For **OCR**

H

GCSE (9–1) Mathematics
Paper 5 (Higher Tier)

Churchill Paper 5D

Time allowed: 1 hour 30 minutes

You may use:
- Geometrical instruments
- Tracing paper

Do not use:
- A calculator

Name	
Class	

INSTRUCTIONS

- Use black ink. You may use an HB pencil for graphs and diagrams.
- Write your name and class in the boxes above.
- Answer **all** the questions.
- Read each question carefully before you start your answer.
- Where appropriate, your answers should be supported with working. Marks may be given for a correct method even if the answer is incorrect.
- Write your answer to each question in the space provided.

INFORMATION

- The total mark for this paper is **100**.
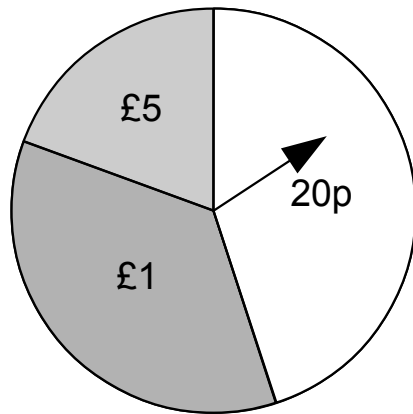- The marks for each question are shown in brackets **[ ]**.

Churchill Maths

Written by Shaun Armstrong

Only to be copied for use in a single school or college having purchased a licence

1

Not to scale

A spinner at a fairground game has three sections.

According to which section the spinner lands on, a player wins 20p, £1 or £5.
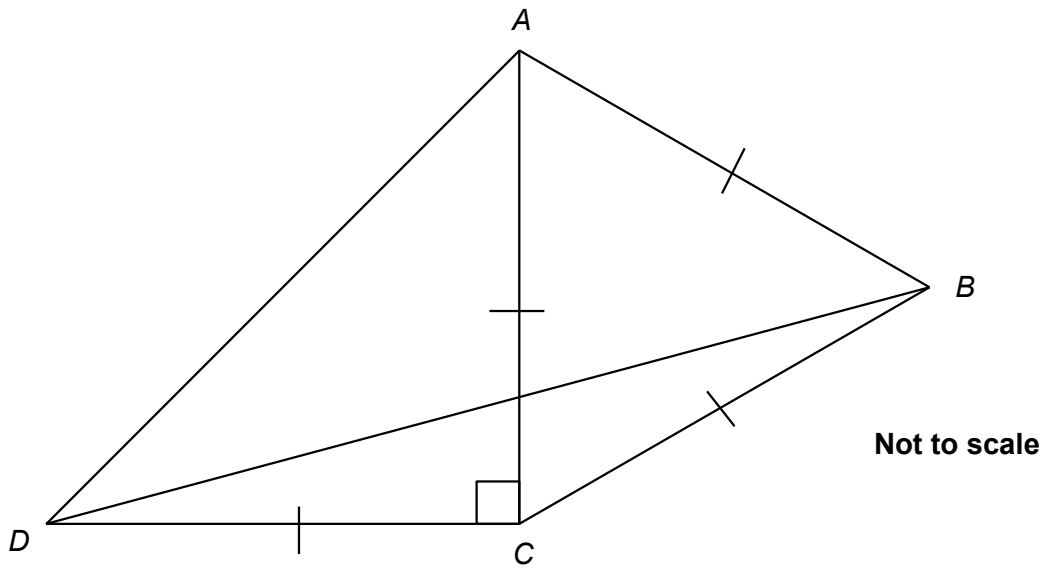
The probability of a player winning 20p is 0.48

The probability of winning £1 is three times the probability of winning £5.

Work out the probability of winning £1.

.... **[3]**

2

Not to scale

ABCD is a quadrilateral.

The lengths *AB*, *AC*, *BC* and *CD* are all equal.

Angle *ACD* = 90º.

Prove that angle *ADB* = 30º.

[5]

3   **(a)**   Work out

$$3\frac{1}{5} \div 1\frac{1}{5}$$

Give your answer as a simplified mixed number.

(a) .... **[3]**

(b)   Work out

0.24 × 5.3

(b) .... **[3]**

© Churchill Maths Limited
Licensed to Thomas Telford School

4 The number of marbles Elsie, Fiona and Greta have are in the ratio 6 : 7 : 11

They decide to play a game.
During the game, the total number of marbles they have doesn't change.

