For **AQA**

GCSE
Mathematics
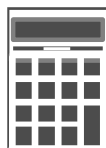# Specification
Paper 3 Foundation Tier

F

Churchill Paper 3D

1 hour 30 minutes

Materials

For this paper you must have:

- a calculator
- mathematical instruments

Instructions

- Use black ink or black ball-point pen.
- Draw diagrams in pencil.
- Write your name and class in the box at the top of the page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- In all calculations, show clearly how you work out your answer.

Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 80.

Churchill Maths

Written by Shaun Armstrong

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1 1 litre of orange juice is poured into 8 cups so that each cup has the same amount.

How much orange juice is in each cup?

Circle your answer.

[1 mark]

12.5 ml   100 ml   125 ml   150 ml

2 $p = \begin{pmatrix} 2 \\ -5 \end{pmatrix}$ and $q = \begin{pmatrix} 1 \\ 3 \end{pmatrix}$.

2 **(a)** Circle the vector 3**p**.

[1 mark]

$\begin{pmatrix} 6 \\ -15 \end{pmatrix}$ $\begin{pmatrix} 5 \\ -5 \end{pmatrix}$ $\begin{pmatrix} 5 \\ -2 \end{pmatrix}$ $\begin{pmatrix} 6 \\ -5 \end{pmatrix}$

2 **(b)** Circle the vector **p** – 4**q**.

[1 mark]

$\begin{pmatrix} -2 \\ -2 \end{pmatrix}$ $\begin{pmatrix} -7 \\ -21 \end{pmatrix}$ $\begin{pmatrix} -2 \\ -17 \end{pmatrix}$ $\begin{pmatrix} -2 \\ -27 \end{pmatrix}$

3   Circle the size of an external angle of a regular octagon.

[1 mark]

45°   60°   120°   135°

4   **(a)**   Five paint brushes cost £13.95

Work out the cost of one paint brush.

[1 mark]

Answer £ _____

4   **(b)**   Sam has £5.

How many chocolate bars costing 56p each can he buy?

[2 marks]

Answer _____

4   **(c)**   Ellie pays £5.76 for four packets of pasta and two jars of pesto.

How much will Alan pay for two packets of pasta and one jar of pesto?

[2 marks]

Answer £ _____

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5

4 × 330 ml	6 × 500 ml	2 litres
£1.49	£3.49	£1.99

A fizzy drink is sold in a pack of 4 cans, a pack of 6 bottles or a large bottle as shown.

Find out which of these offers the best value for money.

Show how you decide.

[3 marks]

Answer _____

6 Write down a fraction with a value between $\frac{2}{7}$ and $\frac{3}{7}$.

[2 marks]

Answer _____

7 Work out

7 **(a)** $4^5 - 5^4$

[2 marks]

Answer _____

7 **(b)** $\dfrac{3 + \sqrt{5}}{6 - 4.3}$

[2 marks]

Answer _____

8 Circle the reciprocal of 0.2

[1 mark]

0.8   2   5   20

9 Mithal starts an online business.
Here are the number of orders he receives each day for the first 9 days.

20   21   16   17   27   22   18   26   22

9 (a) Work out the range of the number of orders.

[1 mark]

_____

Answer _____

9 (b) Find the median of the number of orders.

[2 marks]

_____

_____

_____

Answer _____

After 10 days, the mean number of orders per day is 21.3

9 (c) Work out the number of orders Mithal received on the 10th day.

[3 marks]

_____

_____

_____

_____

_____

Answer _____

10 Circle the calculation that increases the value of P by $\frac{2}{5}$.

[1 mark]

$$0.4 \times P \qquad 1.2 \times P \qquad 1.4 \times P \qquad 2.5 \times P$$

11 (a) A shop reduces the prices of all electrical goods by 20%.

Work out the new price of a cooker that had cost £450.

