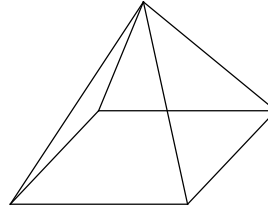
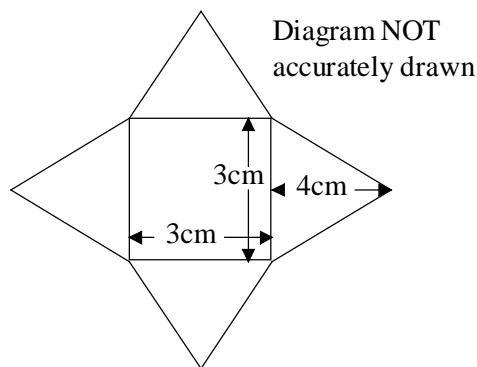


Topical Test Paper 15 : Formulae and Algebra

- 1 The diagram represents a box in the shape of a square-based pyramid. Each triangular face is identical.



The net of the pyramid is shown below



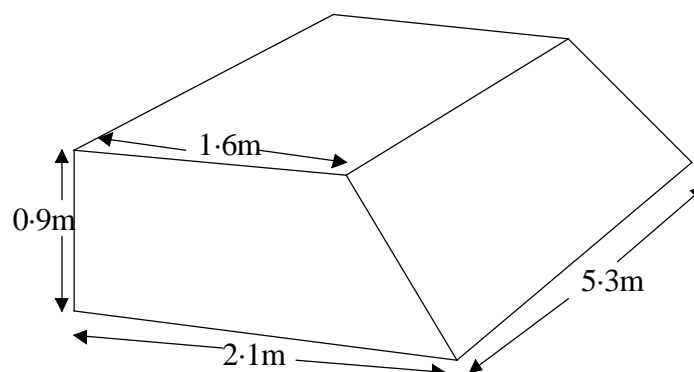
Work out

- the area of the base
- The area of a triangular face
- The total surface area of the box.

Each net is cut from a square card measuring 8cm by 8cm.

- Work out the percentage of card that is thrown away.

- A car journey from Doncaster to Swindon, a distance of 145 miles, takes 2 hours and 54 minutes. Calculate the average speed for the journey in miles per hour.
- Use the formula $d=st$ to find the distance travelled by an aircraft which flies at 165 miles per hour for $2\frac{1}{2}$ hours.
- The diagram, which is not drawn to scale, represents a prism. The cross-section of the prism is a trapezium.



The parallel sides of the trapezium are 1.6 metres and 2.1 metres long and the height of the trapezium is 0.9 m. The length of the prism is 5.3m

- Calculate the volume of the prism.
- Calculate the area of the sloping face of the prism

5. A cylindrical tank holds 22000 litres. Its height is equal to its diameter. Calculate its radius and its height in metres, correct to 2 decimal places.

6. To convert gallons into litres, the formula $L = \frac{9}{2}G$ is used.

(a) use the formula to work out L when G=10

(b) use the formula to work out G when L=49.5

7. The diagram shows a regular hexagon with its centre marked O.

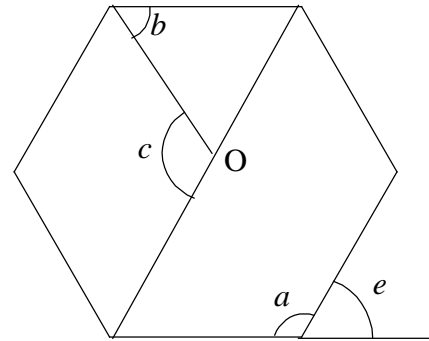
(a) Use the formula $e = \frac{360}{s}$ to work

out e , the external angle of the hexagon where s is the number of sides of the polygon.

(b) Work out the size of the angle marked a .

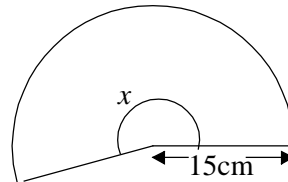
(c) Work out the size of the angle marked b .

(d) Work out the size of the angle marked c .



8. (a) Calculate the area of the circle which has a radius of 11 cm.

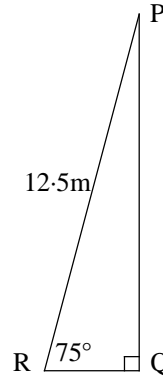
(b) The sector shown is to have the same area as the circle in part (a). Calculate the angle x .



9. To grow maize, the rows of plants must be r metres apart and the distance between plants in the row must be p metres. To work out the number of plants in a hectare the formula $P = \frac{10000}{rp}$ is used.

Calculate P when $r = 0.5$ and $p = 0.75$ giving your answer correct to 2 significant figures.

10. In the right-angled triangle PQR,
 $PR=12.5\text{cm}$ and angle $r=75^\circ$.
 Calculate the length of side PQ.

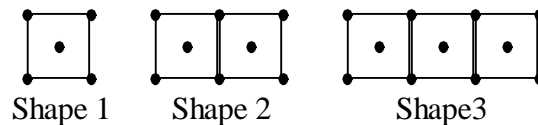


11. Mrs Cracknell bought 3 blouses and 2 scarves. She paid £52
 Mrs Pinsent bought 4 blouses and 1 scarf. She paid £56

The cost of a blouse was b pounds and the cost of a scarf was s pounds.

- (a) Use the information to write down two equations in b and s .
 (b) Solve the equations to find the cost of one blouse and the cost of one scarf.

12. The diagram shows part of a sequence of shapes.



- (a) Complete the table to show the number of dots in each of the first 5 shapes of the sequence.

Shape number (n)	1	2	3	4	5
Number of dots (d)	5	8	11		

- (b) Write down a formula which can be used to calculate the number of dots d , in terms of shape number n .

13. Solve the equations
 (a) $9x + 6 = 36 - x$
 (b) $3(y - 6) = 10 - 2y$

14. Solve the simultaneous equations
 $3x + 2y = 11$
 $x - y = 7$

15. (a) Factorise $x^2 + x - 42$
 (b) Write down the solutions of the equation $x^2 + x - 42 = 0$

16. Use trial and improvement, or otherwise to solve the equation $t^3 + t = 20$ giving your answer correct to 2 decimal places.

15 : Formulae and Algebra

1. (a) 9cm^2 (b) 6cm^2 (c) 33cm^2
(d) 48.4%
2. 50 mph
3. 412.5 miles
4. (a) 8.8245m^3
(b) $1.03 \times 5.3 = 5.459\text{m}^2$
5. $r=1.52\text{m}$ $h=3.04\text{m}$
6. (a) $L=45$ (b) $G=11$
7. (a) $e=60^\circ$ (b) $a=120^\circ$
(c) $b=60^\circ$ (d) $c=120^\circ$
8. (a) 380.1cm^2 (b) $x=194^\circ$
9. 27000 to 2 s.f.
10. 12.1cm
11. (a) $3b+2s=52$ $4b+s=56$
(b) $b = \text{£}12$ $s = \text{£}8$
12. (a) 14, 17 (b) $d = 3n+2$
13. (a) $x = 3$ (b) $y = 5.6$
14. $x = 6$ $y = -2$
15. (a) $(x-6)(x+7)$ (b) $x = 6$ or -7
16. $t=2.59$