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Pearson Edexcel
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Mathematics B

Level 2
Paper 1R



Thursday 24 May 2018 – Morning
Time: 1 hour 30 minutes

Paper Reference
4MB1/01R

You must have:

Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided – *there may be more space than you need.*
- **Calculators may be used.**

Information

- The total mark for this paper is 100.
- 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.
- Check your answers if you have time at the end.
- Without sufficient working, correct answers may be awarded no marks.

Turn over ►

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Answer ALL TWENTY SEVEN questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

- 1 Without using a calculator and showing all your working, calculate

$$2\frac{7}{8} \times 1\frac{3}{5}$$

Give your answer as a mixed number in its simplest form.

.....
(Total for Question 1 is 2 marks)

- 2 Each interior angle of a regular polygon is 168°

Calculate the number of sides of the polygon.

.....
(Total for Question 2 is 2 marks)

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- 3 The number of people living in Delhi is 1.7×10^7
The land area of Delhi is 1.5×10^3 square kilometres.

Calculate the average number of people per square kilometre living in Delhi.
Give your answer in standard form to 2 significant figures.

.....
(Total for Question 3 is 2 marks)

- 4 Given that $y = \frac{7}{x^3} - x^5$

find $\frac{dy}{dx}$

$\frac{dy}{dx} = \dots\dots\dots$

(Total for Question 4 is 2 marks)



- 5 Without using your calculator, and showing all your working,
express $\frac{12}{3 - \sqrt{5}}$ in the form $a + b\sqrt{5}$ where a and b are integers.

(Total for Question 5 is 2 marks)

6

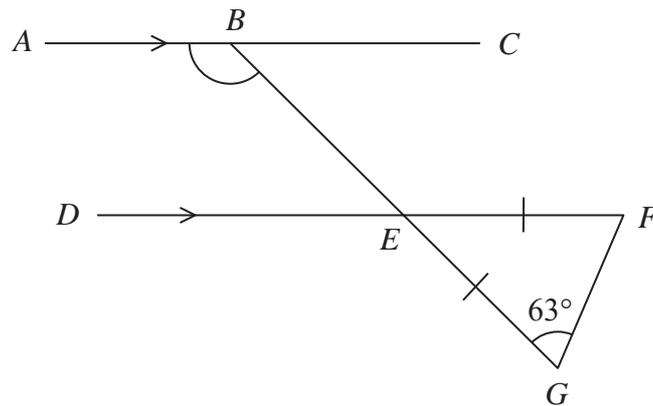


Diagram NOT
accurately drawn

In the diagram, ABC is parallel to DEF .
 BEG is a straight line and $\triangle EFG$ is isosceles with $EF = EG$ and $\angle EGF = 63^\circ$

Find the size, in degrees, of $\angle ABE$.

$\angle ABE = \dots\dots\dots^\circ$

(Total for Question 6 is 3 marks)



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7 Solve the simultaneous equations

$$4x - y = 4$$
$$2x + \frac{7}{2}y = -10$$

Show clear algebraic working.

$x =$

$y =$

(Total for Question 7 is 3 marks)

8 When a biased coin is thrown once, the probability that it lands Heads is 0.6
The coin is thrown 4 times.

Find the probability that the coin lands Heads exactly 3 times.

.....

(Total for Question 8 is 3 marks)



9 Solve $\frac{3 - 2x}{5} = 2x - 3$

Show clear algebraic working.

$x = \dots\dots\dots$

(Total for Question 9 is 3 marks)

10 $X = 2a + b$

$X = 19.4$ to 1 decimal place.

$a = 2.4$ to 1 decimal place.

Calculate the upper bound for the value of b .

Show your working clearly.

