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Centre number

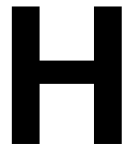
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# GCSE MATHEMATICS



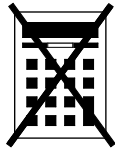
Higher Tier Paper 1 Non-Calculator

Tuesday 6 November 2018 Morning Time allowed: 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.
- Fill in the boxes at the top of this 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.
- Do all rough work in this book. Cross through any work you do not want to be marked.

### Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 80.
- You may ask for more answer paper, graph paper and tracing paper. These must be tagged securely to this answer book.

For Examiner's Use	
Pages	Mark
2–3	
4–5	
6–7	
8–9	
10–11	
12–13	
14–15	
16–17	
18–19	
20–21	
22–23	
<b>TOTAL</b>	

### Advice

In all calculations, show clearly how you work out your answer.



N 0 V 1 8 8 3 0 0 1 H 0 1

Answer **all** questions in the spaces provided

- 1 Simplify  $(5^4)^2$   
Circle your answer. [1 mark]

$5^6$

$5^8$

$25^6$

$25^8$

- 2 Circle the volume, in  $\text{cm}^3$ , of a cylinder with radius 5 cm and height 8 cm [1 mark]

$40\pi$

$80\pi$

$200\pi$

$1600\pi$

- 3 Simplify  $16a^2 \div a + 3a \times 2$   
Circle your answer. [1 mark]

$22a$

$8a$

$38a$

$2a$



4 Circle the value of  $\cos 30^\circ$

[1 mark]

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

$$\frac{\sqrt{3}}{2}$$

$$0$$

$$1$$

5 Work out  $8\frac{1}{2} \div 2\frac{2}{3}$

Give your answer as a mixed number.

[4 marks]

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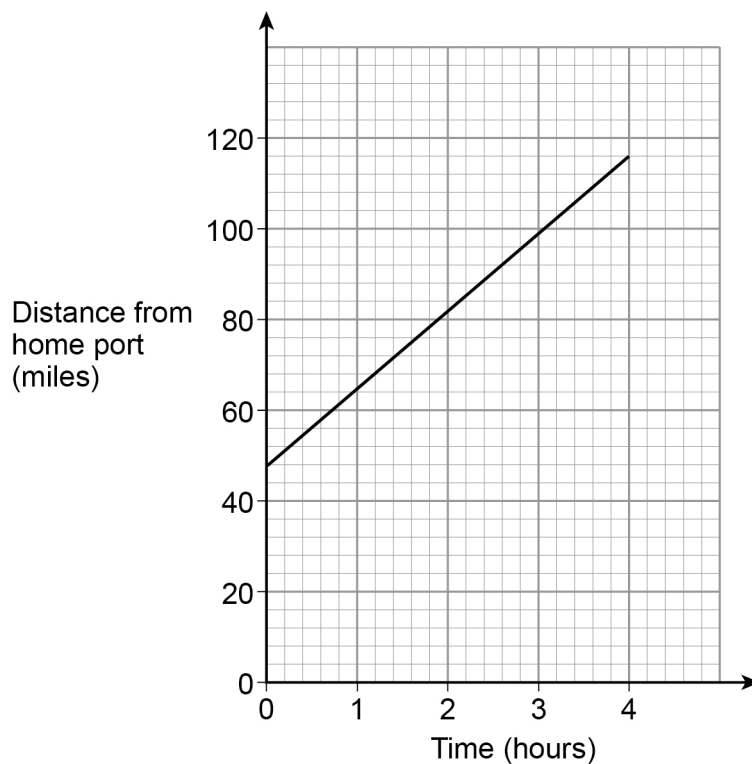
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Answer \_\_\_\_\_



Do not write  
outside the  
box

- 6 A ship is sailing in a straight line from its home port.  
The distance-time graph shows 4 hours of the journey.



Work out the speed of the ship during these 4 hours.

[3 marks]

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Answer \_\_\_\_\_ mph



7 The sum of the angles in any quadrilateral is  $360^\circ$

For example, in a rectangle  $4 \times 90^\circ = 360^\circ$

Zak writes,

$5 \times 90^\circ = 450^\circ$  so the sum of the angles in any pentagon must be  $450^\circ$

Is he correct?

