GCSE MATHEMATICS

S21-C300

Non-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:

Curved surface area of a cone = πrl

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

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

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. Ted is a salesman.
His pay is calculated using this formula.

$$\text{Ted's pay} = 100 + \frac{\text{value of Ted's sales}}{5}$$

(a) One week the value of Ted's sales was £800.

What was Ted's pay for this week? [2]

$\text{Pay} = 100 + \frac{800}{5}$

$= 100 + 160 = 260$

Ted's pay £ 260

(b) The next week Ted's pay was £400.

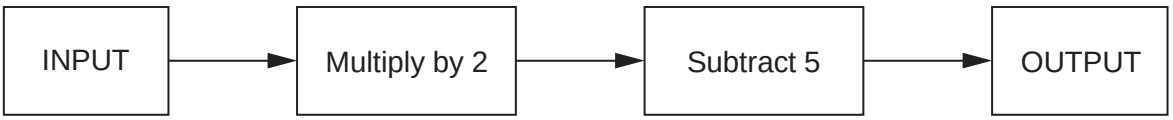
What was the value of Ted's sales for this week? [2]

$400 = \frac{\text{sales}}{5} + 100$

$300 = \frac{\text{sales}}{5} \rightarrow 1500 = \text{sales}$

Value of Ted's sales £ 1500

2. *(a)* Here is a number machine.



(i) The input is 10.
What is the output? [1]

$10 \times 2 = 20 \quad 20 - 5 = 15$

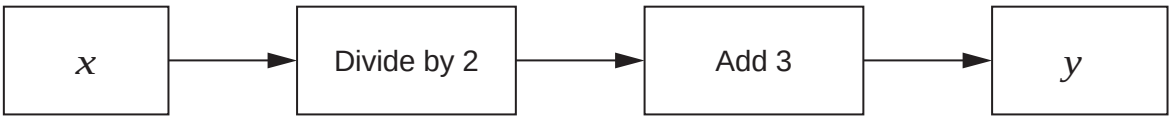
(ii) The input is 4·5.
What is the output? [1]

$4.5 \times 2 = 9 \quad 9 - 5 = 4$

(iii) The output is –3.
What is the input? [1]

$-3 + 5 = 2 \quad 2 \div 2 = 1$

(b) Here is a different number machine.



Circle the rule shown by this number machine.

$2x - 3 = y$ $\frac{x}{2} + 3 = y$ $x = \frac{y}{2} + 3$ $x = 2y - 3$ $\frac{x+3}{2} = y$ [1]

3. *(a)* For five days in winter, the lowest temperature in Downdale was recorded. This information is shown in the table.

Day	Monday	Tuesday	Wednesday	Thursday	Friday
Temperature in °C	2	0	–6	–4·5	–2

(i) Which day was the coldest? [1]

Wednesday

(ii) Work out the difference between the lowest temperature on Monday and the lowest temperature on Thursday. [1]

$2 \longrightarrow -4.5$

-6.5

Difference is 6.5 °C

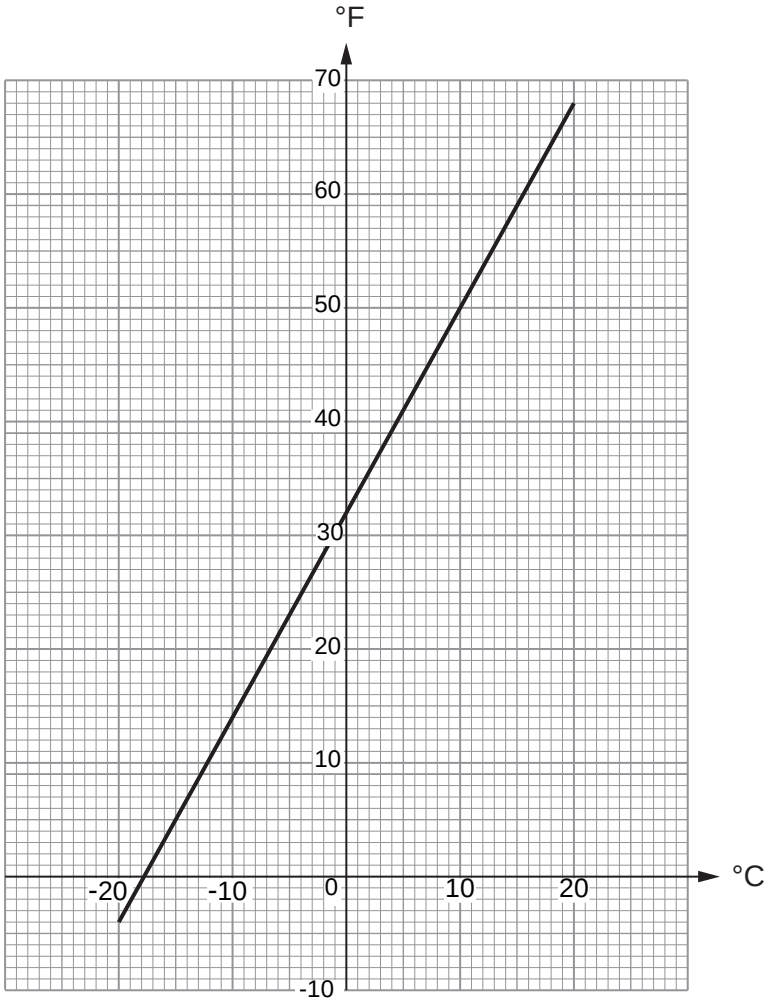
(iii) On Saturday, the lowest temperature was 3°C colder than it was on Friday.

