Name	Class

For **Pearson Edexcel**
Level 1/Level 2 GCSE (9 – 1)

Mathematics

Paper 1 (Non-Calculator)

Higher Tier

Time: 1 hour 30 minutes | Churchill Paper 1A

You must have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser.

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Write your name** in the box at the top of this page.
- Answer **all** questions in the spaces provided.
- **Calculators may not be used.**
- Diagrams are **NOT** accurately drawn, unless otherwise indicated.
- You must **show all your working out**.

Information

- The total mark for this paper is 80.
- The marks for **each** question are shown in brackets.
  - *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

Churchill Maths

Written by Shaun Armstrong

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Answer ALL questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1   Jeremy, Kira and Liz are maths teachers.

Jeremy can mark 12 homeworks in an hour.
Kira can mark 30 homeworks in 2 hours.
Liz can mark 1 homework every 6 minutes.

(a)   Show that Kira is the quickest of the three teachers at marking homework.

(2)

One night, Jeremy and Kira work together to mark 36 homeworks.
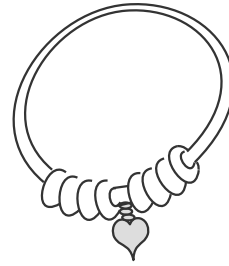They both start at 4.30 pm and work until all the homeworks are marked.

(b)   At what time do Jeremy and Kira finish marking?

....

(3)

(Total for Question 1 is 5 marks)

2   Toby makes bracelets by putting 8 beads, 4 spacers and a heart charm on a silver chain.
He buys the separate items in bulk at the following prices:

20 silver chains	£180
500 beads	£750
100 spacers	£90
30 heart charms	£120

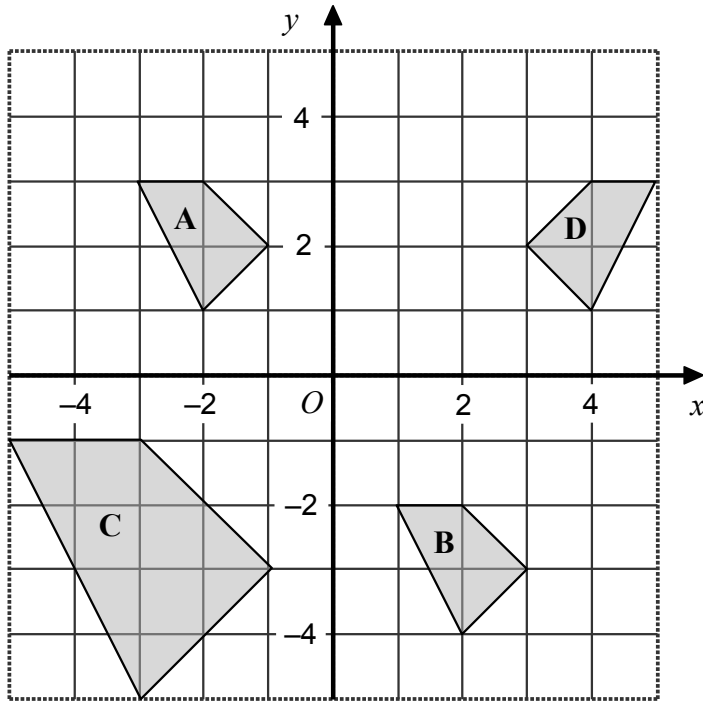(a)   Work out the cost of the materials for one bracelet.

£.....................................

(3)

At a market one day, Toby sells 15 bracelets for £39.90 each.

(b)   How much profit does he make at the market?

£.....................................

(2)

(Total for Question 2 is 5 marks)

3

The shapes **A**, **B**, **C** and **D** are shown on a coordinate grid.

(a) Which of the shapes **B**, **C** and **D** are congruent to shape **A**?

....

(1)

(b) Shape **A** is translated by the vector $\begin{pmatrix} p \\ q \end{pmatrix}$ to give shape **B**.