Tick a box.

Yes

No

Show working to support your answer.

[2 marks]

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Turn over for the next question



- 8** Kim works at an airport in the UK.  
She records the number of planes landing between 10 am and 2 pm each day.  
The table shows the data for the first 10 days in January.

Day	1	2	3	4	5	6	7	8	9	10
Number of planes	148	151	147	155	153	147	155	102	151	154

- 8 (a)** The airport was affected by fog on one of the days.

Which day do you think it was?

Give a reason for your answer.

**[1 mark]**

Day \_\_\_\_\_

Reason \_\_\_\_\_

\_\_\_\_\_

- 8 (b)** Kim uses the data to predict how many planes will land at the airport in a year.

In her method, she

uses an estimate of 150 planes in each 4-hour period throughout the day

assumes the same number of planes each day.

Work out her prediction.

**[3 marks]**

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Answer \_\_\_\_\_



**8 (c)** In fact,  
fewer planes land in winter than in summer  
fewer planes land at night than during the day.

What does this tell you about Kim's prediction?

Tick **one** box.

Her prediction is too low

Her prediction is too high

Her prediction could be too low or too high

Give a reason for your answer.

**[2 marks]**

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**Turn over for the next question**



9

$$\sqrt{6^2 + 8^2} = \sqrt[3]{125a^3}$$

Work out the value of  $a$ .**[4 marks]**

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Answer \_\_\_\_\_

10

Work out the percentage increase from 80 to 280

**[3 marks]**

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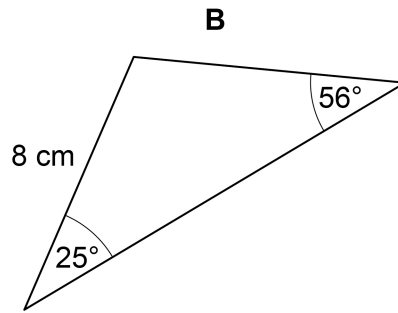
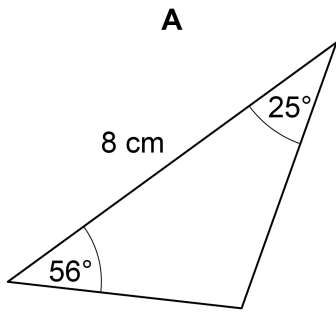
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Answer \_\_\_\_\_ %

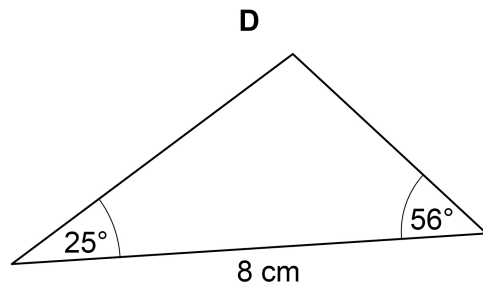
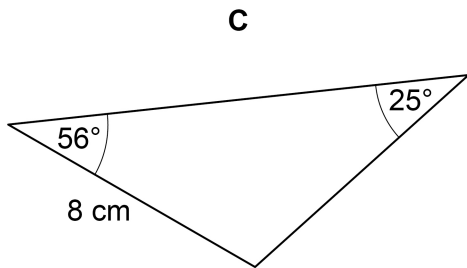




11 Here are four triangles.



Not drawn  
accurately



Which **two** triangles are congruent?  
Circle **two** letters below.

[1 mark]

A

B

C

D

Turn over for the next question



12 Solve  $x^2 - x - 12 = 0$

[3 marks]

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Answer \_\_\_\_\_

13  $e:f = 2:3$  and  $f:g = 5:4$

Work out  $e:g$

Give your answer in its simplest form.

[3 marks]

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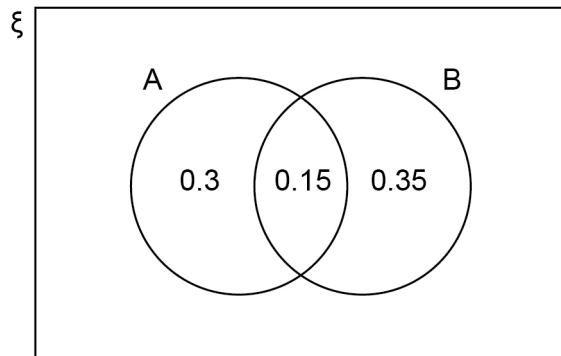
Answer \_\_\_\_\_ : \_\_\_\_\_



14

A and B are two events.