What was the lowest temperature on Saturday? [1]

$-2 - 3 = -5$

-5 °C

(b) This conversion graph may be used to change between temperatures in degrees Celsius (°C) and temperatures in degrees Fahrenheit (°F).



(i) Use the graph to change 50°F to °C. [1]

10 °C

(ii) Use the graph to change –5°C to °F. [1]

23 °F

(iii) One day it is 18°C in Bristol and 67°F in New York.

Is Bristol warmer than New York on this day?

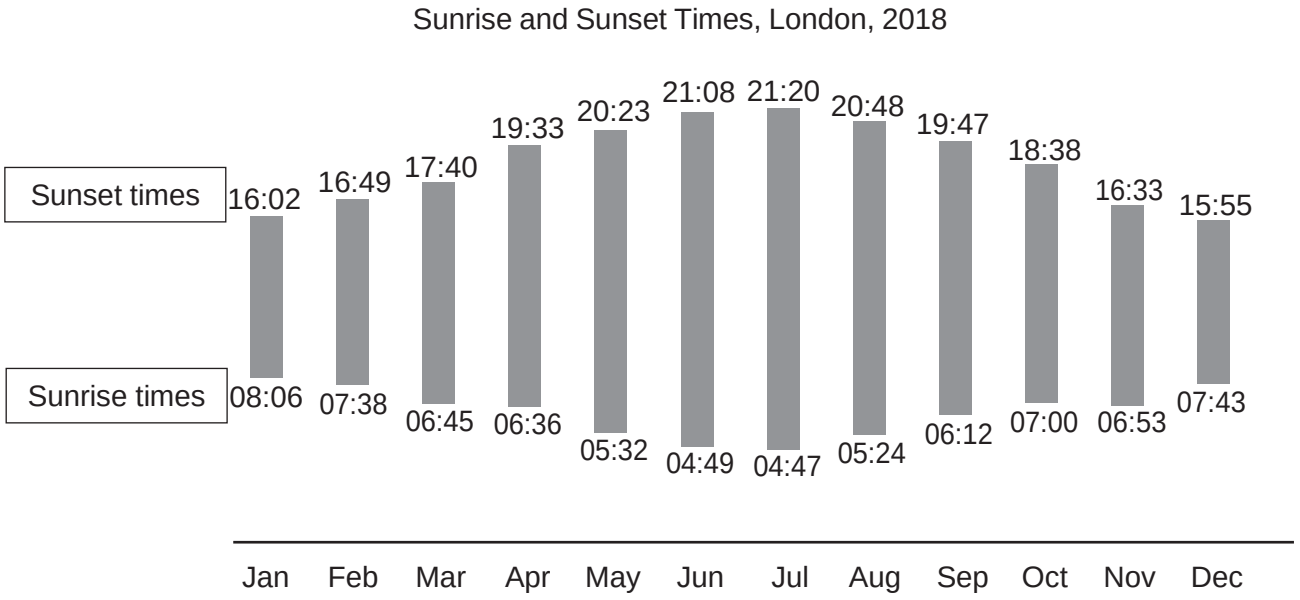
Yes ☐ No ☑

Show how you decide. [1]

18c° = 65F° using the graph

so Bristol has a lower temperature

4. The graph shows the sunrise and sunset times on the 1st day of each month in London in 2018.



(a) What was the sunrise time on 1st December 2018? [1]

7:43

(b) Use the graph to **estimate** the sunset time on 15th April 2018. [1]

19:33 + 25 → 19:58

(c) The amount of daylight is the difference between the sunrise and sunset times.