Write down the values of p and q.

$p =$ ....

$q =$ ....

(2)

(c) Shape **A** is enlarged to give shape **C**.

Write down the scale factor of the enlargement.

....

(1)

(d) Shape **A** is reflected in the line L to give shape **D**.
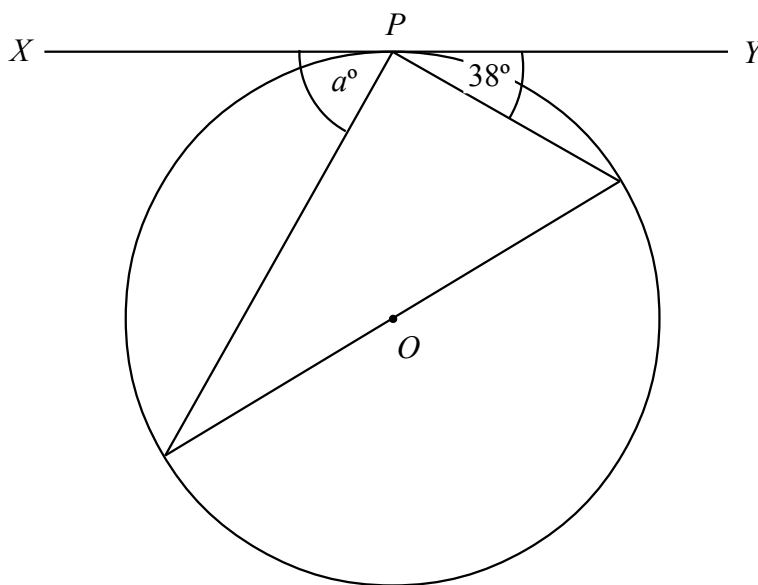
Write down an equation for the line L.

....

(1)

(Total for Question 3 is 5 marks)

4   Make q the subject of the formula $p = 4q - 7$

....

(Total for Question 4 is 2 marks)

5

The diagram shows a circle, centre O.

The straight line XY is a tangent to the circle at the point P.

Work out the value of a.

....

(Total for Question 5 is 2 marks)

6 A company selling clothes online decided to check the productivity of its workers.
The table summarises the number of orders, N, packaged by 120 employees on one afternoon.
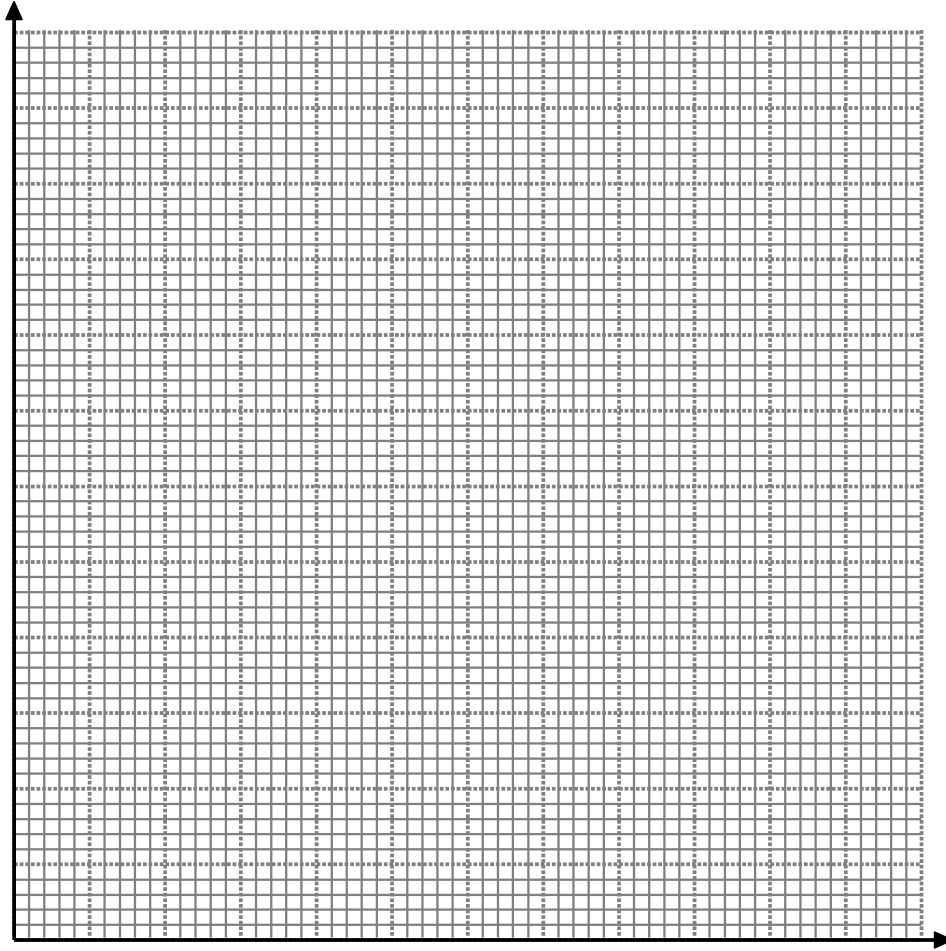
Number of orders (N)	Frequency
$40 < N \le 45$	4
$45 < N \le 50$	17
$50 < N \le 55$	33
$55 < N \le 60$	25
$60 < N \le 65$	20
$65 < N \le 70$	14
$70 < N \le 75$	7

