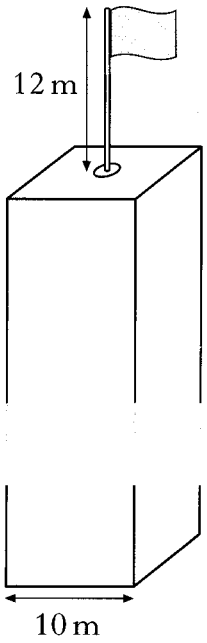
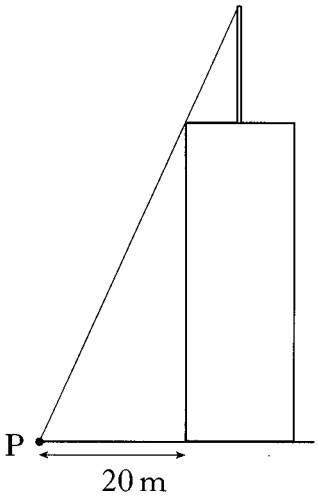
Nat 5 2015 P2 Q9	The flag at each hole on a golf course is coloured red and blue. The diagram below represents a flag. Triangle QRT represents the red section. PQTS represents the blue section.  Triangles PRS and QRT are mathematically similar. The area of triangle QRT is 400 square centimetres. Calculate the area of PQTS, the blue section of the flag.	4
Ans	225 cm^2	
Nat 5 2014 P2 Q5	A supermarket sells cylindrical cookie jars which are mathematically similar.  The smaller jar has a height of 15 centimetres and a volume of 750 cubic centimetres. The larger jar has a height of 24 centimetres. Calculate the volume of the larger jar.	3

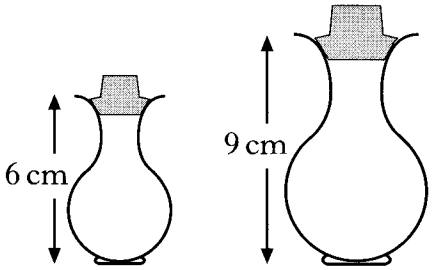
Ans	3072 cm^3	
Nat 5 Specimen P2 Q9	Screenwash is available in two different sized bottles, 'Mini' and 'Maxi'. The bottles are mathematically similar.  Calculate the volume of the 'Maxi' bottle.	3
Ans	4·1472 litres	

Credit 2007 P1 Q8	**8.** Mick needs an ironing board. He sees one in a catalogue with measurements as shown in the diagram below.   When the ironing board is set up, two similar triangles are formed. Mick wants an ironing board which is at least 80 centimetres in length. Does this ironing board meet Mick's requirements? **Show all your working.**	3
Ans	Yes, since 90cm is greater than the required 80cm.	

Credit 2006 P1 Q7	**7.** Coffee is sold in regular cups and large cups. The two cups are mathematically similar in shape.  The regular cup is 14 centimetres high and holds 160 millilitres. The large cup is 21 centimetres high. Calculate how many millilitres the large cup holds.	4
Ans	540 ml	

Credit 2006 P2 Q11	**11.** In triangle ABC, BC = 8 centimetres, AC = 6 centimetres and PQ is parallel to BC.  M is the midpoint of AC. Q lies on AC, x centimetres from M, as shown on the diagram. (*a*) Write down an expression for the length of AQ. (*b*) Show that PQ = $(4 + \frac{4}{3}x)$ centimetres.	4
Ans	(a) (3 + x) cm (b) Proof	

Credit 2005 P2 Q6	**6.** A vertical flagpole 12 metres high stands at the centre of the roof of a tower. The tower is cuboid shaped with a square base of side 10 metres.  At a point P on the ground, 20 metres from the base of the tower, the top of the flagpole is just visible, as shown. Calculate the height of the tower. 	4
Ans	48 m	

Credit 2003 P2 Q9	**9.** Two perfume bottles are mathematically similar in shape.  The smaller one is 6 centimetres high and holds 30 millilitres of perfume. The larger one is 9 centimetres high. What volume of perfume will the larger one hold?	3
Ans	101·25ml	

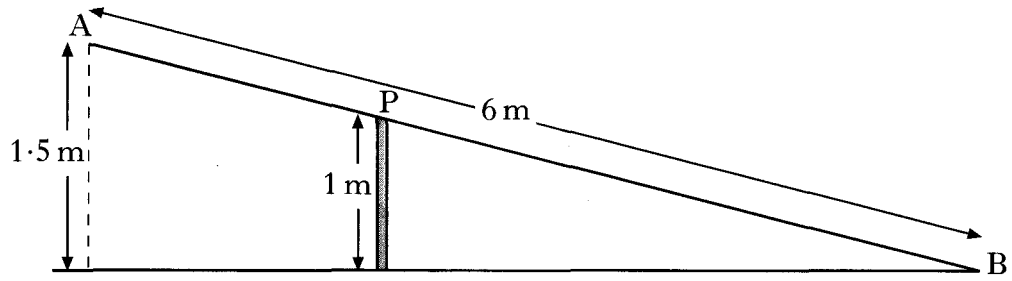
Credit 2002 P2 Q12

12. A metal beam, AB, is 6 metres long.

It is hinged at the top, P, of a vertical post 1 metre high.

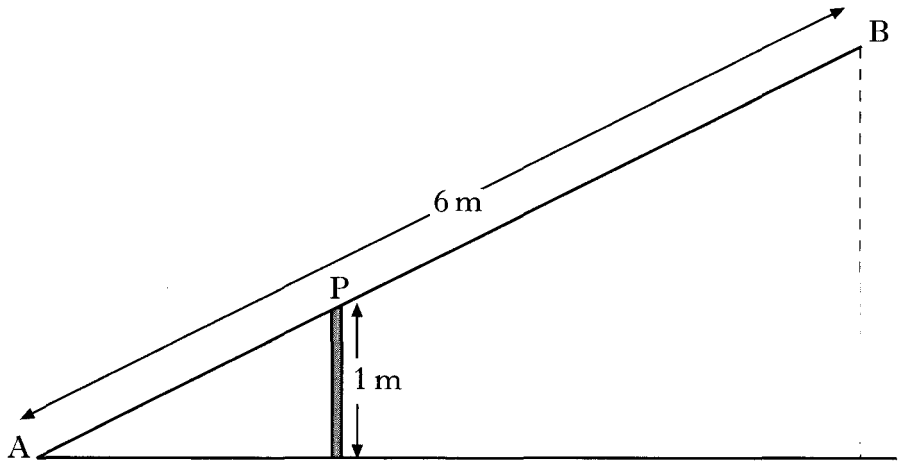
When B touches the ground, A is 1·5 metres above the ground, as shown in Figure 1.

Figure 1



When A comes down to the ground, B rises, as shown in Figure 2.

Figure 2



By calculating the length of AP, or otherwise, find the height of B above the ground.

Do not use a scale drawing.

5

Ans 3 m