At the end of the game, Elsie has half of all the marbles.
The number of marbles Fiona and Greta have are in the ratio 5 : 4

Find out if Fiona has more, less or the same number of marbles as she had before the game.
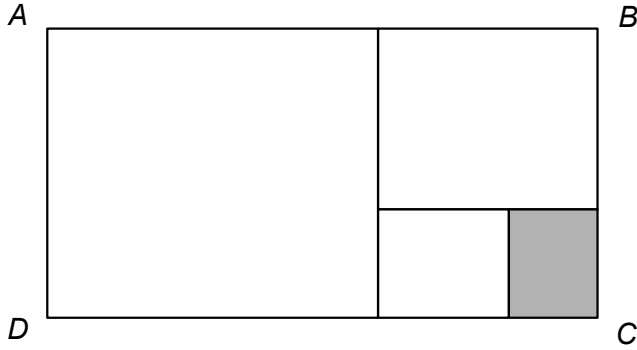
Show your working clearly.

.... **[5]**

5 Hayfa bought 3 boxes of *Cornpops* and 1 box of *Wheatrings* for a total cost of £8.
Jim bought 2 boxes of *Cornpops* and 4 boxes of *Wheatrings* for a total cost of £14.

Work out the difference in price between a box of *Cornpops* and a box of *Wheatrings*.

.... **[5]**

© Churchill Maths Limited

6

Not to scale

The diagram shows rectangle *ABCD*.

A line is drawn parallel to *AD* that divides the area of rectangle *ABCD* in the ratio 3 : 2

In the same way, the smaller of the two rectangles formed is also divided in the ratio 3 : 2

Finally, the smaller rectangle formed is again divided in the ratio 3 : 2

Find the ratio of the area of the smallest rectangle formed (shaded on the diagram) to the area of rectangle *ABCD*.

Give your answer in the form *p* : *q* where *p* and *q* are integers.

.... **[4]**

© Churchill Maths Limited
Licensed to Thomas Telford School

7 **(a)** Write down the integer n such that

$$n < \sqrt{41} < n + 1$$

(a) .... **[1]**

(b) Write down the integer m such that

$$m < \sqrt{89} < m + 1$$

(b) .... **[1]**

(c) Given that $3649 = 41 \times 89$, use your answers to parts (a) and (b) to find an integer x such that

$$x < \sqrt{3649} < x + 16$$

(c) .... **[2]**

© Churchill Maths Limited
Licensed to Thomas Telford School

8 **(a)** A snail is travelling at 0.4 millimetres per second.

Work out the snail's speed in metres per hour.

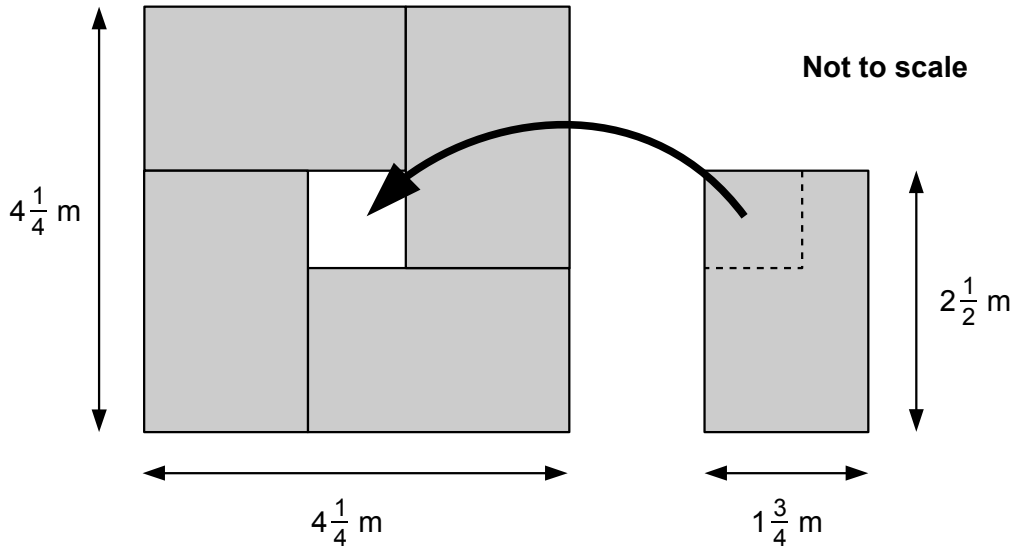**(a)** .... m/h **[2]**

(b) A car is travelling at *x* kilometres per hour.

