



GCSE MATHEMATICS

S21-C300

Non-Calculator Assessment Resource D

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

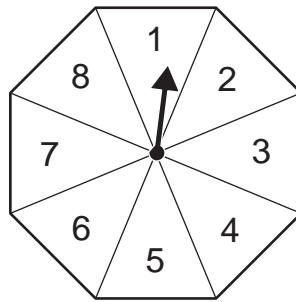
Where a is constant acceleration, u is initial velocity, v is final velocity, s is displacement from the position when $t = 0$ and t is time taken:

$$v = u + at$$

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

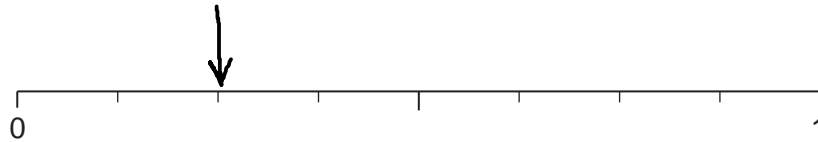
$$v^2 = u^2 + 2as$$

1. (a)

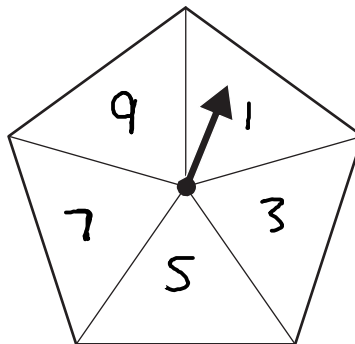


The diagram shows a fair spinner for a simple game.
Rhian needs to score 7 or more with a single spin to win the game.

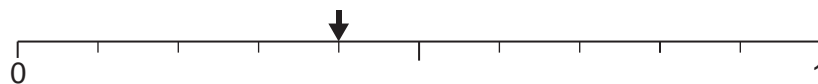
On the probability scale below, mark with an arrow the probability that Rhian wins the game. [1]



(b) Tomas is playing a game with a different fair spinner.
Here is the shape of his spinner.



The arrow on the probability scale below shows the probability that Tomas scores less than 4 with one spin.



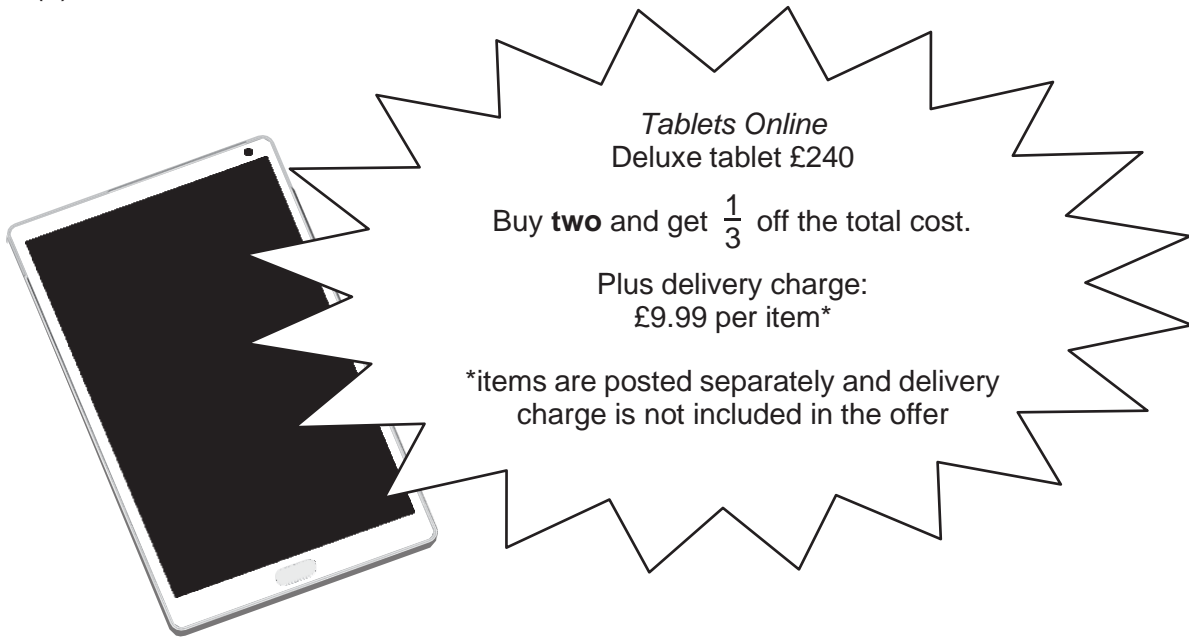
Write five numbers on Tomas' spinner so that the scale is correct. [1]

(c) Simon is playing a game.
The probability that he wins the game is 0.7.