(i) On the 1st of which month was the amount of daylight the greatest? [1]

July

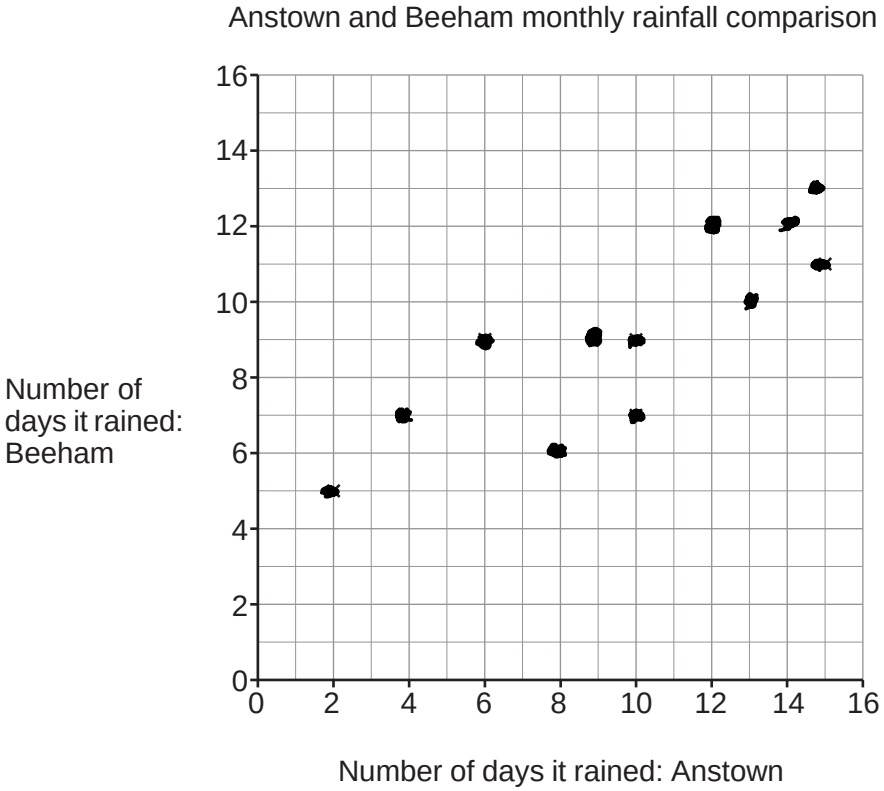
(ii) How many hours and minutes of daylight were there on this day? [2]

16 hours and 33 minutes

16 hours 33 minutes

5. Anisha wants to compare the number of days it rained each month, in Anstown and Beeham, in 2018.

(a) Anisha has plotted the data for the first 6 months on the scatter graph below.



The data for the last 6 months is given in the table.

Number of days it rained: Anstown	4	9	8	13	14	15
Number of days it rained: Beeham	7	9	6	10	12	13

Plot the data for the last 6 months on the scatter graph above. [2]

(b) What does your scatter graph show about the relationship between the number of days it rained in Anstown and the number of days it rained in Beeham? [1]

It shows a positive correlation

(c) Use the scatter graph to find how many months it rained on 11 days or more in **both** Anstown and Beeham? [1]

3

6. Make ***x*** the subject of the following formula. [2]

$$y = \frac{x+3}{4}$$

$4y = x + 3 \rightarrow x = 4y - 3$

7. Gita is carrying out a survey to find out what people think of a proposed new road for Redville.

(a) Gita decides to ask the first 20 people she meets at Redville bus station between 8 a.m. and 9 a.m. on a Monday morning.

Give **two** reasons why this plan is unlikely to produce reliable results. [2]

Reason 1:

Small sample

Reason 2:

They will have a biased view. Need to ask random people

(b) Here is a question from Gita's survey:

How often do you use your car?

1 – 2 ☐ 3 – 4 ☐ 4 – 5 ☐ 6 + ☐

Make **two** criticisms of Gita's question. [2]