Some probabilities are shown on the Venn diagram.

Work out  $P(A' \cup B)$ **[2 marks]**

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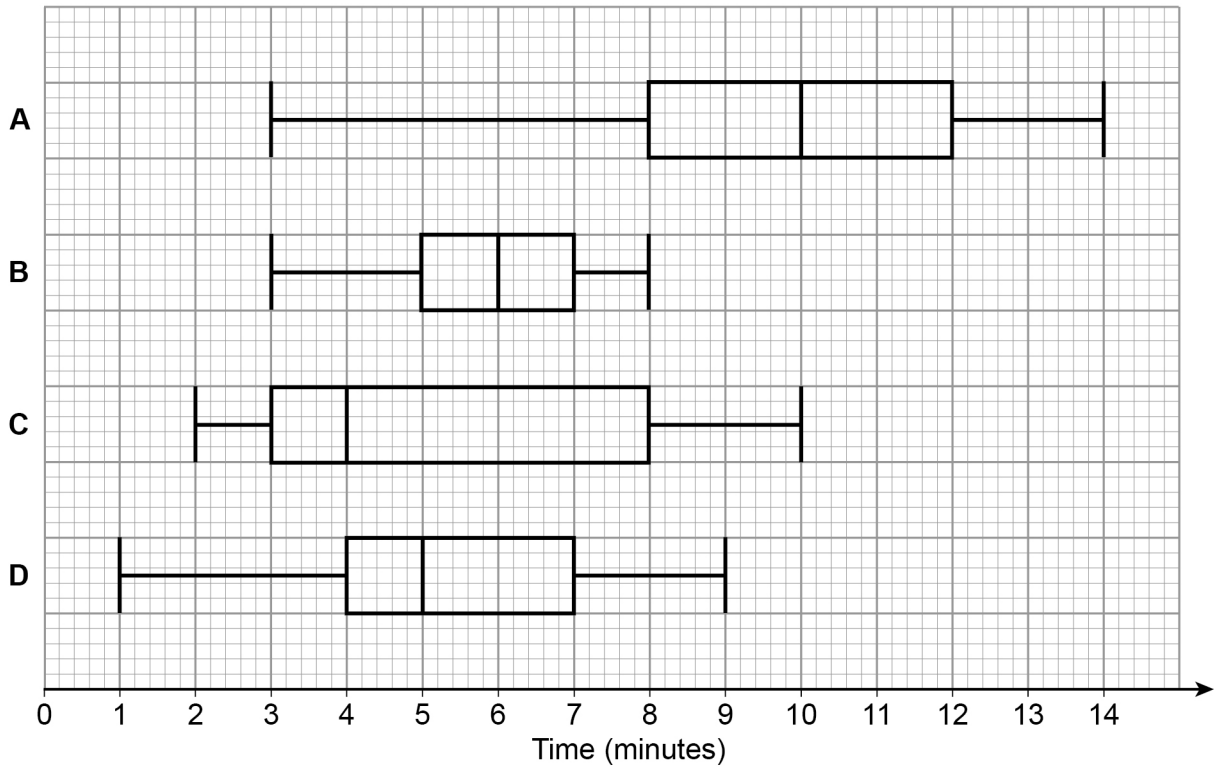
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Answer \_\_\_\_\_

**Turn over for the next question**

- 15** In a survey, queuing times at supermarket checkouts were recorded. One morning, samples of 50 customers were taken at supermarkets A, B, C and D. The box plots represent the results.

**Queuing times**



- 15 (a)** On average, which supermarket had the lowest queuing times?  
Give a reason for your answer.

**[2 marks]**

Supermarket \_\_\_\_\_

Reason \_\_\_\_\_

\_\_\_\_\_



- 15 (b)** At which supermarket were the queuing times most consistent?  
Give a reason for your answer.