What is the probability that Simon does not win his game? [1]

$$1 - 0.7 = \underline{\underline{0.3}}$$

2. (a)



Tablets Online
Deluxe tablet £240

Buy **two** and get $\frac{1}{3}$ off the total cost.

Plus delivery charge:
£9.99 per item*

*items are posted separately and delivery charge is not included in the offer

Rosie buys two Deluxe tablets from *Tablets Online* and has them delivered.

How much does Rosie pay?

[4]

$$240 \times 2 = 480 \text{ before } \frac{1}{3} \text{ off}$$

$$\frac{1}{3} \text{ off } 480 \text{ is } 160 \text{ so } \rightarrow 480 - 160 = \underline{320}$$


$$2 \text{ items so } 2 \times \text{delivery charge} \rightarrow 2 \times 9.99 = \underline{19.98}$$

$$320 + 19.98 = \underline{\underline{339.98}}$$

Rosie pays £ 339.98

(b)

The Laptop Store:
No interest!
Pay 50% deposit on
any laptop and the
rest in 4 equal
payments.



Jim bought a laptop from *The Laptop Store*.
He paid his deposit and the rest of the cost in 4 payments of £108.

How much did Jim pay for his laptop in total?

[3]

4 equal payments = The other 50%

$$£108 \times 4 = \underline{£432}$$
$$£432 \times 2 = 100\%$$
$$= \underline{\underline{864}}$$

Jim paid £ 864

3. (a) Eva's grandchildren all live in Wales or Australia.

$\frac{2}{7}$ of her grandchildren live in Wales.

15 of her grandchildren live in Australia.

How many grandchildren does Eva have?

[3]

$$1 - \frac{2}{7} = \frac{5}{7} \text{ in Australia}$$
$$\frac{5}{7} = 15 \rightarrow \frac{1}{7} = 3 \quad 3 \times 7 = \underline{\underline{21 \text{ total}}}$$
$$\frac{15}{3} = 5$$

..... 21 grandchildren

(b) Eva lives in Wales.

When she goes to Australia for a visit, she always changes £400 into Australian dollars (A\$).

When she went in 2018, the exchange rate was £1 = A\$ 1.70.

When she went in 2016, the exchange rate was £1 = A\$ 2.00.

How many more Australian dollars did Eva receive in 2016 than she did in 2018?

[3]

$$2016 \rightarrow \pounds 400 \times \$2 = \underline{\underline{\$800}}$$

$$2018 \rightarrow \pounds 400 \times \$1.70 = 4 \times 170 = 400 + 280 = \underline{\underline{\$680}}$$

$$\underline{\underline{\$800}} - \underline{\underline{\$680}} = \underline{\underline{\$120}}$$

A\$ 120 more

4. (a) There are 45 swimmers in *Top Swim* club.

All swimmers are learning butterfly and backstroke and are asked which they prefer.

- $\frac{3}{5}$ of all swimmers prefer backstroke.
- The number of juniors is double the number of seniors in the club.
- $\frac{1}{6}$ of the juniors prefer butterfly.

Work out the proportion of swimmers who are seniors and prefer backstroke.
You may use the table to help you.

[5]

	Prefer to swim		Total
	Butterfly	Backstroke	
Seniors	13	2	15
Juniors	5	25	30
Total	18	27	45

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Proportion $\frac{2}{45}$

- (b) *The Sharks* club has two types of membership: swimmers or divers.
The ratio of swimmers to divers is 8 : 3.
18 members of the club are divers.

How many members does *The Sharks* club have?