Find the car's speed, in terms of *x*, in metres per second.

Give your answer in its simplest form.

(b) .... m/s **[3]**

9

Not to scale

$4\frac{1}{4}$ m

$4\frac{1}{4}$ m

$2\frac{1}{2}$ m

$1\frac{3}{4}$ m

Tish is making a square table top.

She has 5 rectangular pieces of wood, each measuring $2\frac{1}{2}$ m by $1\frac{3}{4}$ m.

Tish arranges 4 of the pieces of wood as shown, making a square of side $4\frac{1}{4}$ m.
She then cuts a square from the remaining piece of wood to fill the hole in the middle.

Work out the fraction of the 5th piece of wood that is left over.

.... **[5]**

10 The table gives information on some government revenue over a five-year period.

Source	Total revenue over five years
Income Tax	£824 billion
Corporation Tax	£197 billion
Council Tax	£148 billion

(a) Write the number 824 billion in standard form.

(a) .... **[1]**

(b) Work out how much more was raised over these five years from corporation tax than from council tax.
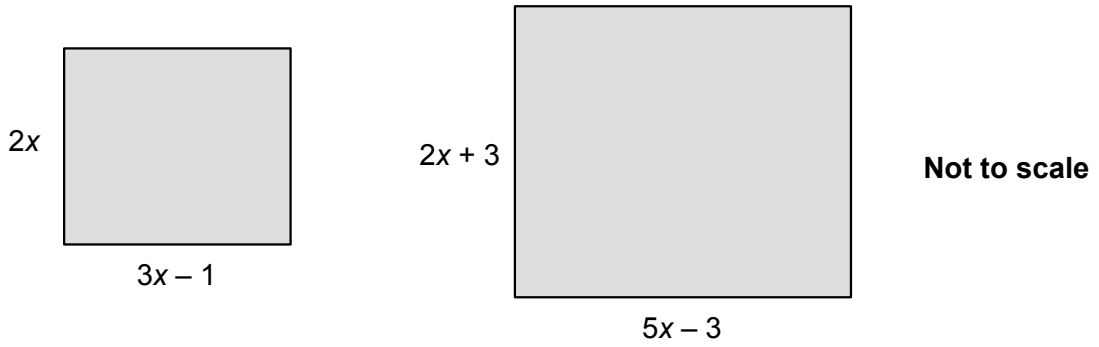
Give your answer in pounds in standard form.

(b) £ .... **[2]**

(c) Work out the mean amount raised from council tax per year during this period.

Give your answer in pounds in standard form.

(c) £ .... **[2]**

11

2x

3x – 1

2x + 3

5x – 3

Not to scale

The diagram shows two rectangles that are mathematically similar.
All measurements are in centimetres.

(a) Show that $4x^2 - 13x + 3 = 0$

[4]

(b) Find the value of x.

