OXFORD

INTERNATIONAL AQA EXAMINATIONS

Please write clearly in block capitals.

Centre number | | | | | | Candidate number | | | | |

Surname _____

Forename(s) _____

Candidate signature _____

INTERNATIONAL GCSE

MATHEMATICS EXTENSION

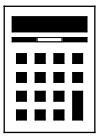
E

Paper 2E

Thursday 30 May 2019 07:00 GMT Time allowed: 2 hours

Materials

For this paper you must have:
- a calculator
- mathematical instruments.



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.
- If you need extra space for your answer(s), use the lined pages at the end of this book. Write the question number against your answer(s).
- 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 100.
- You may ask for more answer paper, graph paper and tracing paper. These must be tagged securely to this answer book.
- If your calculator does not have a π button, take the value of π to be 3.142

Advice
- Show all necessary working; otherwise marks for method may be lost.

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	
24–25	
26	
TOTAL	

Do not write outside the box

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

1 Circle the size of each **interior** angle in a regular hexagon.

[1 mark]

60° 108° 120° 135°

2 Circle the expression that is equivalent to $(3x^2)^3$

[1 mark]

$9x^5$ $9x^6$ $27x^5$ $27x^6$

3 Circle the equation that has the solution $x = -3$

[1 mark]

$(x - 3)^2 = 0$ $(x + 3)^2 = 0$

$(3x - 1)^2 = 0$ $(3x + 1)^2 = 0$

Do not write outside the box

4 Shape A is transformed to shape B by a reflection in $y = -5$

Circle the reverse transformation.

[1 mark]

reflection in $x = 5$ reflection in $x = -5$

reflection in $y = 5$ reflection in $y = -5$

5 Here are seven positive whole numbers.

4 10 16 4 9 a b

The mode is 4

The median is 9

The mean is 8

Work out **one** possible pair of values for a and b.

[3 marks]

$a =$ _____ $b =$ _____

7

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6 Each evening, Mia travels home by train or by bus.

Fares	
Train	$2.15
Bus	$1.80

For 30 days, the relative frequency of Mia travelling home by train was $\frac{1}{5}$

In total, how much did she pay to travel home for the 30 days?

[3 marks]

Answer $ _____

Do not write outside the box

7 Lee is training for a marathon.

In week 1 he runs 40 km

In week 2 he runs 55 km

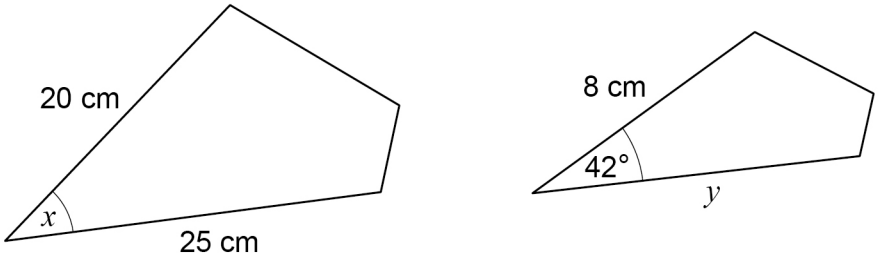
Work out the percentage increase in distance from week 1 to week 2

[3 marks]

Answer _____ %

8 Here are two similar shapes.

Not drawn accurately



Work out the values of x and y.

[3 marks]

$x =$ _____ ° $y =$ _____ cm

9

Turn over ►

Do not write outside the box

9 (a) Here are the first four terms of an arithmetic progression.

–10 –7 –4 –1

Circle the nth term.

[1 mark]

$3n - 7$ $-7 - 3n$ $3n - 13$ $-13 - 3n$

9 (b) A different arithmetic progression has nth term $8n + 5$

The sum of two consecutive terms is 130

Work out the values of the two terms.

[3 marks]

Answer _____ and _____

Do not write outside the box

10 For this question use a ruler and compasses.

Lizzie is sailing near three markers, *A*, *B* and *C*.