(a) (i) Complete this cumulative frequency table.

Number of orders (N)	Cumulative Frequency
$40 < N \le 45$	4
$40 < N \le 50$	
$40 < N \le 55$	
$40 < N \le 60$	
$40 < N \le 65$	
$40 < N \le 70$	
$40 < N \le 75$	

(2)

(ii) Draw a cumulative frequency graph for this data on the grid on the next page.
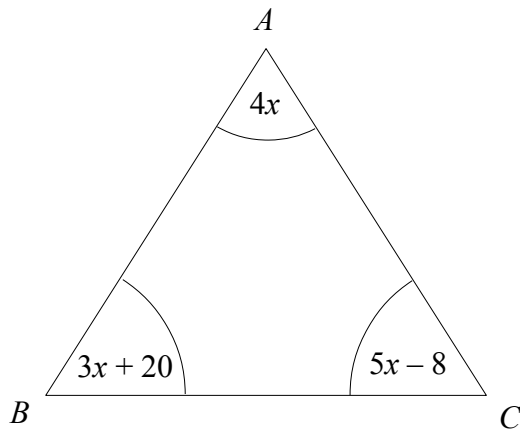
© Churchill Maths Limited

(3)

(b)   Employees who packed 53 or fewer orders will have their productivity checked again the next week.

How many employees will this affect?

....

(1)

(Total for Question 6 is 6 marks)

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7

The angles in triangle ABC are given in degrees.

Prove that $AB = AC$.

<div align="right">

(Total for Question 7 is 4 marks)

</div>

8   The number of emails Leanne sent this week is 20% more than last week.

This week Leanne sent 240 emails.

Work out how many emails Leanne sent last week.

....

<div align="right">

(Total for Question 8 is 2 marks)

</div>

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9   A model of bicycle is available in 5 frame sizes.
For each frame size there are 7 possible colours.

There are 3 sets of gears that can be fitted on the smallest 2 frame sizes and 6 sets that can be fitted on the 3 larger frame sizes.

(a)   Noah is buying the largest frame size.

In how many different ways can he choose the colour and gears for his bike?

....
(1)

(b)   Here is part of a leaflet about this model of bike.

Available in ____ combinations of frame size, colour and gears

What number is missing from the leaflet?

....
(2)

(Total for Question 9 is 3 marks)

10 A bag contains only red beads and blue beads.

Faria picks out a bead at random, notes its colour and puts the bead back.
Faria does this 10 times and gets a red bead 7 times.