[2 marks]

Answer £ _____

11 (b) Jacob's weekly pay increases from £200 to £214.
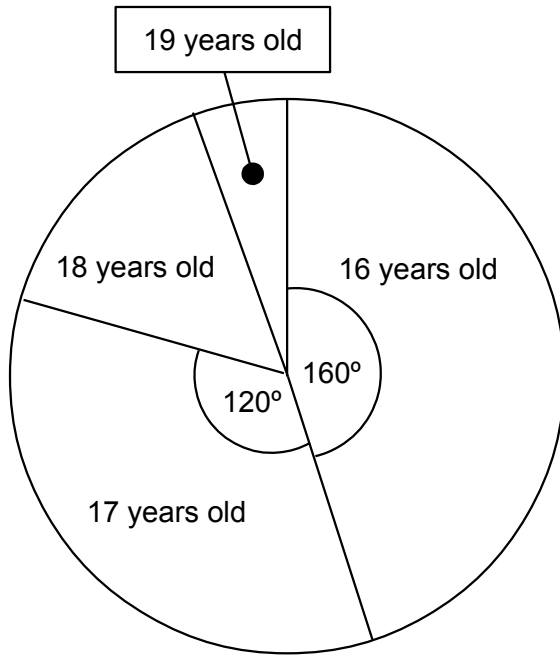
Work out the percentage increase in his pay.

[2 marks]

Answer _____ %

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12

The pie chart gives information about the ages of sixth-form students on a skiing trip.

32 of the students were 16 years old.

12 **(a)** Work out the number of students who were 17 years old.

[2 marks]

_____

_____

_____

_____

Answer _____

There were 3 times as many 18 year old students as 19 year old students on the trip.

12 **(b)** Work out the number of students who were 18 years old.

[3 marks]

_____

_____

_____

_____

Answer _____

13 This question is about adding together consecutive whole numbers.

For example, 6 + 7 + 8 = 21.

13 **(a)** Find two consecutive whole numbers that add together to give 59.

[1 mark]

Answer _____

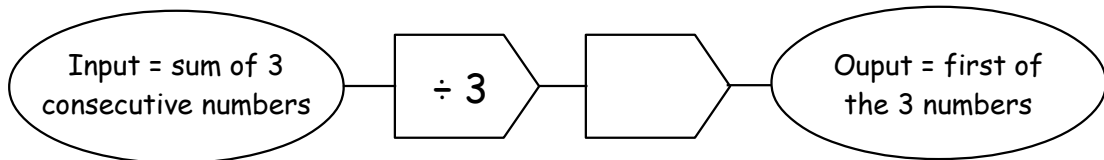**13** **(b)** Find three consecutive whole numbers that add together to give 45.

[2 marks]

Answer _____

**13** **(c)** You are told the sum of three consecutive whole numbers.

Complete this number machine to show how you can work out the **first** of the three consecutive numbers.

Input = sum of 3 consecutive numbers → ÷ 3 → [   ] → Ouput = first of the 3 numbers

[1 mark]

13 **(d)** You are told the sum of five consecutive whole numbers.

Complete this number machine to show how you can work out the **first** of the five consecutive numbers.

Input = sum of 5 consecutive numbers → [   ] → [   ] → Ouput = first of the 5 numbers
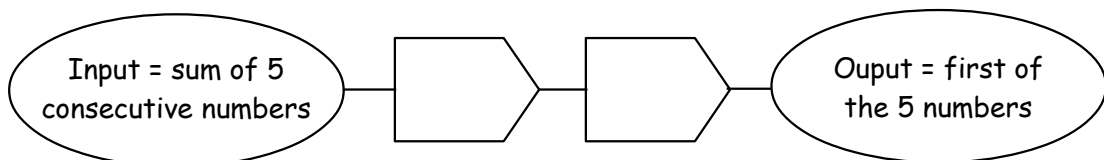
[2 marks]

14 Simplify $\dfrac{1}{a} + \dfrac{1}{a} + \dfrac{1}{a}$

Circle the answer.

[1 mark]

$$\dfrac{1}{a^3} \qquad\qquad \dfrac{3}{a^3} \qquad\qquad \dfrac{3}{a} \qquad\qquad \dfrac{1}{a}$$

15 All the exercise books used by a school are green or blue.

The ratio of green books to blue books on Ms. Begum's desk is 4 : 3

There are 18 blue books on her desk.

15 **(a)** Work out the total number of books on Ms. Begum's desk.