[2]

$$18 = 3 \text{ parts} \rightarrow 1 \text{ part} = 6 \text{ people}$$

$$\text{total parts} = 8 + 3 = 11 \quad 11 \times 6 = \underline{\underline{66}}$$

66 members

5. (a) (i) Write 4.8×10^{-3} as an ordinary number. [1]

$$4.8 \rightarrow \underline{0.0048}$$

- (ii) Work out the value of $(2.5 \times 10^{20}) + (9 \times 10^{20})$.
Give your answer in standard form. [2]

$$2.5 \times 10^{20} \rightarrow 250,000,000,000,000,000,000,000,000$$

$$9 \times 10^{20} \rightarrow 900,000,000,000,000,000,000,000,000$$

$$90 + 25 = 115$$

$$1,150,000,000,000,000,000,000,000,000$$

$$= \underline{1.15 \times 10^{21}}$$

- (b) In 2018, the total volume of ice in the Greenland ice sheet was $2.99 \times 10^6 \text{ km}^3$.
The total surface area of the ice sheet was $1.799 \times 10^6 \text{ km}^2$.

Assuming that the depth of the ice was constant for the whole ice sheet, **estimate** the depth of the ice in 2018.

You must state the units of your answer. [3]

$$\begin{aligned} (3 \times 10^6) \div (1.8 \times 10^6) &= \\ (3 \div 1.8) \times (10^6 \div 10^6) &= 5/3 \times 1 \\ &= \underline{\underline{5/3 \text{ km}}} \end{aligned}$$

Depth of ice = $\frac{5}{3}$ Units km

6. Huw has a maths test.

(a) For the first question, Huw divides 752 by a whole number.

His answer, which is correct, is 25 remainder 27.

What whole number did Huw divide by?

[3]


$$752 - 27 = 725$$

$$725 / 25 = \underline{\underline{29}}$$

(b) The second question is:

The only food provided for guests at Seaview Hotel is breakfast. The hotel has enough food to make breakfast for 20 guests for 6 days.
How long would the food last 30 guests?
You may assume each guest eats the same amount of food for breakfast.

Here is Huw's working.

	<u>20 guests for 6 days</u>
	<u>10 guests for 3 days</u>
	<u>30 guests for 9 days</u>

(i) Without working out the correct answer, explain why Huw's answer of 9 days is incorrect. [1]

Because his answer means that with more guests the food lasts longer which is not true.

(ii) Work out the correct answer. [2]

$$20 \text{ guests} : 6 \text{ days}$$

$$120 \text{ guests} : 1 \text{ day}$$

$$30 \text{ guests} : 4 \text{ days}$$

4 days

7. Shania has two pieces of ribbon.

One piece is $5\frac{1}{4}$ metres long.

The difference between the lengths of the two pieces is $2\frac{9}{20}$ metres.

Work out the **two** possible lengths of the other piece of ribbon.

Give each of your answers as a mixed number in its simplest form.

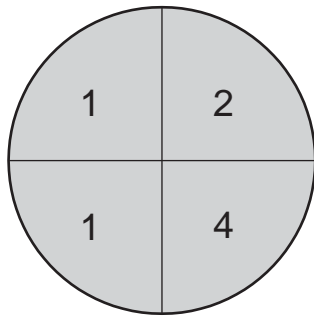
[4]

Other piece can be longer or shorter.

longer $\rightarrow 5\frac{1}{4} + 2\frac{9}{20} \rightarrow \frac{21}{4} + \frac{49}{20} \rightarrow \frac{105}{20} + \frac{49}{20} = \frac{154}{20} = \frac{77}{10}$
 $= 7\frac{7}{10}$

shorter $\rightarrow 5\frac{1}{4} - 2\frac{9}{20} \rightarrow \frac{105}{20} - \frac{49}{20} = \frac{56}{20} = \frac{14}{5} = 2\frac{4}{5}$

8. The diagram shows a dartboard with 4 sectors of equal size.



Sanjeev throws 3 darts which all hit this dart board.
Each dart is equally likely to hit any sector of the dart board.

He **multiplies** his three numbers to find his score.

Work out the probability that his score is an odd number.

[2]

$$P(1) = 0.5 \quad P(2) = 0.25 \quad P(4) = 0.25$$

$$\text{ways to get 1} \rightarrow 1 \times 1 \times 1 \rightarrow (0.5 \times 0.5 \times 0.5) \\ = 0.125 / \frac{1}{8}$$

$$\therefore P = \frac{1}{8}$$