

For **AQA**

Name

Class

**GCSE**  
**Mathematics**  
**Specification**  
Paper 1 Higher Tier

**H**

Churchill Paper 1E

1 hour 30 minutes

**Materials**

**For this paper you must have:**

- mathematical instruments

You must **not** use a calculator



**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.



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Answer **all** questions in the spaces provided.

**1** Work out  $3 \times 1.2 + 1.6 \div 2$

Circle the answer.

[1 mark]

4.4

4.2

3.8

2.6

**2** Work out  $\frac{3}{5} - \frac{2}{9}$

Circle the answer.

[1 mark]

$-\frac{1}{4}$

$\frac{1}{45}$

$\frac{6}{45}$

$\frac{17}{45}$

**3** Circle the coordinates of the turning point of the curve with equation  $y = (x + 3)^2 + 1$

[1 mark]

(3, 1)

(3, -1)

(-3, 1)

(-3, -1)

4 Circle the number with the largest value.

[1 mark]

$$\sqrt{65}$$

$$\frac{1}{0.09}$$

7.9

$$(2.1)^3$$

5 At a party, each child had chocolate, strawberry or vanilla ice cream.

The ratio of the number who had chocolate to the number who had strawberry was 5 : 4

The ratio of the number who had strawberry to the number who had vanilla was 3 : 2

Find the ratio of the number who had chocolate to the number who had vanilla.

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

[3 marks]

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Answer \_\_\_\_\_



7 Liam plans to get fit using a treadmill.

In the first week of the year, he will spend 1 hour on the treadmill.  
Each week, he will increase the amount of time he spends on it by 10 minutes.  
For example, in the second week of the year, he will spend 1 hour 10 minutes on the treadmill.

7 (a) Work out how long Liam spends on the treadmill in the fifth week of the year. **[2 marks]**

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Answer \_\_\_\_\_

7 (b) Work out in which week of the year Liam spends 3 hours on the treadmill. **[2 marks]**

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Answer \_\_\_\_\_

Liam's friend Naz says

“It's impossible to keep increasing the time like that for a year – there aren't enough hours in a week!”

7 (c) Is Naz correct?  
Use calculations to show how you decide. **[3 marks]**

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Answer \_\_\_\_\_

8 (a) Solve the inequality  $\frac{1}{2}x + 9 > 3(x - 2)$

[2 marks]

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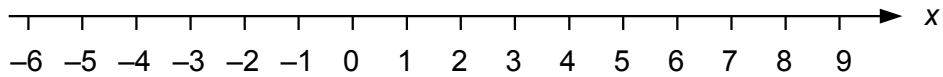
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Answer \_\_\_\_\_

8 (b) Represent your solution to part (a) on this number line.



[1 mark]

8 (c) Solve the inequality  $x^2 \geq 16$

[2 marks]

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Answer \_\_\_\_\_

9 Circle the best estimate for the value of

$$\frac{\sqrt{26} + 1.98}{(5.9)^2 - 8.3}$$

[1 mark]

-8

-3.5

0.25

1.4

10 Jen spends  $\frac{3}{8}$  of her income on rent.

$\frac{6}{11}$  of the money she has left after paying rent goes on food and other living expenses.

She saves the rest of her income.

Work out the fraction of her total income that Jen saves.

[3 marks]

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Answer \_\_\_\_\_

- 11** Tim owns 140 books.  
Each book is either fiction or non-fiction.  
Also, each book has either a paperback or a hardback cover.

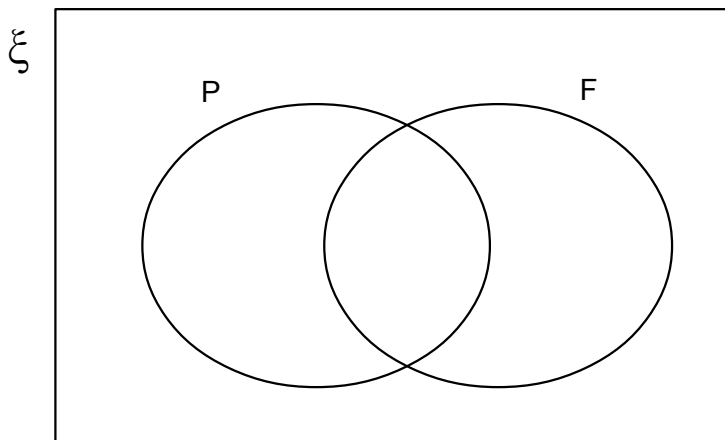
80 of Tim's books are fiction books with a paperback cover.  
1 in 7 of his books are non-fiction books with a hardback cover.  
The total number of fiction books is 10 more than the total number of books with a paperback cover.