**[2 marks]**

Supermarket \_\_\_\_\_

Reason \_\_\_\_\_

\_\_\_\_\_

- 16** Circle the number that is closest to the value of  $29^3$

**[1 mark]**

27 000

90

2700

9000

- 17** Work out the exact value of  $\left(\frac{3}{4}\right)^{-3}$

**[2 marks]**

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Answer \_\_\_\_\_

**Turn over for the next question**

7
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**Turn over ►**

18

Beth and Mia translate documents from Spanish into English.

A set of documents that would take Beth 8 days would take Mia 10 days.

Beth starts to translate the documents.

After 2 days Beth and Mia both work on translating the documents.

How many **more** days will it take to complete the work?

You **must** show your working.

[4 marks]

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



**19** In a chess club, there are  $x$  boys and  $y$  girls.

**19 (a)** If 5 more boys and 8 more girls join, there would be half as many boys as girls.

Show that  $y = 2x + 2$

**[2 marks]**

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**19 (b)** If instead,  
10 more boys and 1 more girl join, there would be the same number of boys and girls.

Work out  $x$  and  $y$ .

**[3 marks]**

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$x =$  \_\_\_\_\_

$y =$  \_\_\_\_\_



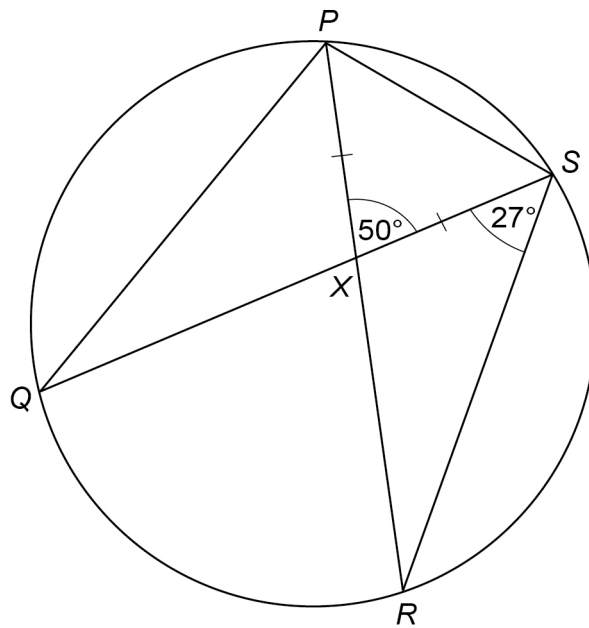
20

$P, Q, R$  and  $S$  are points on a circle.

$PXR$  and  $QXS$  are straight lines.

$PX = SX$

Not drawn  
accurately



Prove that  $QS$  is **not** a diameter of the circle.

[4 marks]

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**21** Here are the first four terms of a quadratic sequence.

11          26          45          68

Work out an expression for the  $n$ th term.

**[3 marks]**

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Answer \_\_\_\_\_

**Turn over for the next question**



22

Solve  $\frac{x}{x+4} + \frac{7}{x-2} = 1$

You **must** show your working.

**[4 marks]**

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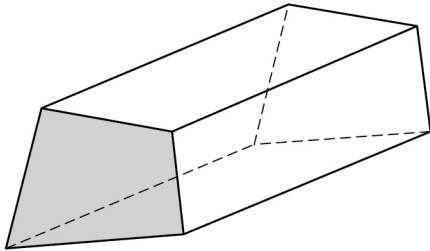
$x =$  \_\_\_\_\_



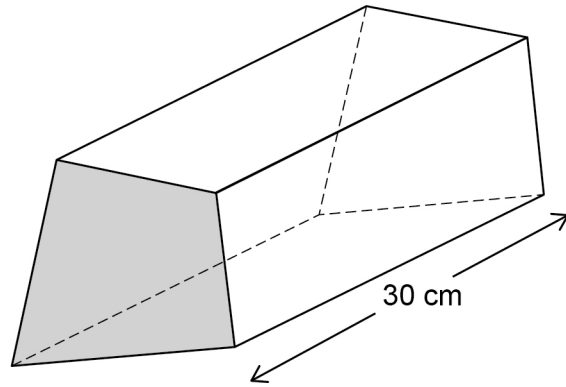
23

Prisms A and B are similar.  
The cross sections are shaded.

