

Year 11 General mathematics Worksheet

10 questions on Measurement and Geometry from the Maths B (General Maths) national curriculum for Year 11.



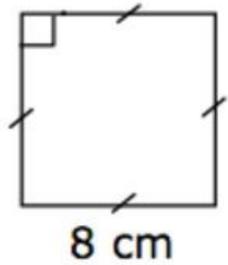
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Homework help in a click: yourtutor.com.au

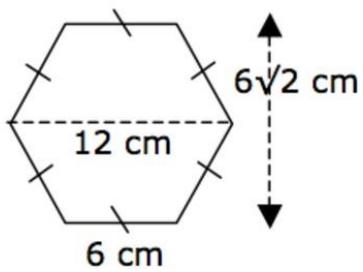


Questions

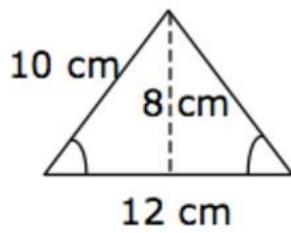
1. Which plane shape has perimeter 36 cm and area 64 cm².



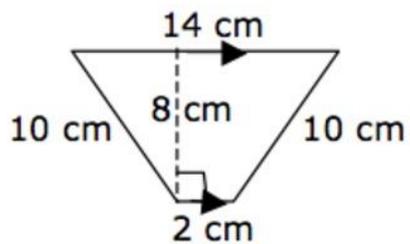
a)



b)

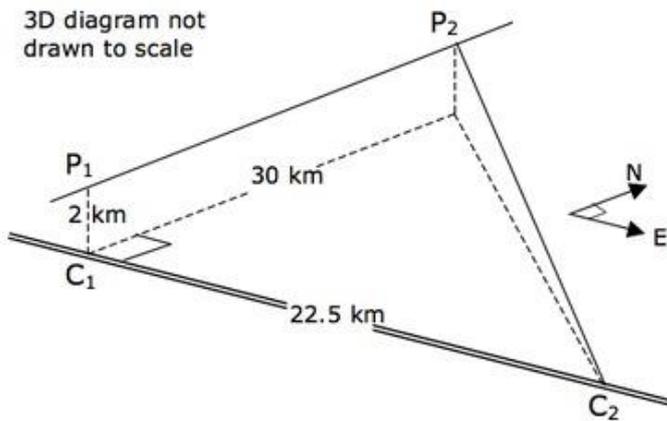


c)



d)

Answer: _____



2.

Clara is driving due east on a straight, level road at 90 kph.

Paul is flying due north at a constant altitude of 2 km at 120 kph.

At 12 noon, Paul at P_1 is directly above Clara at C_1 .

At 12:15 pm, what is (i) the bearing and (ii) the angle of elevation of Paul's plane at P_2 from Clara's car at C_2 ?
(answers to the nearest degree)

a) (i) $N37^\circ W$ (ii) 87°

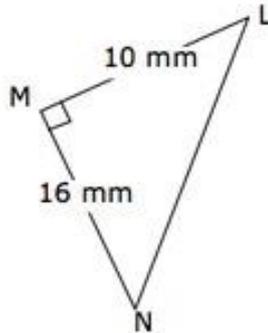
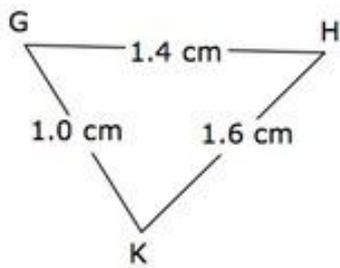
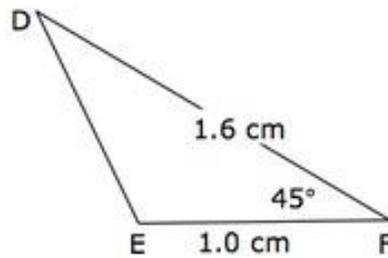
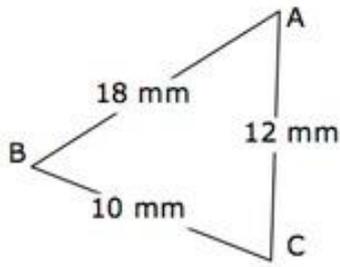
b) (i) $N53^\circ W$ (ii) 87°