$\dots\dots\dots$

(Total for Question 10 is 3 marks)



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11 Make x the subject of $\frac{x^3 + a}{c - x^3} = \frac{4}{3}$

$x =$

(Total for Question 11 is 3 marks)

12 Given that $6 \times 5^{3k+4} = 750$
find the exact value of k .

$k =$

(Total for Question 12 is 3 marks)



13

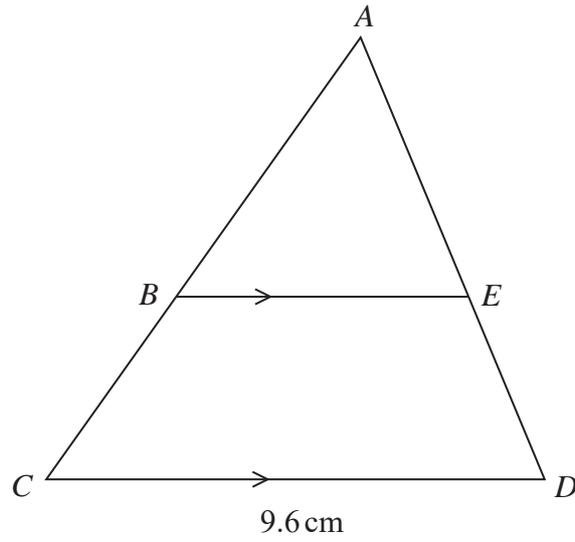


Diagram NOT accurately drawn

The diagram shows triangle ACD and triangle ABE .
The point B is on AC and the point E is on AD such that BE is parallel to CD .

$CD = 9.6 \text{ cm}$

Area of triangle $ABE = 27 \text{ cm}^2$

Area of trapezium $BCDE = 21 \text{ cm}^2$

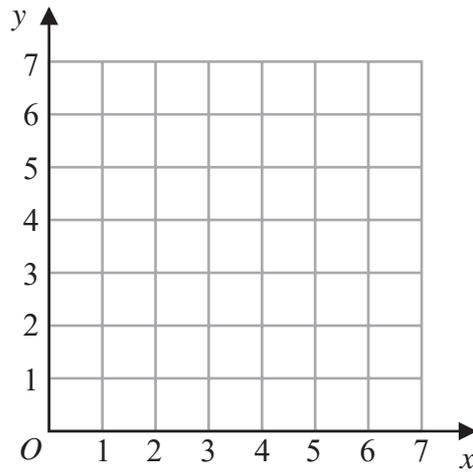
Calculate the length, in cm, of BE .

.....cm

(Total for Question 13 is 3 marks)



14



(a) On the grid, draw and label the straight line with equation

(i) $y = 2$

(ii) $x + y = 5$

(iii) $y = 2x + 1$

(3)

(b) On the grid, show by shading, the region defined by the inequalities

$$y \geq 2 \text{ and } x + y \leq 5 \text{ and } y \leq 2x + 1$$

Label the region **R**.

(1)

(Total for Question 14 is 4 marks)

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15 Barry and Carlos share \$120 in the ratio 3 : 2

Barry gives $\frac{1}{5}$ of his share to Mary.

Carlos gives 35% of his share to Mary.

Express the total amount that Barry and Carlos give to Mary as a fraction of the \$120
Give your answer in its simplest form.

.....
(Total for Question 15 is 4 marks)

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16 (a) Simplify $2w^4y^3 \times 3wy^5$

.....
(2)

(b) Simplify $(27a^6c^3)^{\frac{1}{3}}$

.....
(2)

(Total for Question 16 is 4 marks)



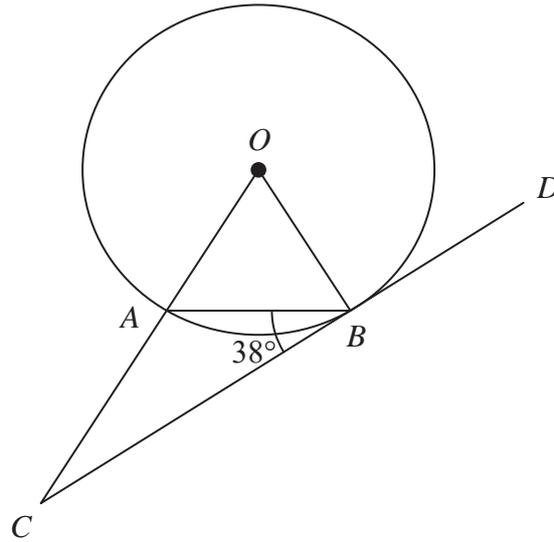


Diagram **NOT** accurately drawn

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A and *B* are points on the circumference of a circle, centre *O*.

