GCSE MATHEMATICS

S21-C300

With Calculator Assessment Resource E

Foundation Tier

Formula list

Area and volume formulae

Where r is the radius of the sphere or cone, l is the slant height of a cone and h is the perpendicular height of a cone:

$$\text{Curved surface area of a cone} = \pi r l$$

$$\text{Surface area of a sphere} = 4\pi r^2$$

$$\text{Volume of a sphere} = \frac{4}{3}\pi r^3$$

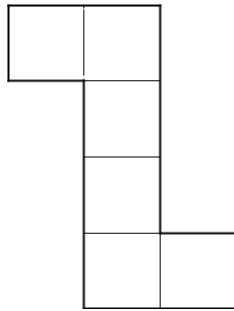$$\text{Volume of a cone} = \frac{1}{3}\pi r^2 h$$

Kinematics formulae

Where a is constant acceleration, u is initial velocity, v is final velocity, s is displacement from the position when $t = 0$ and t is time taken:

$$v = u + at$$

$$s = ut + \frac{1}{2}at^2$$

$$v^2 = u^2 + 2as$$

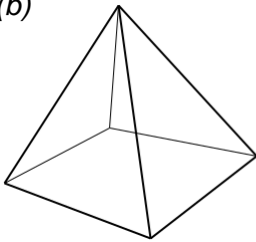**1.** *(a)* The diagram shows a 2D shape made from squares.

This shape is folded along each dotted line to make a 3D shape.
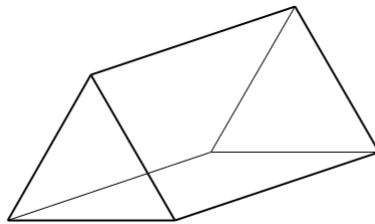
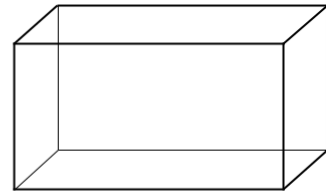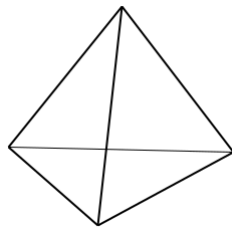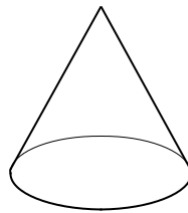Write down the name of this 3D shape. [1]

Cube

(b)

A

B

C

D

E

Which of the 3D shapes drawn above has 5 faces, 9 edges and 6 vertices?

Tick (√) **one** box. [1]

A ☐   B ☑   C ☐   D ☐   E ☐
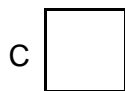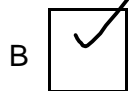
2. This table shows minimum rates of pay in the UK for 2018.

Minimum wage	
Age (years)	Rate of pay (per hour)
Under 18	£4.20
18–20	£5.90
21–24	£7.38
25 and over	£7.83

(a) In 2018, Barry was 19 years old and earned the minimum wage per hour.

(i) Calculate the pay that Barry earned for working 23 hours. [1]

£5.90 × 23 = £135.70

(ii) One week, Barry earned £218.30.

How many hours did Barry work for this week? [2]

£218.30 ÷ £5.90 = 37 hows

(b) In 2018, Shanice was 22 years old and earned the minimum wage per hour.
One week, Shanice worked for 32 hours and received a bonus of £25.

Calculate how much Shanice earned for this week. [2]

(32 × £7.38) + (25) = £261.16

3. *(a)* A newspaper headline states,

'63% of households in Barville owe money'

What percentage of households do not owe money? [1]

$100 - 63 = \underline{\underline{37.\%}}$

(b) The households of Churchton owe a total of £8 100 043.

Write 8 100 043 in words. [1]

Eight Million, One Hundred Thousand and Forty-three.

(c) There are 3650 households in Lowtown.
48% of these households owe an average of £3400.

Calculate the total amount of money owed by these households. [3]

$\frac{48}{100} \times 3650 = \underline{1752 \text{ owe money}}$

$1752 \times 3400 = \underline{\underline{£5,956,800}}$

(d) There are 49 000 households in Hamborough.
21 425 households are **not** in debt.
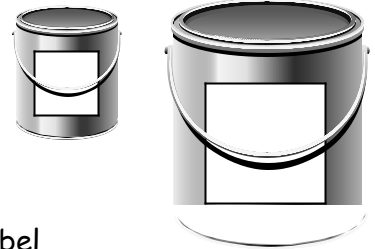
What fraction of households in Hamborough **are** in debt? [1]

$49000 - 21425 = 27575 \text{ in debt}$

$\frac{27575}{49000} = \underline{\underline{\frac{1103}{1960}}}$

4. *(a)* A factory sells paint in different size tins.