(b) .... **[2]**

© Churchill Maths Limited
Licensed to Thomas Telford School

12
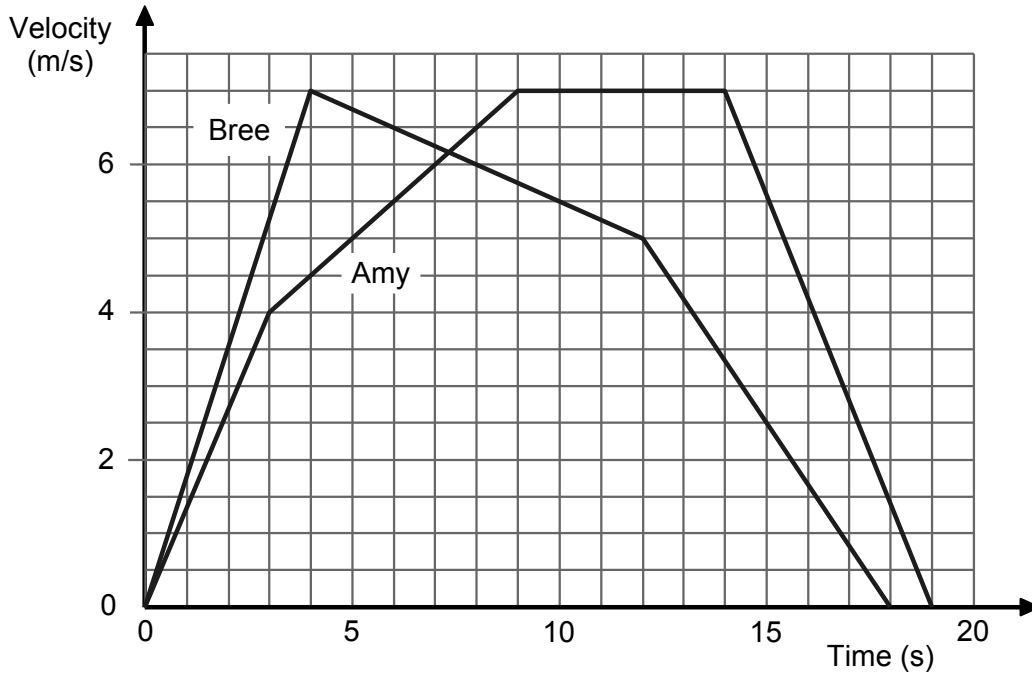
Amy and Bree run a race over 60 metres.

The velocity-time graph from the start of the race is shown above.

(a) Who is running fastest after 6 seconds?

Explain how you know.

....

.... **[1]**

(b) Work out how long Amy takes to run 60 metres.

(b) .... s **[4]**

© Churchill Maths Limited
Licensed to Thomas Telford School

(c) Show that Bree wins the race.

[2]