She is

closer to *AC* than to *AB*

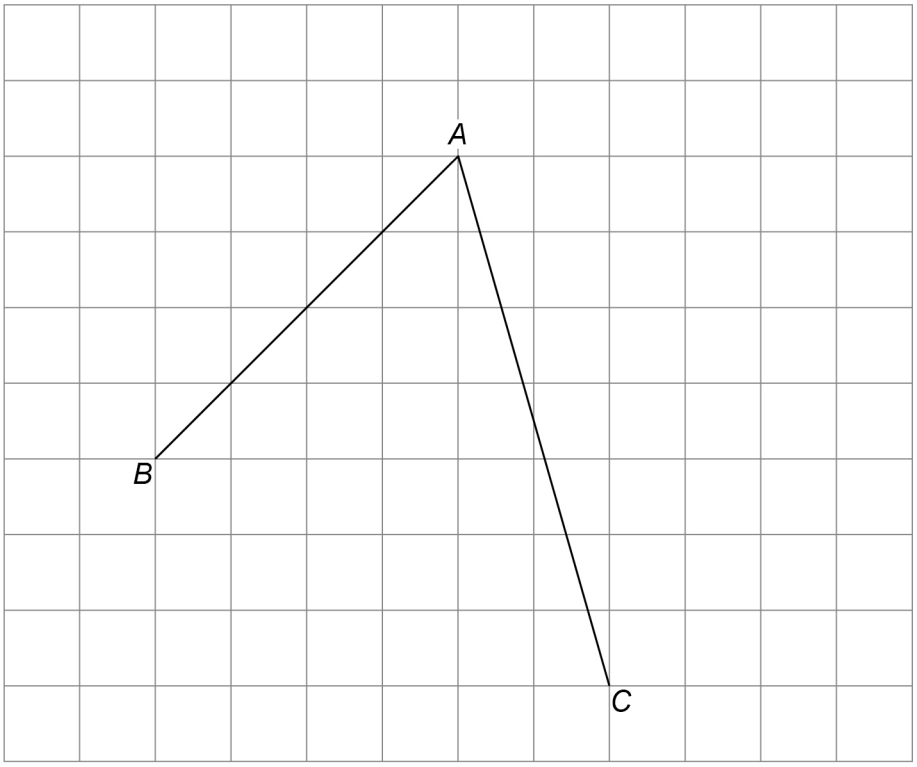
less than 400 m from *B*.

Construct the region where Lizzie could be.

Label this region R.

[4 marks]

Scale: 1 cm represents 100 m



Turn over for the next question

8

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11 250 students at a college were asked how many hours they studied each weekend.
The table shows the results.

Hours, h	Frequency
$0 \leqslant h < 2$	20
$2 \leqslant h < 4$	39
$4 \leqslant h < 6$	43
$6 \leqslant h < 8$	46
$8 \leqslant h < 10$	78
$h \geqslant 10$	24

11 (a) Work out the class interval that contains the median.

[1 mark]

Answer _____

11 (b) The college has 7500 students.

Estimate how many of these students study **less than** 2 hours each weekend.

[2 marks]

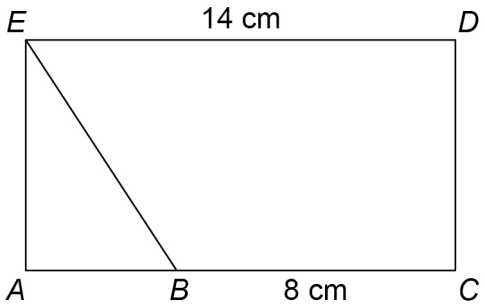
Answer _____

Do not write outside the box

12 *ACDE* is a rectangle.

Trapezium *BCDE* has area 55 cm^2

Not drawn accurately



Work out the area of triangle *ABE*.

[3 marks]

Answer _____ cm^2

Turn over for the next question

6

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13 A bottle with 500 ml of sunflower oil has mass 810 g

400 ml of the oil is used.

The bottle with the remaining oil has mass 442 g

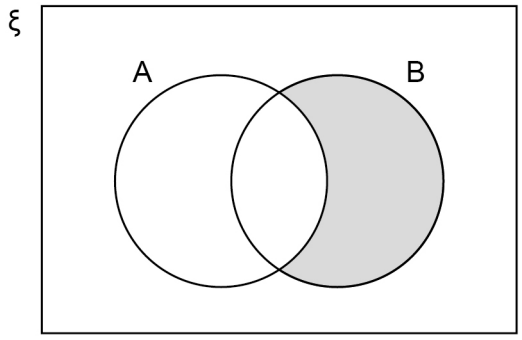
Work out the mass of the bottle.

[4 marks]

Answer _____ g

Do not write outside the box

14 (a) Here is a Venn diagram.



Which of these represents the shaded region?

Circle your answer.