- 11 (a)** Complete the Venn diagram representing this information.

$\xi$  = books that Tim owns

P = books with a paperback cover

F = fiction books



**[3 marks]**

- 11 (b)** Elisha picks one of Tim's books at random.

The one she picks has a hardback cover.

Find the probability that it is a non-fiction book.

**[1 mark]**

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Answer \_\_\_\_\_



12 The functions  $f$  and  $g$  are such that

$$f(x) = \frac{x + 1}{2} \quad \text{and} \quad g(x) = \frac{3}{x}$$

Find the value of

12 (a)  $f(11)$

[1 mark]

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Answer \_\_\_\_\_

12 (b)  $g^{-1}(9)$

[2 marks]

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Answer \_\_\_\_\_

12 (c)  $gf\left(\frac{1}{2}\right)$

[2 marks]

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Answer \_\_\_\_\_

**13 (a)** There are three-quarters of a million bacteria in a dish.

The number of bacteria doubles every 40 minutes.

Circle the number of bacteria there will be in the dish after 4 hours.

**[1 mark]**

12 million

24 million

48 million

96 million

**13 (b)** The value, £ $P$ , of a car after  $T$  years is given by the formula

$$P = 8000 \times 0.63^T$$

Circle the annual percentage decrease in the value of the car.

**[1 mark]**

0.63%

37%

50.4%

63%

14 Express as a single number in standard form

14 (a)  $(9.3 \times 10^7) + (8 \times 10^6)$

[2 marks]

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Answer \_\_\_\_\_

14 (b)  $\frac{4.2 \times 10^4}{1.4 \times 10^{-6}}$

[2 marks]

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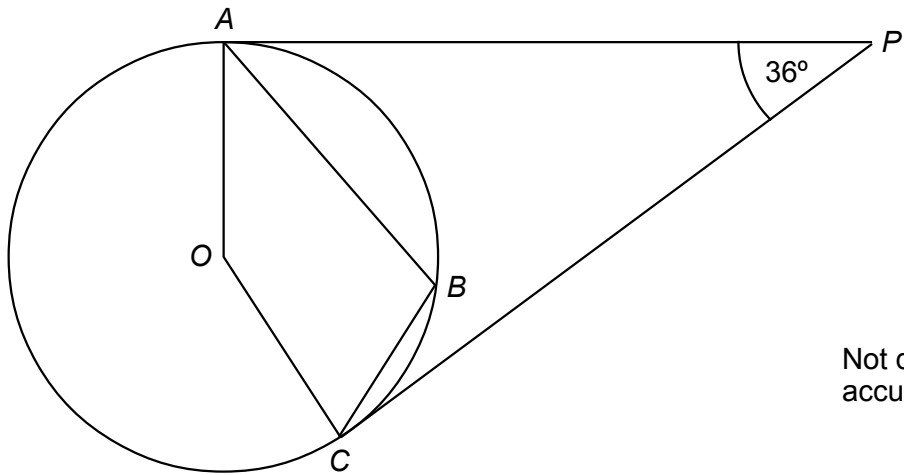
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Answer \_\_\_\_\_

15



Not drawn accurately

The points  $A$ ,  $B$  and  $C$  lie on the circumference of a circle, centre  $O$ .

$PA$  and  $PC$  are tangents to the circle.

Angle  $APC = 36^\circ$ .

Prove that angle  $ABC = 108^\circ$ .