13 Make x the subject of

$$y = \frac{x + 4}{2x - 5}$$

.... **[3]**
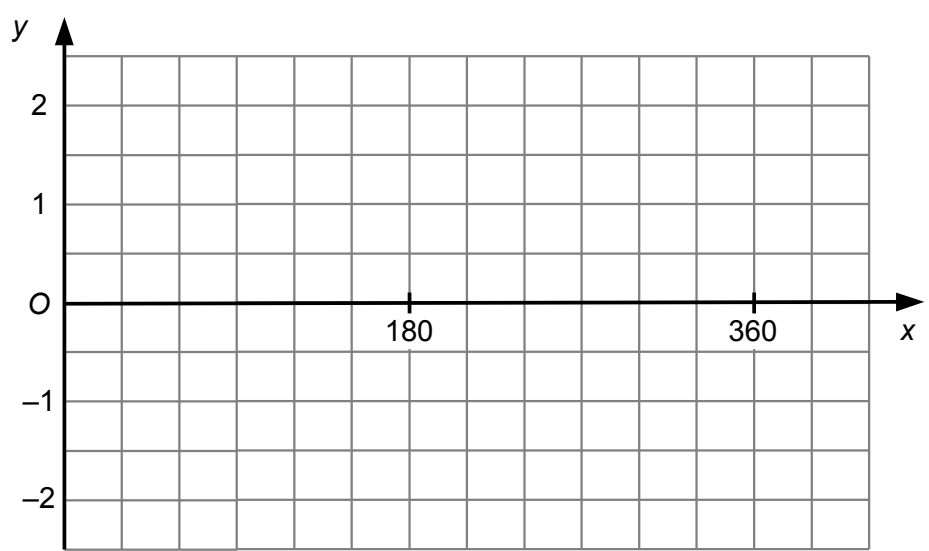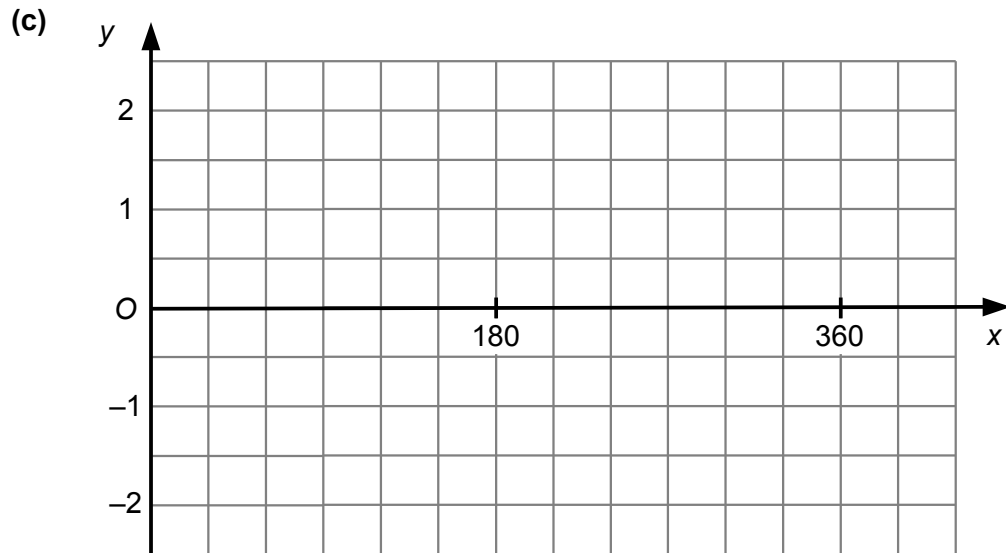
14 **(a)**
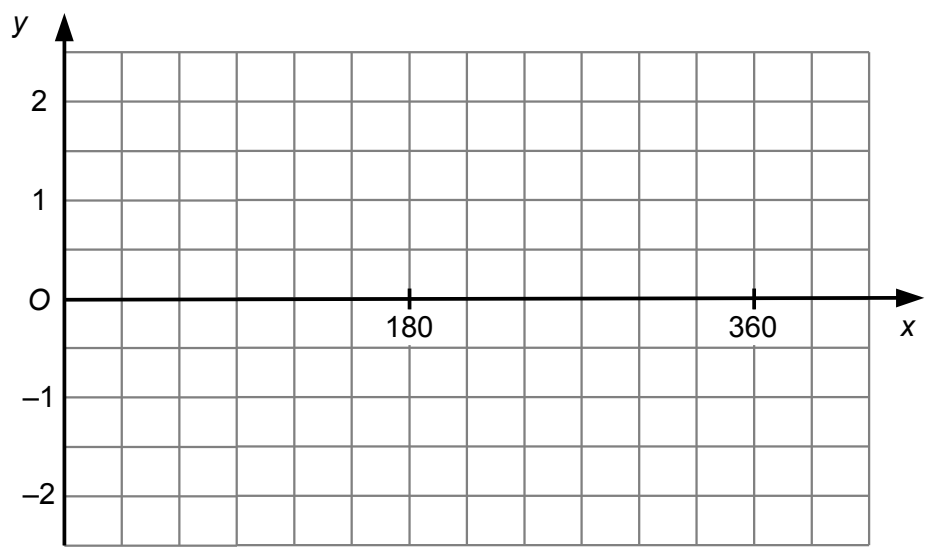
On the grid above, sketch the graph of $y = \sin x^\circ$ for $0 \leq x \leq 360$.

[2]

(b)

On the grid above, sketch the graph of $y = -\cos x^\circ$ for $0 \leq x \leq 360$.

[2]

© Churchill Maths Limited
Licensed to Thomas Telford School

(c)

On the grid above, sketch the graph of $y = \sin(x - 60)°$ for $0 \le x \le 360$.

[2]

15 Prove that the difference between the squares of two consecutive even numbers is equal to twice the sum of the two numbers.

[4]