CBD is the tangent to the circle at *B*.

CAO is a straight line.

$\angle ABC = 38^\circ$

Giving your reasons, find the size, in degrees, of $\angle ACB$.

$\angle ACB = \dots\dots\dots^\circ$

(Total for Question 17 is 4 marks)

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18 $\vec{OA} = \begin{pmatrix} 4 \\ -2 \end{pmatrix}$ and $\vec{OB} = \begin{pmatrix} -2 \\ 6 \end{pmatrix}$

(a) Find \vec{AB} as a column vector.

$$\vec{AB} = \begin{pmatrix} \\ \end{pmatrix} \quad (2)$$

(b) Calculate the modulus of \vec{AB}

.....
(2)

(Total for Question 18 is 4 marks)



19 Write $(3x + 2) \div \left(\frac{3x^2 - 7x - 6}{5} \right) - \frac{5}{x + 3}$ as a single fraction in its simplest form.

Show clear algebraic working.

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.....
(Total for Question 19 is 4 marks)

20

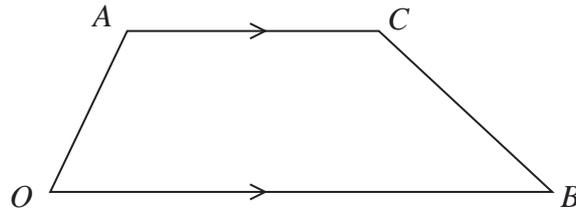


Diagram **NOT**
accurately drawn

The diagram shows a trapezium $OACB$ in which

$$\vec{OA} = \mathbf{a}, \quad \vec{AC} = 3\mathbf{b}, \quad \vec{OB} = 5\mathbf{b}$$

The point P lies on OC such that $OP:PC = 5:1$

D is the point such that OB is a straight line and APD is a straight line.

Prove that $OB:OD = 1:3$

(Total for Question 20 is 4 marks)

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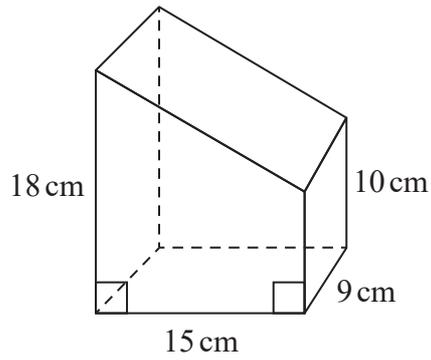


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The diagram shows a right prism of length 9 cm.

A cross section of the prism is a trapezium in which the parallel sides are of length 18 cm and 10 cm and the distance between these parallel sides is 15 cm.

Calculate the total surface area, in cm^2 , of the prism.

..... cm^2

(Total for Question 21 is 5 marks)

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22 T varies inversely as the square of y .

$$T = 0.32 \text{ when } y = 5$$

(a) Find a formula for T in terms of y .

.....
(3)

(b) Find the positive value of y when $T = 200$

.....
(2)

(Total for Question 22 is 5 marks)



23 (a) Write $x^2 + 10x - 7$ in the form $(x + p)^2 + q$

.....
(2)

(b) Hence solve the equation $x^2 + 10x - 7 = 0$

Give your answer in the form $a \pm \sqrt{b}$ where a and b are integers.
Show your working clearly.

.....
(3)

(Total for Question 23 is 5 marks)

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24 $(x + 2)$ is a factor of $x^3 - 3x^2 + ax + 12$ where a is a constant.

