



GCSE MATHEMATICS

S21-C300

With Calculator Assessment Resource F

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 sign in a shop shows the cost of sending letters and parcels.

What are you sending?	Class	Cost
Small letter	1st	67p
	2nd	58p
Large letter	1st	£1.01
	2nd	79p
Small parcel	1st	£3.45
	2nd	£2.95
Medium parcel	1st	£5.75
	2nd	£5.05

Customers can choose 1st or 2nd class post for different sizes of letter or parcel.

(a) What is the cost of sending 5 small letters, using 1st class post?

[1]

$$\pounds 0.67 \times 5 = \pounds 3.35$$

(b) Helen always uses first class post.
She makes a large letter into a small letter by folding it in half.

How much money does this save?

[2]

$$\pounds 1.01 - \pounds 0.67 = \pounds 0.34$$

(c) Brad sends:

- 3 small parcels using 2nd class post,
- 2 medium parcels using 1st class post.

How much does Brad pay to send all 5 parcels?

[2]

$$(3 \times \pounds 2.95) + (2 \times \pounds 5.75) = \pounds 20.35$$

Brad pays £ 20.35

2. There are:

- 28 days in February,
- 52 weeks in a year.

(a) Emile is given £8.12 pocket money every week.

How much pocket money is Emile given in a whole year?

[1]

$$52 \times \pounds 8.12 = \underline{\underline{\pounds 422.24}}$$

(b) For this year, Catrin is given £7.35 pocket money every week.

(i) How much pocket money is Catrin given in February?

[2]

$$28 \div 7 = 4 \quad 4 \times \pounds 7.35 = \underline{\underline{\pounds 29.4}}$$

(ii) Catrin multiplies the total for February by 12.

This method will not give the correct amount for the whole year.

Why not?

[1]

Not every month has exactly 4 weeks
like February.

(c) Each morning, Aled is given 95p pocket money.

He saves all his pocket money from 1st February until the 15th March.

Will Aled have saved enough money to pay £40 for a concert ticket on the evening of the 15th March?

You must show all your working.

[3]

$$28 \text{ days} + 15 \text{ days} = \underline{\underline{43 \text{ days}}}$$

$$43 \times \pounds 0.95 = \underline{\underline{\pounds 40.85}}$$

Yes he will $\pounds 40.85 > \pounds 40.00$

3. (a) (i) Simplify $9a - 1 - 6a + 8$. [2]

$$\begin{array}{l} 9a - 6a = 3a \\ -1 + 8 = 7 \end{array} \rightarrow \underline{\underline{3a + 7}}$$

- (ii) Expand $3(x + 2)$. [2]

$$\underline{\underline{3x + 6}}$$

- (b) Solve each of the following.

- (i) $x + 6 = 15$ [1]

$$x + 6 = 15 \rightarrow \underline{\underline{x = 9}}$$

- (ii) $y/7 = 6$ [1]

$$y/7 = 6 \rightarrow \underline{y} = 7 \times 6 = \underline{\underline{42}}$$

- (c) $v = u + at$

- Find v when $u = -2$, $a = 6$ and $t = 3$. [2]

$$\begin{array}{l} v = u + at \rightarrow v = (-2) + (6)(3) \\ v = -2 + 18 \\ v = \underline{\underline{16}} \end{array}$$

4. (a) Estate agents help people sell their houses. They charge people for the help that they provide.

Bilal plans to sell his house for £146 000.
He has a choice of these two estate agents:

Blue Blocks Estate Agent Fixed

Charge £1420 + 20% VAT

Sell 'em Fast Estate Agent Charge

1.25% of the selling price

Bilal wants to pay as little as possible to the estate agent.

Which estate agent should Bilal choose?

You must show all your working.

[4]

$$\text{Blue Blocks} \rightarrow \left(\pounds 1420 + \frac{20}{100} \times 1420 \right) = \underline{\underline{\pounds 1704}}$$

$$\text{Sell em fast} \rightarrow \left(\pounds 146,000 \times \frac{1.25}{100} \right) = \underline{\underline{\pounds 1825}}$$

$$\underline{\underline{\text{Blue Blocks is less by } 1825 - 1704 = \underline{\underline{\pounds 121}}}}$$

Bilal should choose Blue Blocks

(b) Stamp duty is a tax that is paid when houses are purchased (bought).