Faria says "There are more red beads than blue beads in the bag."

(a) Comment on Faria's statement.

....

....

(1)

Rosa, Shamila and Tess each do the same experiment as Faria.
Here are all the results.

	Number of times a red bead is picked	Number of times a blue bead is picked
Faria	7	3
Rosa	6	4
Shamila	8	2
Tess	6	4

Faria is going to pick out another bead and put it back in the bag.

(b) Using the results in the table, work out the best estimate for the probability that she picks out a red bead.

....

(2)

In another bag containing beads, 60% of the beads are green.
Faria is going to pick out two beads at random from the bag.
She says

"The probability of both beads being green is $\frac{1}{3}$ as you work out $\frac{6}{10} \times \frac{5}{9}$."
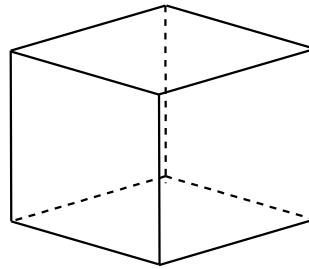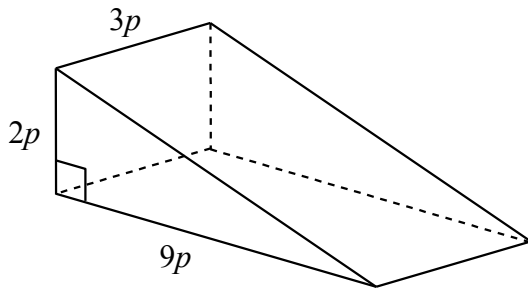
(c)   Is Faria correct?

Explain your answer.

....

....

....

....

(2)

(Total for Question 10 is 5 marks)

11

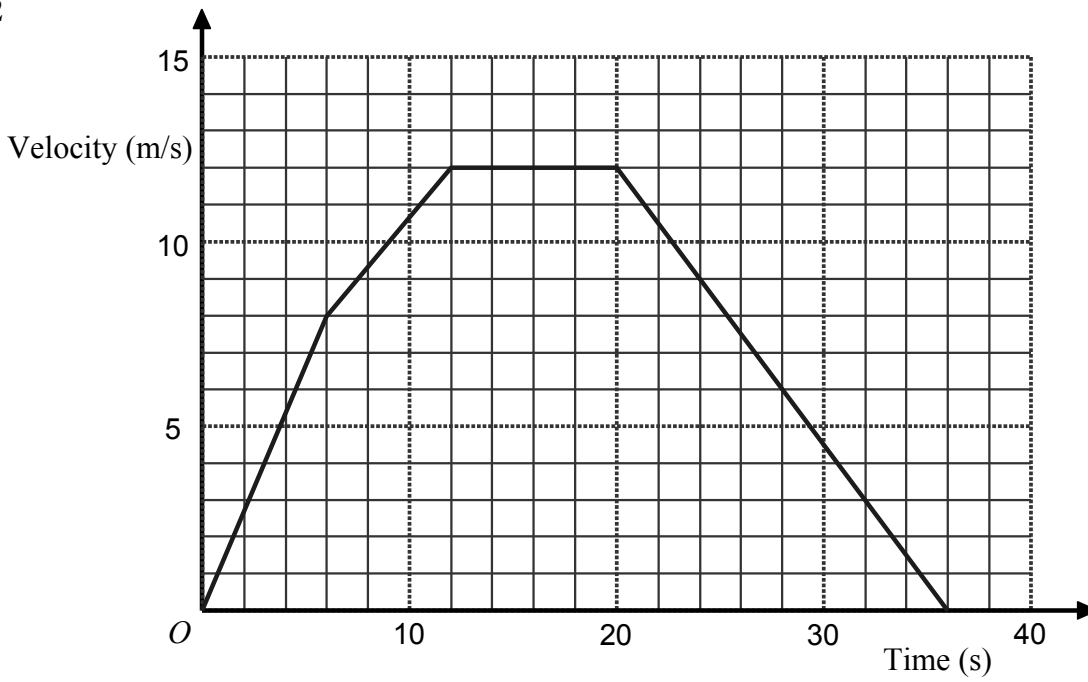The triangular prism and the cube shown above have the same volume.