c) (i) $N37^\circ W$ (ii) 3°

d) i) $N53^\circ W$ (ii) 3°

Answer: _____

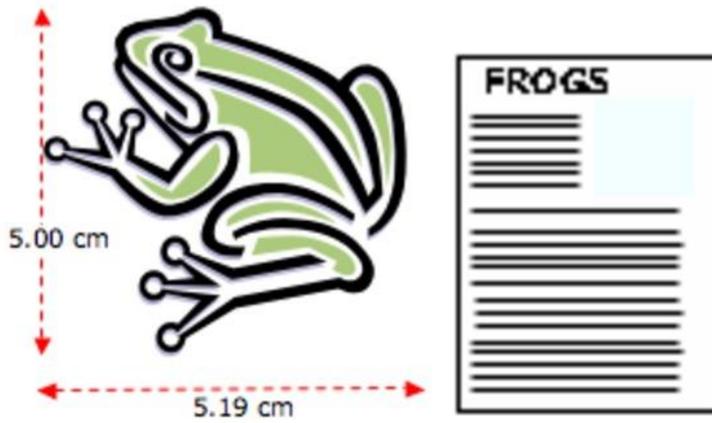
3. Which triangles have the same area?



- a) Only $\triangle GHK$ and $\triangle LMN$ have the same area.
- b) No two of the triangles have the same area.
- c) Only $\triangle ABC$ and $\triangle DEF$ have the same area.
- d) All four have the same area.

Answer: _____

4. Kumar is using a word processing program to prepare his homework assignment. He has already placed the text on a page. Kumar now wants to paste in a graphic to fill the top right hand corner in a square that is 8 cm high and 8 cm wide. The graphic is 5 cm high and 5.19 cm wide.

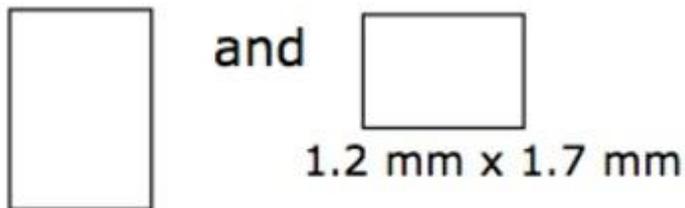


By what percentage should Kumar scale the graphic to fill the space on his page?

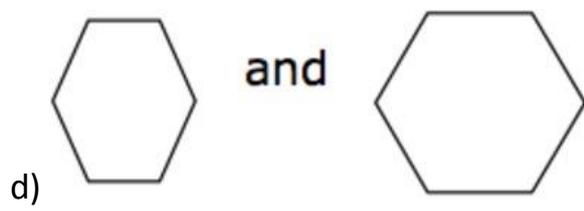
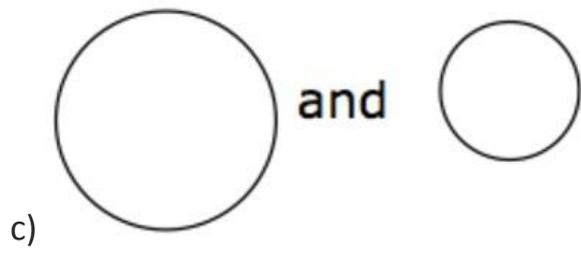
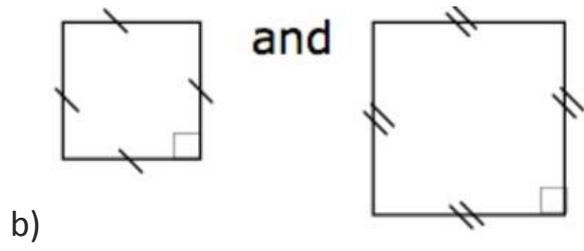
- a) 154%
- b) 15%
- c) 65%
- d) 160%

Answer: _____

5. Which two figures are **not** similar?



- a) 3.4 mm x 2.4 mm



Answer: _____



6.

Using a ruler, measure the straight line distances between the four capital cities Adelaide, Brisbane, Melbourne and Sydney and the distance representing 500 km on the scale.

Calculate the actual distances in kilometres between the cities.