For houses purchased up to £925 000, the stamp duty is calculated as follows:

- 0% on the first £125 000 of the purchase price,
- 2% on the next £125 000 of the purchase price,
- 5% on the next £675 000 of the purchase price.

An example to calculate the stamp duty on a house with a purchase price £275 000.

Example

House purchased for £275 000, the stamp duty is calculated as follows:

0% on the first	£125 000	£ 0
2% on the next	£125 000	£2500
5% on the next	£ 25 000	£1250
Total stamp duty on	£275 000	£3750

Mr Evans is asked to pay stamp duty of £12 000 when he buys a new house. He pays £380 000 for his new house.

Is the stamp duty he is asked to pay correct?

You must show all your working.

[3]

Correct

Incorrect

$$\text{First } \pounds 125,000 = \pounds 0$$

$$\text{Second } \pounds 125,000 = \frac{2}{100} \times \pounds 125,000 = \pounds 2500$$

$$\text{Last } \pounds 130,000 = \frac{5}{100} \times \pounds 130,000 = \pounds 6500$$

$$\pounds 0 + \pounds 2500 + \pounds 6500 = \underline{\underline{\pounds 9000}}$$

Stamp duty should be £9000 not £12000

5. The table below gives information from the Highway Code on stopping distances for cars.

Speed	Stopping distance in metres = Thinking distance + Braking distance (Thinking distance is given first, followed by Braking distance)
20 mph	
30 mph	
40 mph	
50 mph	

Remember 50 mph is 80 km/h.

The stopping distances given in the Highway Code assume good driving conditions and alert drivers.

When a driver is tired and the road is wet, the thinking distance increases by 30% and the braking distance increases by 20%.

A tired driver travels at 64 km/h in wet driving conditions.

Calculate their stopping distance in metres.

Given km/h we need mph 50 ^[4] $64/1.6 = 40 \text{ mph}$

For 40 mph thinking distance = 12 metres
 Increase by 30% $\rightarrow 12 \times 1.3 = 15.6 \text{ m}$

For 40 mph braking distance = 24 metres
 Increase by 20% $\rightarrow 24 \times 1.2 = 28.8 \text{ metres}$

Stopping distance = $15.6 + 28.8 = 44.4 \text{ m}$

6. (a) In Queenbridge, the mean daily snowfall for a week was 1.6 cm. If there had been 1 cm more snowfall on each day, what would the mean daily snowfall have been? [1]

$$(1.6 \times 7) + (1 \times 7) = 18.2 \text{ total in week}$$

$$18.2 \div 7 = \text{new mean} = \underline{\underline{2.6 \text{ cm}}}$$

- (b) In Sansburg, the snowfall for each of the first 10 days in January was measured. The results are summarised in the table below. midpoint of 5

Daily snowfall, s in cm	Number of days = f	M	MF
$1.5 \leq s < 2.5$	4	2	8
$2.5 \leq s < 3.5$	2	3	6
$3.5 \leq s < 4.5$	1	4	4
$4.5 \leq s < 5.5$	0	5	0
$5.5 \leq s < 6.5$	3	6	18
	10		36

Calculate an estimate for the mean daily snowfall for these 10 days. [4]

$$36 \div 10 = \underline{\underline{3.6 \text{ cm}}}$$

- (c) During the first 5 days of February, the mean snowfall in Awezell was 4.7 cm. On 6th February the snowfall was 23.9 cm. Calculate the mean snowfall for the first 6 days of February. [3]

$$5 \times 4.7 = 23.5 \text{ cm first 5 day total}$$

$$\frac{23.5 + 23.9}{6} = \text{mean for 6 days} = \underline{\underline{7.9 \text{ cm}}}$$

$$\underline{\underline{7.9}} \text{ cm}$$