16 **(a)** n is an integer such that

$$-4 \leq 2n < 8$$

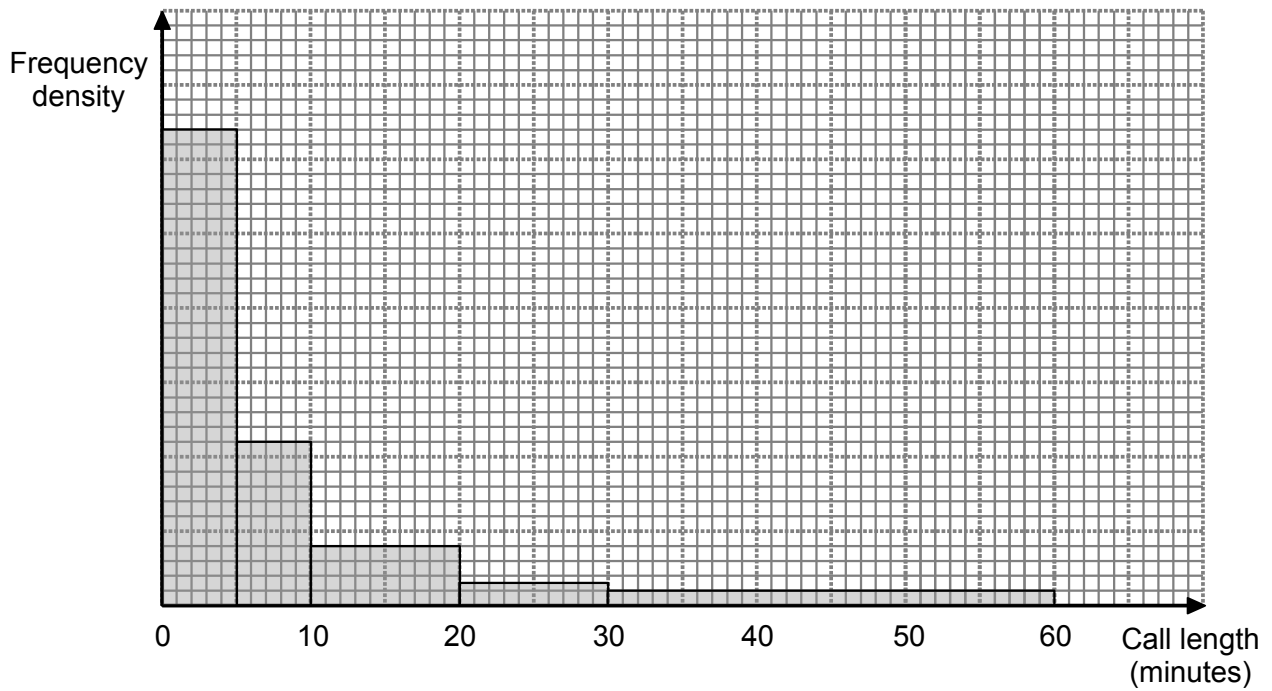Write down all the possible values of n.

(a) .... **[2]**

(b) Find the solution set of the inequality

$$2y^2 - 3y \leq 14$$

(b) .... **[4]**

17 The histogram shows information about the length of Paula's phone calls one week.

9 of Paula's calls lasted more than 20 minutes.

(a) Calculate an estimate for the number of Paula's calls that lasted less than 3 minutes.
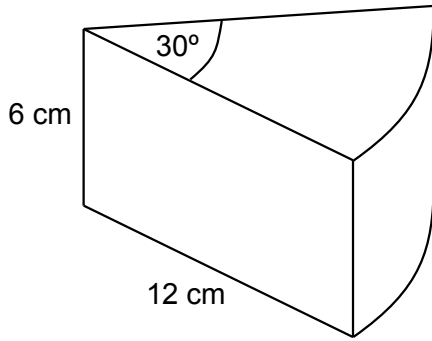
(a) .... [4]

(b) Is your answer to part **(a)** likely to be an overestimate or an underestimate?

Explain why, using the histogram to justify your answer.

....

....

....

.... [2]

18

Not to scale

A piece of cake is in the shape of a prism.

The cross-section of the prism is a sector of a circle of radius 12 cm.
The angle at the centre of the sector is 30º.

The height of the piece of cake is 6 cm.

(a) Show that the volume of the piece of cake is 72π cm^3.

[3]

(b) Find the surface area of the piece of cake, giving your answer in the form $(a + b\pi)$ cm^2, where a and b are integers.

(b) .... cm^2 **[4]**

© Churchill Maths Limited
Licensed to Thomas Telford School

19 A kitchen cupboard only has tins of beans, sweetcorn and tomatoes.

The table shows the probability of each type of tin being chosen when a tin is picked at random from the cupboard.

Tin	Beans	Sweetcorn	Tomatoes
Probability	x	$2x^2$	$x(x + 1)$

(a) Find the value of x.

(a) .... **[4]**

A tin is picked at random from the cupboard.

(b) Given that the tin does not contain tomatoes, find the probability that it contains beans.

(b) .... **[4]**

© Churchill Maths Limited