[1 mark]

$A \cap B'$ $A' \cup B$ $A' \cap B$ $A \cup B'$

14 (b) $P = \{1, 3, 5, 7, 9\}$

$P \cap Q = \{5, 9\}$

$P \cup Q = \{1, 3, 5, 6, 7, 8, 9\}$

List all the elements of set Q.

[2 marks]

Answer _____

7

Do not write outside the box

15 Line L

is parallel to the line $y = 2x - 8$

passes through the point (4, 11)

Work out the equation of line L.

[2 marks]

Answer _____

16 Solve $\frac{x+2}{5} + \frac{x-3}{4} = 10$

[4 marks]

$x =$ _____

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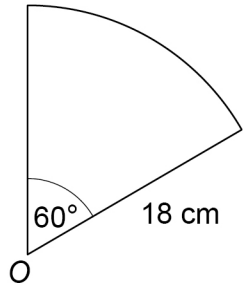
17 The diagram shows a sector of a circle, centre *O*.

Not drawn accurately



Work out the area of the sector.

Give your answer in terms of π.

[2 marks]

Answer _____ cm^2

18 Circle the matrix that represents a reflection in the line $y = -x$

[1 mark]

$\begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}$ $\begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix}$ $\begin{pmatrix} 0 & -1 \\ -1 & 0 \end{pmatrix}$ $\begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix}$

9

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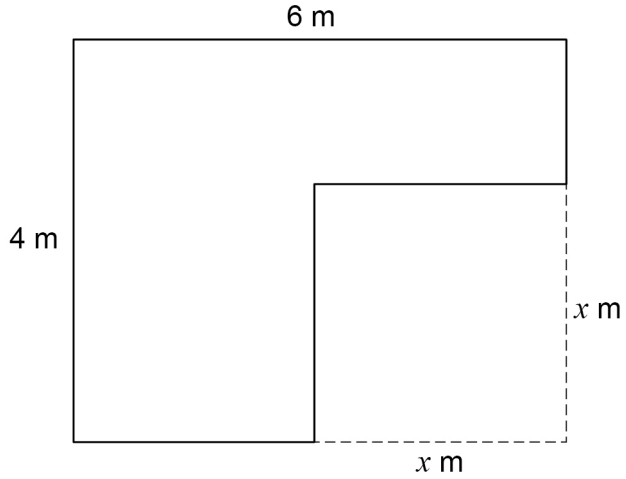
19 A 6 m by 4 m rectangular piece of card has a square of side length x m removed.



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The area of the remaining card equals the area of the square.

Work out the **exact** value of x.

[4 marks]

Answer _____

Do not write outside the box

20 (a) Rearrange $y = \frac{x+1}{x-2}$ to make x the subject.

[4 marks]

Answer _____

20 (b) Factorise fully $3m^2 - 12p^2$

[3 marks]

Answer _____

11

Turn over ►

Do not write outside the box

21 The wavelength, w, of sound waves is inversely proportional to their frequency, f.

When the wavelength is 0.25 metres the frequency is 1360 hertz.

Work out the frequency when the wavelength is 0.8 metres.

[4 marks]

Answer _____ hertz

22 Here is some information about the lengths of some leaves.

Length, l (cm)	**Frequency**
$0 < l \leqslant 5$	5
$5 < l \leqslant 10$	2
$10 < l \leqslant 15$	1
$15 < l \leqslant 20$	4

A cumulative frequency diagram is drawn.

Circle the point that is on the diagram.

[1 mark]

(2.5, 5) (10, 7) (12.5, 8) (20, 4)

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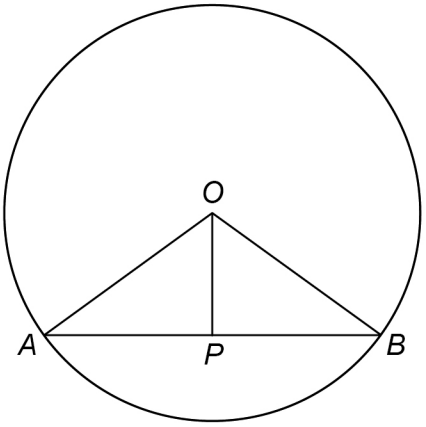
23 The diagram shows a circle, centre O.

P is the midpoint of the chord AB.



Use congruent triangles to prove that OP is perpendicular to AB.