[2 marks]

Answer _____

Ms. Begum puts some more exercise books on her desk.

The ratio of green books to blue books is now 3 : 2

15 **(b)** Work out the smallest number of books that Ms. Begum could have put on her desk.
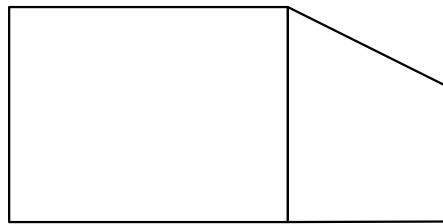
[2 marks]

Answer _____

16
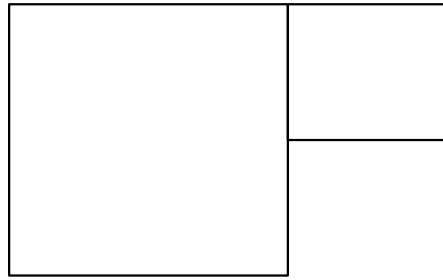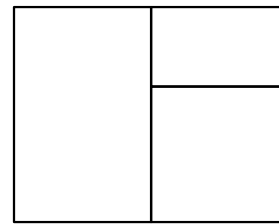

Plan

Front Elevation

Side Elevation

The Plan, Front Elevation and Side elevation of an object are shown above.

In the space below, make a 3-D sketch of the object.

[3 marks]

17   Lillian is draining her swimming pool.

The depth of water in the pool, *d* metres, is given by

$$d = 3 - 0.004t$$

where *t* is the time in minutes since draining began.

17   **(a)**   How deep was the water in the pool before draining began?

[1 mark]

Answer _____ m

17   **(b)**   Work out the depth of water in the pool four hours after draining begins.
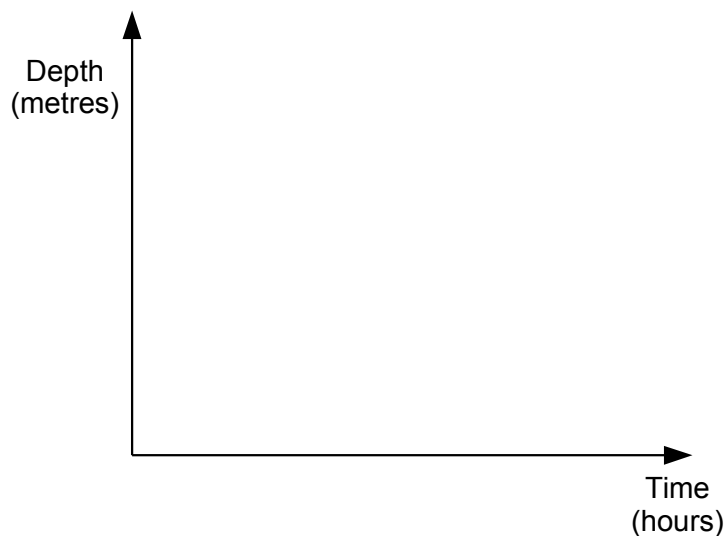
[2 marks]

Answer _____ m

17   **(c)**   On the axes below, sketch a graph showing the depth of water in the pool during the first four hours of draining.

[1 mark]

18 A bag contains 160 sweets.
Each sweet is red, green, yellow or purple in colour.

When a sweet is picked at random from the bag, the probability of getting each colour of sweet is as follows.

Colour	Red	Green	Yellow	Purple
Probability	0.4	0.15	0.2	0.25

18 **(a)** Work out how many red sweets are in the bag.

[2 marks]

Answer _____

10 sweets are removed from the bag.
3 of these sweets are red.

Another sweet is picked at random from the bag.

18 **(b)** Work out the probability that the sweet is red.

[2 marks]

Answer _____

19   The sum of the first 3 terms of a Fibonacci sequence is 22.

Circle the 3rd term of the sequence.

[1 mark]

9   10   11   13

20   Margaret takes three different medicines, Alezin, Betadon and Cannezole.

Alezin comes in packets of 48 tablets and she has to take 4 tablets each day.
Betadon comes in packets of 15 tablets and she has to take 3 tablets each day.
Cannezole comes in packets of 20 tablets and she has to take 2 tablets each day.