Which table shows these distances most accurately?

a)

metres	Adelaide	Brisbane	Melbourne
Brisbane	1200		
Melbourne	690	2400	
Sydney	2200	1700	900

b)

centimetres	Adelaide	Brisbane	Melbourne
Brisbane	13.5		
Melbourne	5.8	11.8	
Sydney	10.1	6	6.3

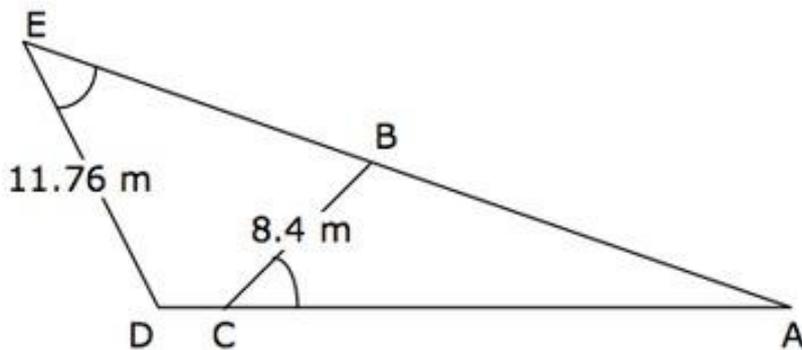
	kilometres	Adelaide	Brisbane	Melbourne
	Brisbane	1607		
	Melbourne	690	1405	
c)	Sydney	1202	714	750

	kilometres	Adelaide	Brisbane	Melbourne
	Brisbane	160		
	Melbourne	69	141	
	Sydney	120	71	75

d)

Answer: _____

7. The triangles ABC and ADE are similar.
The area of $\triangle ABC = 75 \text{ m}^2$.



What is the area of the quadrilateral BCDE?

- a) 147 m^2
- b) 30 m^2
- c) 105 m^2
- d) 72 m^2

Answer: _____

8. A 220g can of baked beans has a height, h , of 7.5 cm and a radius, r , of 3.0 cm.



Its surface area is $63\pi \text{ cm}^2$. Its volume is $67.5\pi \text{ cm}^3$.

Find (i) the exact surface area and (ii) the exact volume of a can that is one and a third times as high and one and a quarter times as wide as the 220g can.

Hint: The formula for surface area is $A = 2\pi r^2 + 2\pi rh$.

The formula for volume is $V = \pi r^2h$.

a) (i) 103.125 cm^2
(ii) 140.625 cm^3

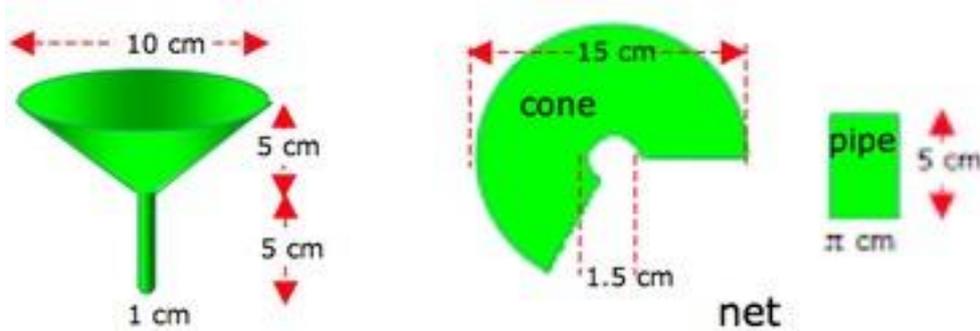
b) (i) $140.625 \pi \text{ cm}^2$
(ii) $103.25 \pi \text{ cm}^3$

c) (i) $103.125 \pi \text{ cm}^2$
(ii) $140.625 \pi \text{ cm}^3$

d) (i) 283 cm^2
(ii) 442 cm^3

Answer: _____

9. A funnel made of very thin metal is an open truncated cone joined to a cylindrical pipe of diameter 1.0 cm.



The surface area, $A \text{ cm}^2$ of the funnel, can be calculated from:

$$A = \frac{2\pi}{3} (7.5^2 - 0.75^2) + 5\pi$$

The total capacity, $C \text{ cm}^3$, of the funnel, is given by:

$$C = \frac{\pi}{27} [5^2 \times 50 - 0.5^2 \times 5] + \pi \times 0.5^2 \times 5$$

How many millilitres (to one tenth of 1 mL) of petrol would be in the funnel when it is filled to the brim?