The square label on a small tin has a height of 6cm.
The square label on a large tin has a height of 15cm.

Complete this statement:

The large label is an enlargement of the small label

using a scale factor of __5/2__ $15 \div 6 = 5/2$

[1]

Diagram not drawn to scale

(b) The factory makes orange paint by mixing yellow paint and red paint.

On Monday, they use 66 litres of yellow paint and 99 litres of red
paint. On Tuesday, they use 264 litres of yellow paint.

How many litres of red paint must be used on Tuesday to make the same colour of
orange?   [2]

$Y : R$

Monday → $\overset{\frown}{66 : 99}$

×4   ×4

Tuesday → $264 : 396$ 396 litres

(c) Three friends buy some paint.

- Murphy buys 5 litres of paint.
- Jane buys 3 times as much paint as Murphy.
- Alexei buys half as much paint as Jane.
- Paint costs £4.95 for half a litre.

Calculate the total cost of the paint.   Half litre = 4·95   [3]

1 litre paint = x   One litre = £9·90

Murphy = $5x$ Jane = $3(5x) = 15x$

Alexei = $\frac{15x}{2} = 7\cdot5x$

Total $15x + 7.5x + 5x = 27.5x$

The total cost of the paint is £ __272·25__ $27.5x + 9.90$
$= £272.25$

5. *(a)* A train from Leicester to London has:
- 1 first class carriage with 48 seats,
- 4 standard class carriages, each with 72 seats.

The train manager notes that:

- $\frac{3}{4}$ of the first class seats are taken,

- $\frac{5}{8}$ of the standard class seats are taken,

- no passengers are standing.

The train manager thinks that the train is more than $\frac{2}{3}$ full.
Is the train manager correct?
You must show all your working. [7]

Seats total capacity → $48 + (4 \times 72) = 336$ seats
288

Seats taken → $(3/4 \times 48) + (5/8 \times 288) = 216$ taken

$\frac{216}{336} = 9/14 = 0.64$ taken up

$2/3 = 0.0\dot{6}6$ $0.64 < 0.66$

So this is incorrect → less than $2/3$ taken up

Tick (√) the appropriate box.

The train manager is correct ☐   The train manager is not correct ☑

(b) The distance by rail from Leicester to London is 100 miles.

(i) Assume that the train travels at an average speed of 80 mph.

Calculate the arrival time in London of a train that leaves Leicester at 11:50 a.m.

[3]

$$Time = \frac{Distance}{Speed}$$

$$Time = \frac{100}{80} = 5/4 \text{ hours} = 1 \text{ hour } 15 \text{ minutes}$$

$$11:50 + 1 \text{ hour } 15 \text{ mins} = 1:05 \text{ pm}$$

(ii) The train actually travelled slower than the assumed 80 mph.
How would this affect the arrival time? [1]

arrive later then 1:05 pm

6. 25 years ago, Raveena's grandparents invested £500 for her in an account paying 3.4% compound interest per annum.
No extra money was paid in and no money was withdrawn during these 25 years.

Raveena has decided to withdraw all the money in the account after 25 years.

How much should Raveena receive?
Give your answer correct to the nearest penny.
You must show all your working. [3]

$500 \times 1.034^{25} = £1153.41$

7. *(a)*

Recipe for scones

Ratio of ingredients

flour : butter : sugar

70 : 17 : 10

Nadeen has 102 g of butter and plenty of flour and sugar.
Nadeen uses all this butter to make scones.

Calculate the quantity of flour and sugar Nadeen needs. [3]

102 ÷ 17 = 6 times amount of butter so 6 scones.

6 × 70g = 420 grams flow   6×10g = 60 grams
Sugar

Flour _420_ g

Sugar _60_ g

(b)

Nutrition per scone				
kcal	fat	carbohydrates	fibre	protein
268	10 g	41 g	1 g	6 g

Nadeen has been recommended to eat 2200 kcal per day.
She eats two scones for lunch.
Her breakfast was 390 kcals.

What percentage of the recommended daily kcals does Nadeen have **left** for meals later in the day?
Give your answer correct to the nearest 0.01%. [4]

2200 − [(2×268) + (390)]

2200 − [926] = 1274 kcal left

(1274/2200) × 100 = 57.40909091...%
= 57.91 %