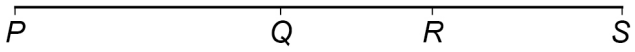
[4 marks]

9

Turn over ►

Do not write outside the box

24 A straight road goes through four towns, *P*, *Q*, *R* and *S*, as shown.



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PQ : *QR* = 9 : 5

QR : *RS* = 4 : 7

Work out *PR* : *RS*

Give your answer in its simplest form.

[3 marks]

Answer _____ : _____

Do not write outside the box

25 n is an integer.

25 (a) Write down an expression for the next even number after $2n$.

[1 mark]

Answer _____

25 (b) Prove that the difference between two consecutive even square numbers is always an **odd** multiple of 4

[3 marks]

Turn over for the next question

7

Do not write outside the box

26 Simplify fully $(x-6)(x+1)(x+3)+(9+x^2)(2-x)$

[4 marks]

Answer _____

Do not write outside the box

27 Here is a rectangle.

Not drawn accurately

Work out the area of the rectangle in cm^2

Give your answer in the form $a\sqrt{2} + b\sqrt{3}$ where a and b are integers.

You **must** show your working.

[3 marks]

Answer _____ cm^2

Turn over for the next question

7

Do not write outside the box

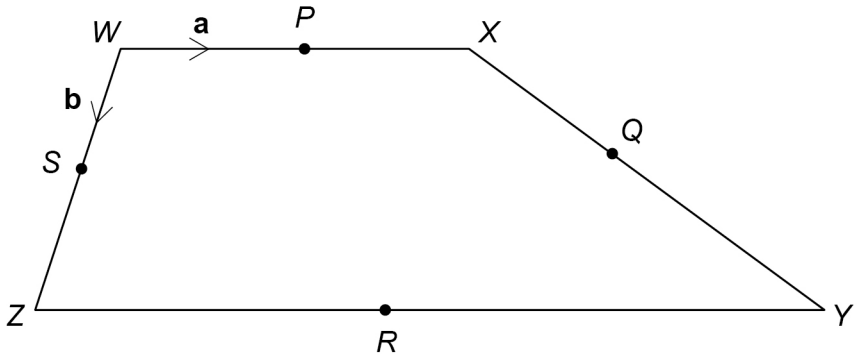
28 *WXYZ* is a trapezium.

P, *Q*, *R* and *S* are the midpoints of the sides.

$\overrightarrow{WP} = \mathbf{a}$

$\overrightarrow{WS} = \mathbf{b}$

$\overrightarrow{ZY} = 2\overrightarrow{WX}$



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28 (a) Show that $\overrightarrow{XQ} = \mathbf{a} + \mathbf{b}$

[2 marks]

28 (b) Show that $\overrightarrow{SR} = \overrightarrow{PQ}$

[2 marks]

Do not write outside the box

28 (c) Choose one of these shapes to complete the sentence about *PQRS*.

parallelogram rectangle rhombus trapezium

Give reasons for your answer.

[2 marks]

PQRS must be a _____

Reasons _____

29 Show that $\frac{8^{\frac{2}{3}}}{32}$ can be written in the form 2^m where m is an integer.

[3 marks]

9

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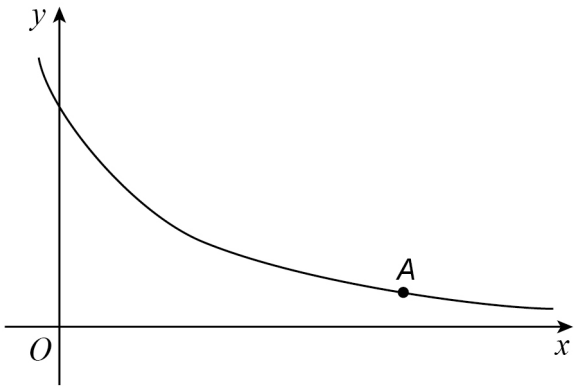
30 Here is a sketch of the curve $y = k^x$



Point A $\left(3, \frac{27}{64}\right)$ lies on the curve.

Work out the value of k.

[2 marks]

Answer _____

Do not write outside the box

31 Sadiq plays a game with 10 cards.

8 of the cards are blue and 2 are red.

He wins the game if he picks a red card.

He picks up to 3 cards, one at a time, **without replacement**.

Once he picks a red card he stops.

Work out the probability that he wins.

[4 marks]

Answer _____

Turn over for the next question

6

Do not write outside the box

32 Work out the coordinates of the stationary points on the curve

$$y = x^3 - 9x^2 + 24$$

[5 marks]

Answer _____

END OF QUESTIONS

5

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