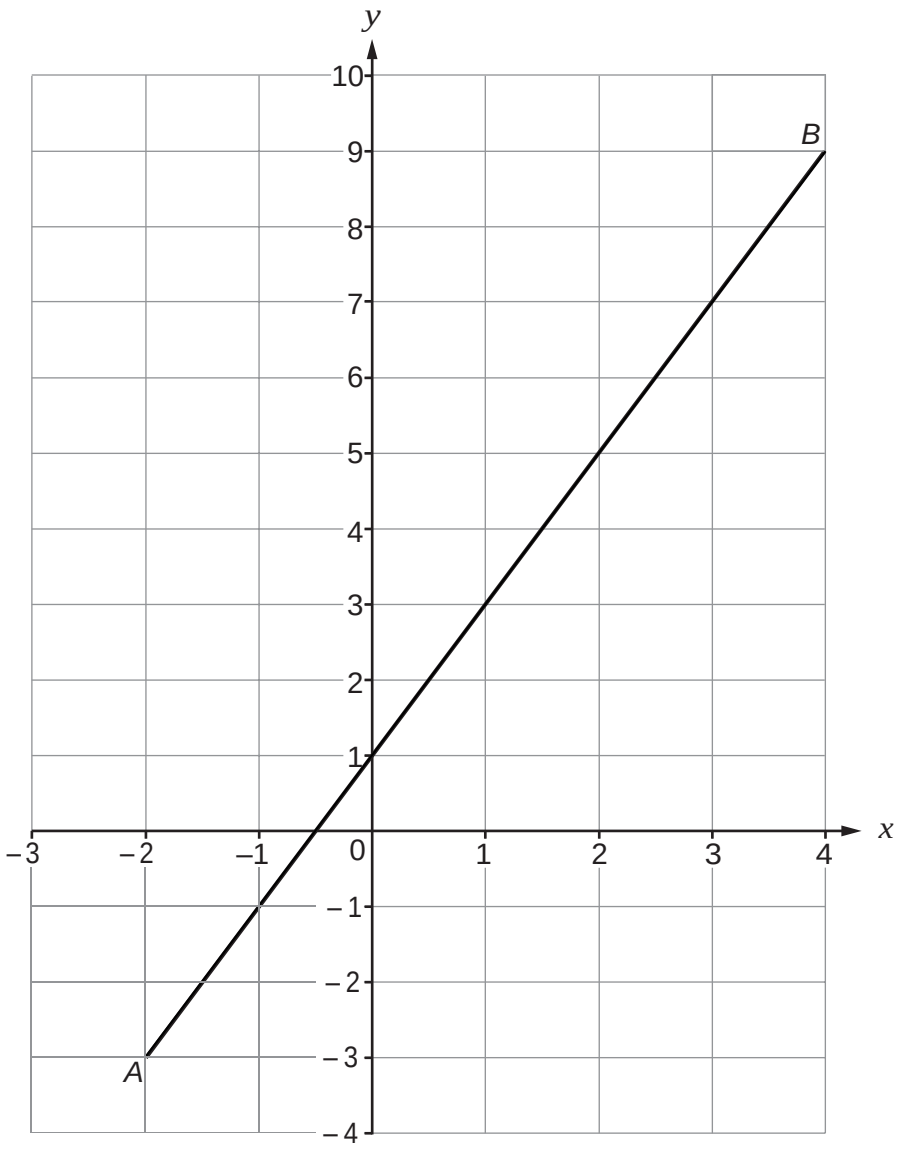
Criticism 1:

There is no option for none = 0
Not everyone has a car.

Criticism 2:

There are no specific numbers above 6 so will produce unreliable results. Many people drive more than 6 times.

8.



The diagram shows the graph of a straight line, *AB*.

Find the equation of this line.

Give your answer in the form $y = mx + c$. [3]

Two points (2, 5) and (4, 9)
x y x_2 y_2

$\frac{9-5}{4-2} = \frac{4}{2} = 2$ gradient

$y = 2x + c$

$5 = 4 + c \rightarrow c = 1$

$y = 2x + 1$

$y = 2x + 1$

9. *(a)* Solve $5x - 1 = 3x + 4$. [2]

$5x - 1 = 3x + 4$

$2x = 5$

$x = 5/2$

(b) Solve the following simultaneous equations. [2]

$$2x + y = 8$$
$$x - y = 1$$

(1) $2x + y = 8$ (2) $x - y = 1$

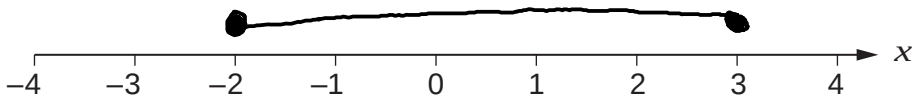
(1) $y = 8 - 2x$

Sub (1) into (2) $\rightarrow x - (8 - 2x) = 1$

$x - 8 + 2x = 1 \rightarrow 3x = 9 \rightarrow x = 3$

Sub $x = 3$ in (2) $\rightarrow 3 - y = 1 \rightarrow y = 2$

(c) Represent the inequality $-2 \leq x \leq 3$ on the number line below. [1]



(d) Solve $\frac{2x}{3} < 4$. [2]

$\frac{2x}{3} < 4 \rightarrow 2x < 12$

$x < 6$