The cross-section of the triangular prism is a right-angled triangle.

Find an expression for the length of one edge of the cube in terms of p.

....

(Total for Question 11 is 3 marks)

12

The diagram shows the velocity-time graph for a cyclist riding along a straight road.

(a)   For how long during this ride did the cyclist travel at a constant velocity?

.... s

(1)

(b)   Work out the acceleration of the cyclist 10 seconds after the start of the ride.

.... m/s^2

(2)

(c)   Work out the total distance travelled by the cyclist.

.... m

(3)

(Total for Question 12 is 6 marks)

13 Solve the equation

$$5y - (2 \times 10^6) = 4 \times 10^7$$

Give your answer in standard form.

....

(Total for Question 13 is 3 marks)

14 Henrik and Rob both work part-time in a shop.

In a normal week the ratio of what Henrik earns to what Rob earns is 3 : 2

In the week before Christmas they each receive a £20 bonus. The bonus means that the ratio of what Henrik earns to what Rob earns becomes 4 : 3

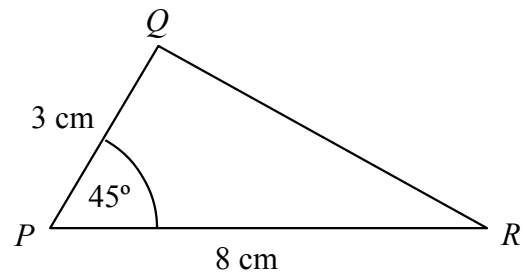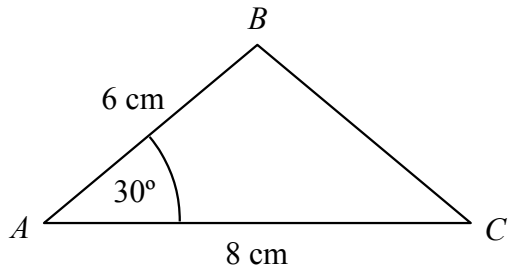How much does Henrik earn in the week before Christmas?

£...

(Total for Question 14 is 4 marks)

15 (a) Complete this table of exact values.

sin 0º	sin 30º	sin 45º	sin 60º	sin 90º
0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$		

(1)

(b) Triangles *ABC* and *PQR* are shown below.

By working out the exact area of each triangle, find out which one has the larger area.

....

(3)

(Total for Question 15 is 4 marks)

16 The functions f and g are defined as follows.

$$f(x) = 3x - 1 \qquad g(x) = \frac{x + 3}{2}$$

Evaluate

(a) fg(5),

....
(2)

(b) $g^{-1}(-2)$.

....
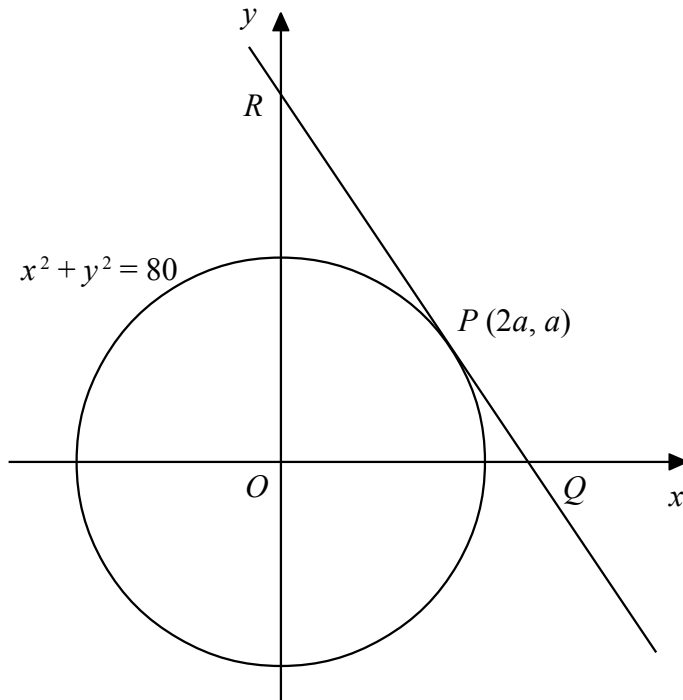(2)