[3 marks]

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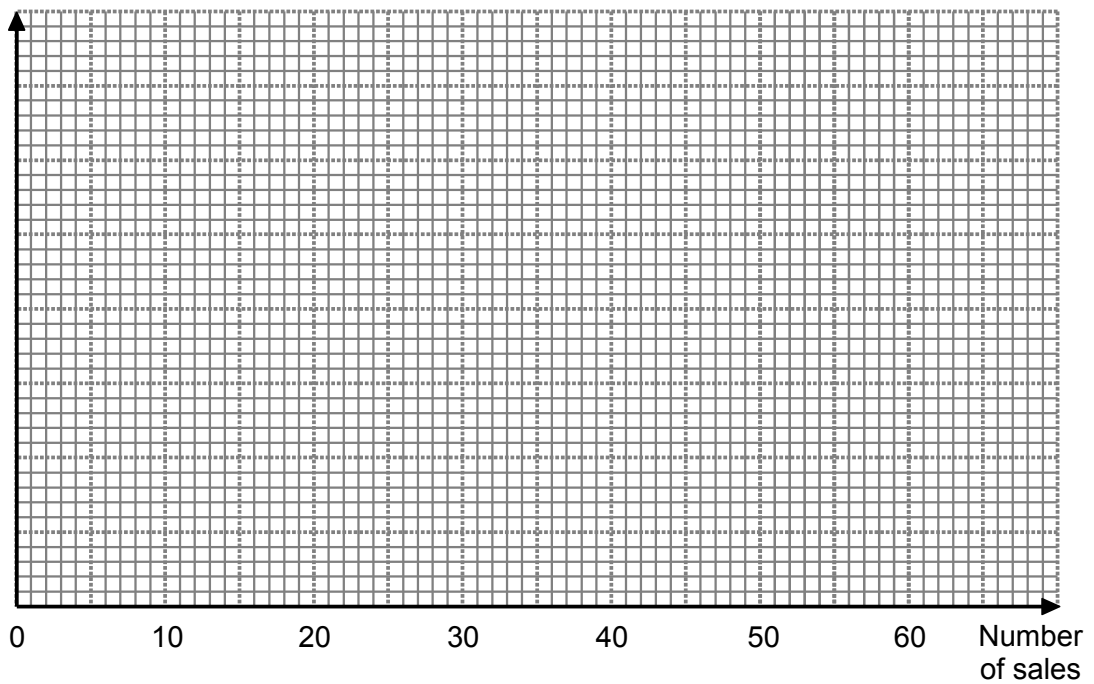
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- 17 A company places an advert for its coffee machine in a magazine to try and increase sales. This table shows information about sales of the machine in the 30 days before the advert runs.

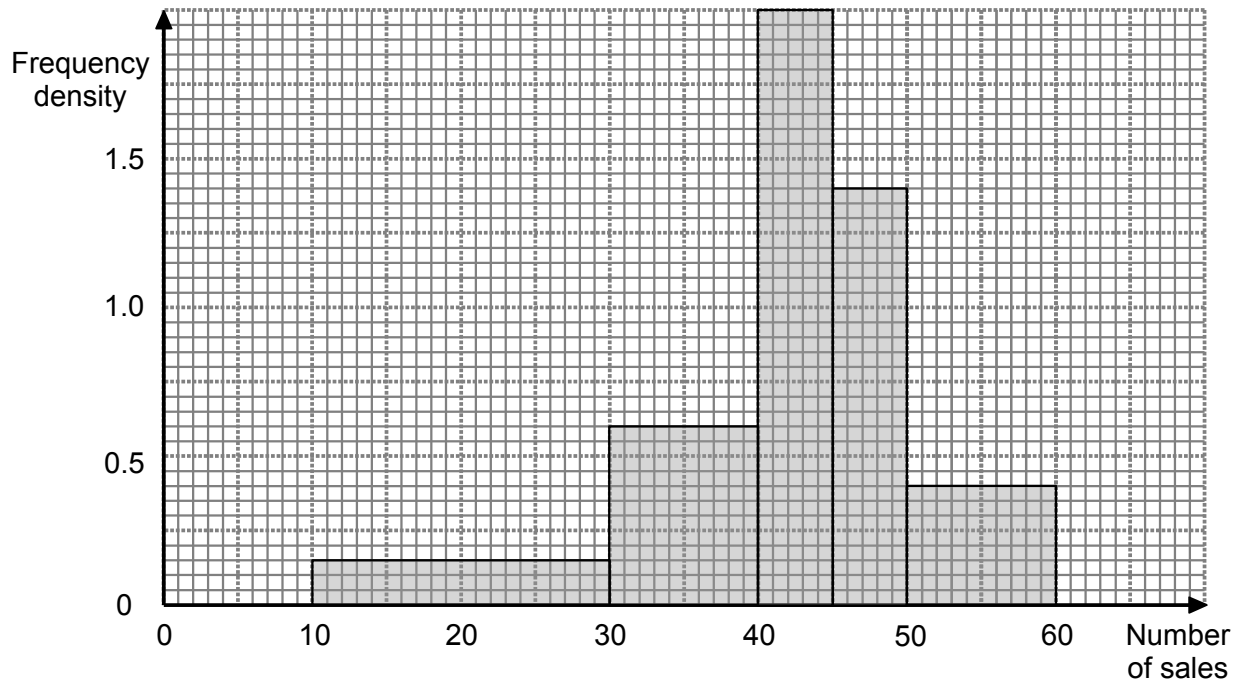
Number of sales ( $S$ )	Number of days
$10 \leq S < 30$	5
$30 \leq S < 40$	8
$40 \leq S < 45$	9
$45 \leq S < 50$	6
$50 \leq S < 60$	2