**Prism A**  
volume =  $480 \text{ cm}^3$



**Prism B**  
length = 30 cm



area of the cross section of A : area of the cross section of B = 4 : 9

Work out the area of the cross section of B.

[5 marks]

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Answer \_\_\_\_\_  $\text{cm}^2$



24

Show that  $\frac{2\sqrt{6}}{\sqrt{5}} - \frac{\sqrt{3}}{\sqrt{10}}$  can be written in the form  $\frac{c\sqrt{d}}{10}$

where  $c$  and  $d$  are integers.

**[3 marks]**

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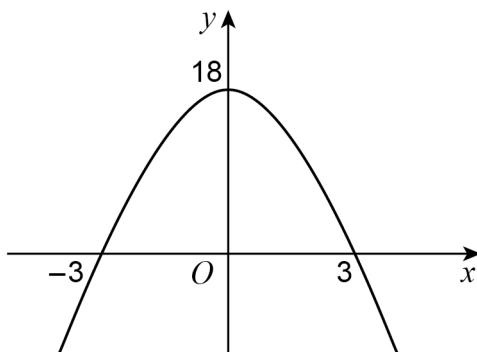
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25

A quadratic curve intersects the axes at  $(-3, 0)$ ,  $(3, 0)$  and  $(0, 18)$



Not drawn  
accurately

Work out the equation of the curve.

[3 marks]

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Answer \_\_\_\_\_

Turn over for the next question

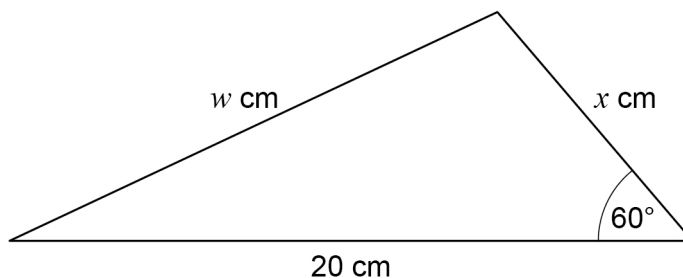


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26

The area of this triangle is  $25\sqrt{3} \text{ cm}^2$

Not drawn accurately



Work out the value of  $w$ .

Give your answer in the form  $a\sqrt{b}$  where  $a$  and  $b$  are integers greater than 1

[5 marks]

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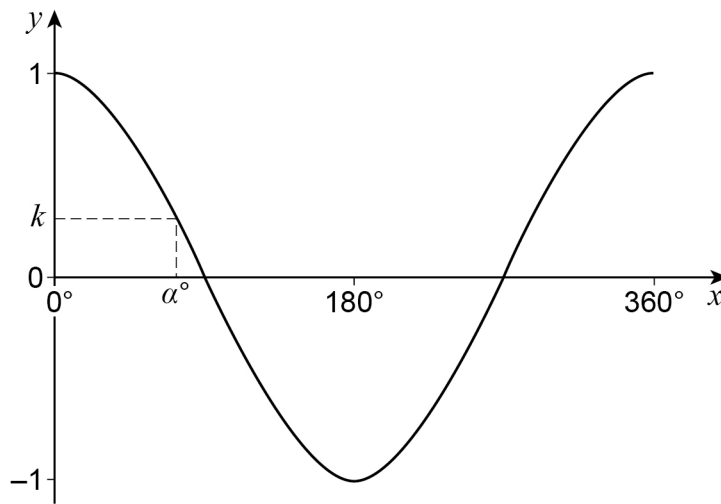
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Answer \_\_\_\_\_



27 Here is a sketch of  $y = \cos x$  for values of  $x$  from  $0^\circ$  to  $360^\circ$



Not drawn accurately

$\alpha^\circ$  is an acute angle.

$\cos \alpha^\circ = k$

27 (a) Circle the value of  $\cos (180^\circ - \alpha^\circ)$

[1 mark]

- $1 - k$                        $k$                        $-k$                        $-1 - k$

27 (b) Circle the value of  $\cos (360^\circ + \alpha^\circ)$

[1 mark]

- $k - 1$                        $k + 1$                        $-k$                        $k$

END OF QUESTIONS



**There are no questions printed on this page**

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outside the  
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