(Total for Question 16 is 4 marks)

17 David says

"The value of $\sqrt{x}$ is greater than the value of $\sqrt[4]{x}$ for all positive values of x."

Decide whether or not David is correct.
Show working to justify your answer.

(Total for Question 17 is 2 marks)
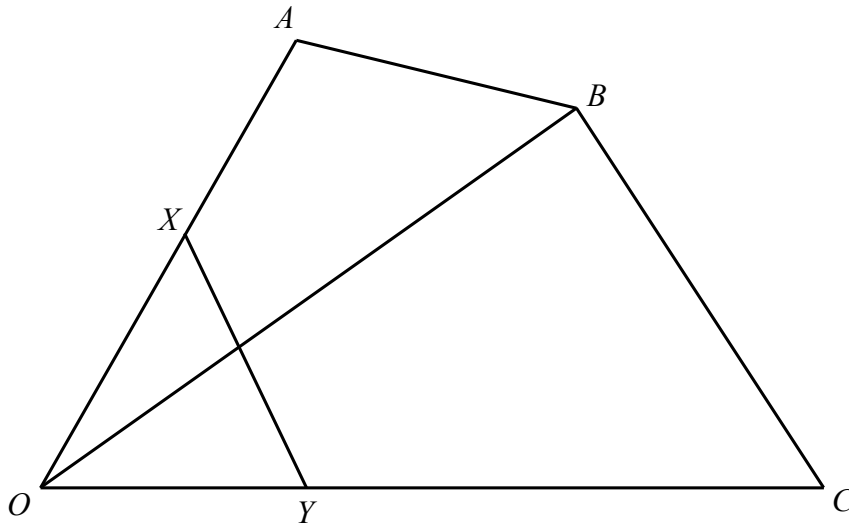
18

$x^2 + y^2 = 80$

A circle has the equation $x^2 + y^2 = 80$.
The centre of the circle is the origin, O.

The point P on the circle has coordinates $(2a, a)$ where a is a positive constant.
The tangent to the circle at P crosses the x-axis at the point Q and crosses the y-axis at the point R.

Work out the area of triangle OQR.

....

(Total for Question 18 is 5 marks)

19

Quadrilateral *OABC* is shown above.

$\overrightarrow{OA} = 4\mathbf{p}$, $\overrightarrow{OB} = 3\mathbf{p} + 3\mathbf{q}$ and $\overrightarrow{OC} = 6\mathbf{q}$.

X is the midpoint of *OA*.
Y is the point on *OC* such that $YC = 2OY$.

(a)   Express $\overrightarrow{XY}$ in terms of **p** and **q**.

....

(2)

(b)   Show that *BC* is parallel to *XY*.

(2)

(Total for Question 19 is 4 marks)

20 (a) (i) Express $x^2 + 4x - 3$ in the form $(x + p)^2 + q$.

....
(2)

(ii) Hence, solve the equation

$$x^2 + 4x - 3 = 0$$

....
(1)

(b) The solutions of the equation $y^2 + ay + b = 0$ are

$$y = 1 + \sqrt{2} \quad \text{and} \quad y = 1 - \sqrt{2}$$

Find the values of the integers a and b.

$a =$ ....

$b =$ ....
(3)

(Total for Question 20 is 6 marks)

TOTAL FOR PAPER IS 80 MARKS