- 17 (a) On the grid, draw a histogram for the information in the table.



[3 marks]

The histogram on the next page shows information about sales of the machine in the 30 days after the advert runs.



17 (b) By comparing the two histograms, comment on whether or not the advert has been successful. [1 mark]

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17 (c) For the 30 days after the advert, estimate the number of days on which the company sold 35 or more coffee machines. [2 marks]

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Answer \_\_\_\_\_ days

17 (d) Explain why your answer to part (c) is only an estimate. [1 mark]

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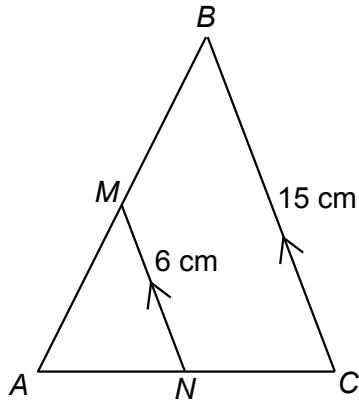


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19



Not drawn accurately

Circle the ratio of the area of triangle  $AMN$  to the area of quadrilateral  $BCNM$ .

[1 mark]

2 : 5

4 : 21

4 : 25

8 : 117

20 (a) Evaluate  $27^{\frac{2}{3}}$

[2 marks]

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Answer \_\_\_\_\_

20 (b) Find the value of  $x$  for which

$$25^x = 5^{\frac{7}{2}} \times 125^{-\frac{1}{3}}$$

[3 marks]

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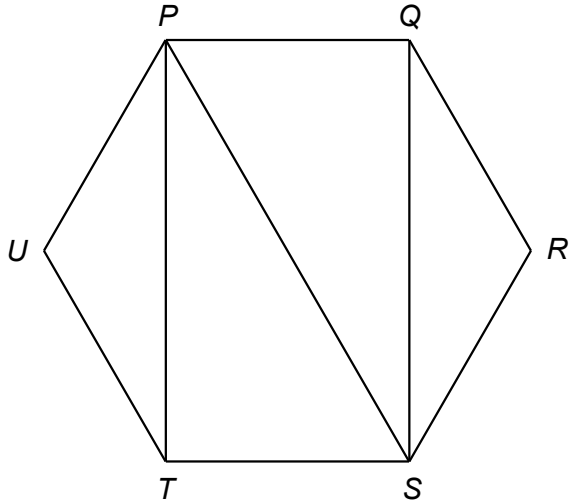
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Answer \_\_\_\_\_

21



Not drawn accurately

$PQRSTU$  is a regular hexagon.

Prove that triangle  $PQS$  is congruent to triangle  $STP$ .

**[3 marks]**

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