On the 10th May, she opens a new packet of each of the three medicines.

On what date will Margaret next have to open a new packet of all three medicines on the same day?

[4 marks]

Answer _____

21 Matt cycles for 1 hour on an oval track.
One lap of the track measures 250 m.

He rides at 30 km/h for the first 20 minutes.
He rides at 24 km/h for the last 40 minutes.

21 **(a)** Show that Matt completes 104 laps.

[3 marks]

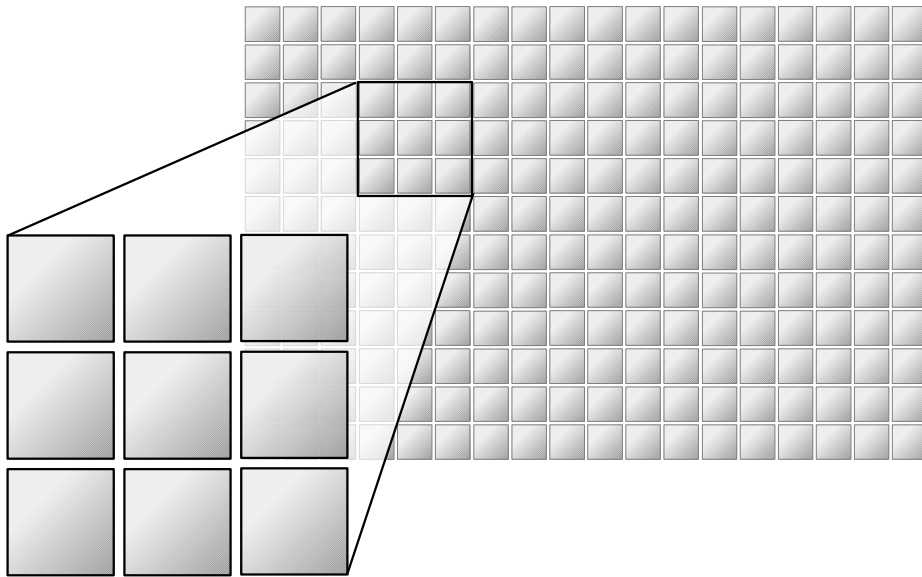**21** **(b)** After how long had Matt covered half of the total distance he cycled.

[3 marks]

Answer _____ minutes

22

Greg and Jill are estimating the number of small square tiles on a kitchen wall.
The tiled wall is rectangular and measures 3.2 m by 1.4 m.

Greg says

"Each small tile is a square of side 2 cm so there are 11 200 tiles."

22 (a) Greg has ignored the gaps between the tiles.

Show how he has calculated the number of tiles.

[2 marks]

There is a 2 mm gap between adjacent tiles.
Jill decides to take account of the gaps by treating each tile as a square of side 2.2 cm.

She says

"Each tile is 10% wider and 10% taller so the area of each tile will be 20% bigger."

22 (b) Explain why Jill is wrong.

[1 mark]

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22 **(c)** Estimate the number of tiles on the wall.

In your estimate, count each part of a tile as a tile.

[2 marks]

Answer _____

23 **(a)** Solve $\quad 5x - 1 < x + 19$

[2 marks]

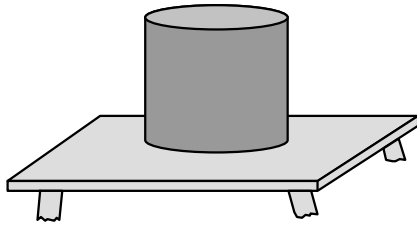Answer _____

23 **(b)** Factorise $\quad p^2 - 8p + 12$

[2 marks]

Answer _____

24

Not drawn accurately

Pressure = $\dfrac{\text{Force}}{\text{Area}}$

A tin in the shape of a cylinder is placed with its circular end on a table.

The tin exerts a force of 55 newtons on the table.

The pressure on the table is 2100 newtons/m^2.

Work out the radius of the base of the tin in centimetres.

[3 marks]

Answer _____ cm

END OF QUESTIONS