- a) $149.2 \pi \text{ cm}^2$
- b) 145.6 mL
- c) 149.2 mL
- d) 132.3 cm^3

Answer: _____

10. Jasper measures angles and distances on a map before sailing from Pleasant Harbour to Windy Island.
 He notes that on his map Windy Island is 200 km from Pleasant Harbour on a true bearing of 028°T .
 Jasper sails from Pleasant Harbour keeping on a compass bearing of $\text{N}28^\circ\text{E}$.

If the variation is 8°W , how far is Jasper from Windy Island after he has sailed 200 km?

a) $400 \sin 4^\circ \text{ km} = 27.90 \text{ km}$

b) $200 \sin 28^\circ \text{ km} = 93.90 \text{ km}$

c) $400 \cos 14^\circ \text{ km} = 388.12 \text{ km}$

d) $200 \sin 8^\circ \text{ km} = 27.83 \text{ km}$

(Answer to the nearest 10 metres).

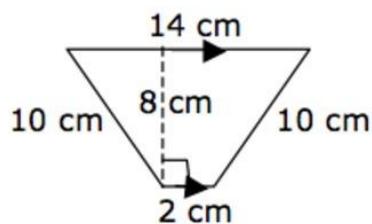
Answer: _____

The Answers.

Hey! No peeking until you've finished...



Question 1



Answer: d)

The square and the triangle both have a perimeter of 32 cm. These two shapes can be eliminated.

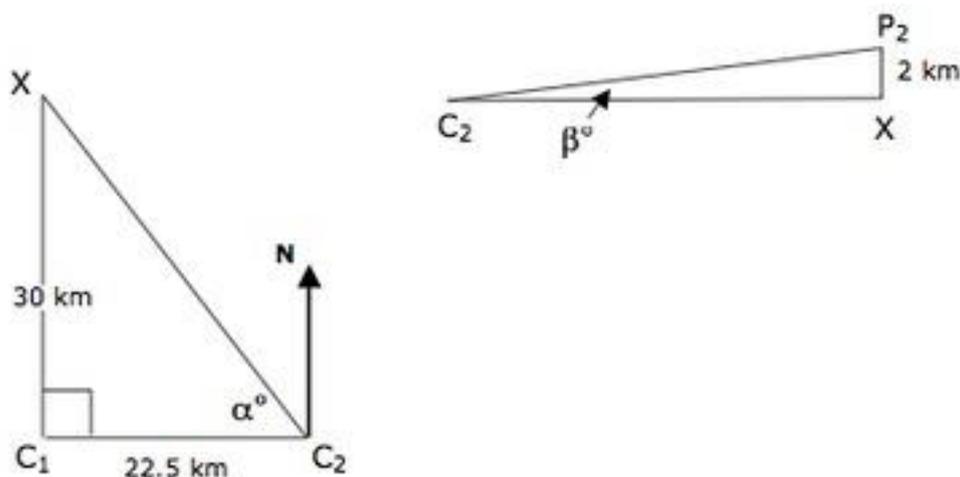
The area of a trapezium is half the perpendicular height times the sum of the parallel sides.

The hexagon can be divided into two congruent trapeziums but the heights are irrational numbers. Eliminate the hexagon.

The area of the isosceles trapezium = $8 \times (2 + 14) \div 2 \text{ cm} = 64 \text{ cm}$ and its perimeter is $(2 + 14 + 10 + 10) \text{ cm} = 36 \text{ cm}$.

Question 2

Answer: c) (i) N37°W (ii) 3°



The diagrams are not drawn to scale. Triangle C_1C_2X is on the ground.

C_1X lies under P_1P_2 , the flight path of the airplane.

C_1C_2 is the car route along the road.

(i) $\tan \alpha^\circ = 30/22.5$

$\alpha^\circ = 53^\circ$, to the nearest degree.

The bearing of X from C_2 is $N37^\circ W$

C_2X by Pythagoras = $\sqrt{30^2 + 22.5^2} = 37.5$ km.

(ii) Triangle C_2XP_2 is in a vertical plane.

$\tan \beta^\circ = 2/37.5$

The angle of elevation of P_2 from C_2 is β° and equals 3° , to the nearest degree.

Question 3

Answer: c) Only $\triangle ABC$ and $\triangle DEF$ have the same area.

Use Heron's formula for triangles ABC and GHK .

Use one half the product of the sides times the sine of the included angle for triangle DEF .

Use area = half base x height for triangle LMN .