(a) Show that $a = -4$

(2)

(b) Factorise completely $x^3 - 3x^2 - 4x + 12$

.....
(3)

(Total for Question 24 is 5 marks)



- 25 A box of toy bricks contains only red bricks, blue bricks, green bricks, yellow bricks and orange bricks.

A brick is taken at random from the box.

The table gives information about the probabilities that the brick is red or is blue or is green or is yellow or is orange.

| | | | | | |
|--------------------|------|------|-------|--------|--------|
| Colour | red | blue | green | yellow | orange |
| Probability | 0.15 | 0.13 | 0.2 | 0.32 | x |

- (a) Calculate the value of x .

$$x = \dots\dots\dots (2)$$

There are 39 blue bricks in the box.

- (b) Find the number of yellow bricks in the box.

$$\dots\dots\dots (2)$$

Alvaro draws a pie chart to show information about the number of bricks of each colour.

- (c) Calculate the size of the angle, in degrees, of the sector for red bricks.

$$\dots\dots\dots (2)$$

(Total for Question 25 is 6 marks)



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$$26 \quad \mathbf{A} = \begin{pmatrix} 4 & 3 \\ -2 & 1 \end{pmatrix} \quad \mathbf{B} = \begin{pmatrix} 2 & -3 \\ 1 & 4 \end{pmatrix} \quad \mathbf{C} = (5 \quad 2)$$

Find

(a) $3\mathbf{A} + 2\mathbf{B}$

$$\begin{pmatrix} & \\ & \end{pmatrix}$$

(2)

(b) \mathbf{AB}

$$\begin{pmatrix} & \\ & \end{pmatrix}$$

(2)

(c) \mathbf{CB}

.....

$$(2)$$

(Total for Question 26 is 6 marks)



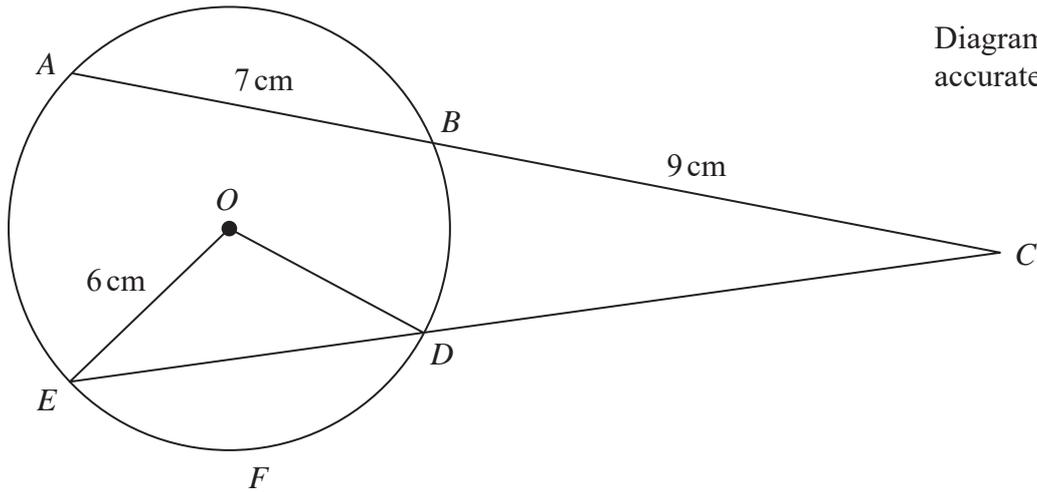


Diagram **NOT**
accurately drawn

In the diagram, $ABDFE$ is a circle, centre O and radius 6 cm.
 ABC and EDC are straight lines.

The arc EFD is of length $\frac{7}{2}\pi$ cm.

Calculate the length, in cm to 3 significant figures, of DC .

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.....cm

(Total for Question 27 is 6 marks)

TOTAL FOR PAPER IS 100 MARKS



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