Question 4

Answer: a) 154%

The width which is 5.19 cm has to be enlarged to 8 cm.

$8 \div 5.19 = 1.541425819 \dots = 154.1425819 \dots \%$

The width, 5.19 cm, and height, 5 cm, of the graphic must be increased by 154% to 7.9926 cm \times 7.7 cm.

Question 5

Answer: d) The hexagons

All squares are similar. Corresponding angles are equal and all pairs of corresponding sides are in proportion.

All circles are similar. The circumferences are in the same ratio as their radii.

In the two rectangles shown, all angles are right angles. The corresponding sides are in the ratio 2:1. The difference in orientation does not matter.

The two hexagons are not similar. Even if corresponding sides are in proportion the corresponding pairs of angles are not equal.

Question 6

kilometres	Adelaide	Brisbane	Melbourne
Brisbane	1607		
Melbourne	690	1405	
Sydney	1202	714	750

Answer: c)

Divide the distances between cities by the length of the 500 km scale.

Then multiply by 500.

For example: If the distance between Adelaide and Brisbane on the computer screen is 10.5 cm and the length of the scale is 3.2 cm, then the calculated distance from Adelaide to Brisbane will be approximately $500 \times 10.5 \div 3.2$ km.

Question 7

Answer: d) 72 m^2

Area of quadrilateral BCDE = Area of triangle ADE – Area of triangle ABC.

Triangles ADE and ABC are equiangular and therefore similar.

Areas of similar triangles are proportional to the squares of the sides.

Area of triangle ADE : Area of triangle ABC = $11.76^2 : 8.4^2$.

Therefore the area of triangle ADE = $(11.76^2 \div 8.4^2) \times 75 \text{ m}^2$. Area of

quadrilateral BCDE = $(11.76^2 \div 8.4^2) \times 75 - 75 \text{ m}^2$

= 72 m^2 .

Question 8

Answer: c) (i) $103.125 \pi \text{ cm}^2$, (ii) $140.625 \pi \text{ cm}^3$.

New radius = one and a quarter $\times r \text{ cm} = 5 \times 3 \div 4 \text{ cm} = 3.75 \text{ cm}$.

New height = one and a third $\times h \text{ cm} = 7.5 \times 4 \div 3 \text{ cm} = 10 \text{ cm}$.

(i) New surface area = $2\pi \times 3.75^2 + 2\pi \times 3.75 \times 10 \text{ cm}^2 = 103.125 \pi \text{ cm}^2$.

(ii) New volume = $\pi \times 3.75^2 \times 10 \text{ cm}^3 = 140.625 \pi \text{ cm}^3$.

Question 9

Answer: c) 149.2 mL

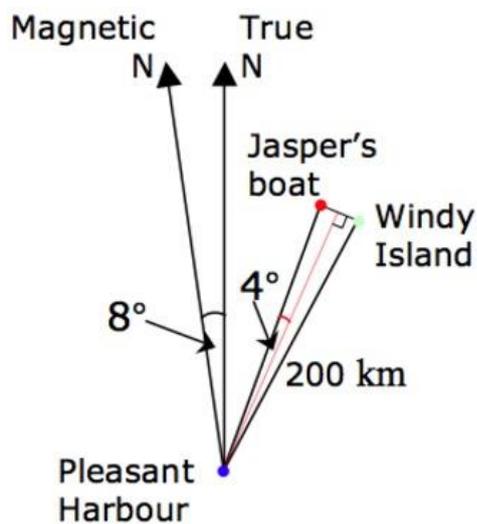
By calculator, C = 149.225651.

The quantity of petrol in the funnel = 149.2 mL to the nearest tenth of a millilitre.

Question 10

Answer: a) $400 \sin 4^\circ \text{ km} = 27.90 \text{ km}$

Jasper's map tells him the true bearing of Windy Island is 28°E of True North. Jasper's magnetic compass is directing him 8° west of Windy Island. The triangle with vertices Pleasant Harbour, Windy Island and Jasper's boat is isosceles with equal sides 200 km and angles of 8° , 86° and 86° .



If the distance from Jasper's boat to Windy Island is $2w$ km then

$$w = 200 \sin 4^\circ \text{ and } 2w = 400 \sin 4^\circ = 27.9025895 \dots$$

To the nearest ten metres Jasper is 27.90 metres from Windy Island.