Write your name here

Surname	Other names

Pearson Edexcel
International GCSE

Centre Number | | | | | |

Candidate Number | | | | |

Mathematics B

Paper 1

Thursday 26 May 2016 – Morning
Time: 1 hour 30 minutes

Paper Reference
4MB0/01

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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P 4 5 9 1 9 A 0 1 2 0

PEARSON

Answer ALL TWENTY EIGHT questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 Calculate the gradient of the line joining the points with coordinates (–3, –4) and (6, –1).

.....

(Total for Question 1 is 2 marks)

2 Factorise completely $18x^2 - 2y^2$

.....

(Total for Question 2 is 2 marks)

3 In 1964 the high jump world record for women was 1.91 metres.
In 1987 it was 2.09 metres.

Calculate, to 3 significant figures, the percentage increase in this world record between 1964 and 1987.

..... %

(Total for Question 3 is 2 marks)

4 Simplify $\frac{36a^2b^5}{4a^3b^2}$

.....

(Total for Question 4 is 2 marks)

5 The bearing of Nashik from Surat is 142°

Find the bearing of Surat from Nashik.

.....°

(Total for Question 5 is 2 marks)

6 Given that $f(x) = 3 - 2x$

find $ff(x)$ in terms of x. Simplify your answer.

$ff(x) =$ .....

(Total for Question 6 is 2 marks)

7 $\mathscr{E} = \{a, b, c, d, e, f, g, h, i, j\}$

$A = \{a, b, c, d, e\}$

$B = \{a, c, e, g, i\}$

Find $(A \cup B)'$

.....

(Total for Question 7 is 2 marks)

8

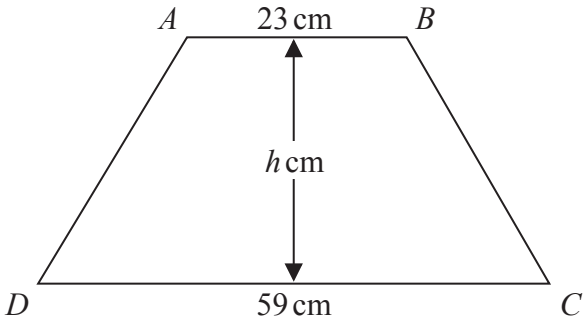

Diagram **NOT** accurately drawn

ABCD is a trapezium with *AB* parallel to *DC*.
AB = 23 cm, *DC* = 59 cm and the area of *ABCD* is 574 cm^2

Given that *h* cm is the height of the trapezium, find the value of *h*.

h = ...

(Total for Question 8 is 2 marks)

9 Write $\frac{3}{x} - \frac{5}{2x}$ as a single fraction. Simplify your answer.

.....

(Total for Question 9 is 2 marks)

10 $p^2 = 3x - 1$

Simplify $2p^2 - 6x + 7$

.....

(Total for Question 10 is 2 marks)

11 The mass M_e of the Earth is 5.9722×10^{24} kg
The mass M_j of the planet Jupiter is 1.8981×10^{27} kg

(a) Find the value of $\frac{M_j}{M_e}$ to the nearest integer.

.....

(1)

(b) Express your answer to part (a) in standard form.

.....

(2)

(Total for Question 11 is 3 marks)

12 Solve the equation $2(3x - 4) - 4(1 - 3x) = 3(x + 4)$
Show clear algebraic working.

$x =$ .....

(Total for Question 12 is 3 marks)

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13 Given that $x : y = 5 : 8$ and that $y : z = 6 : 7$, find $x : z$

Give your answer in its simplest form.

$x : z =$ .....

(Total for Question 13 is 3 marks)

14

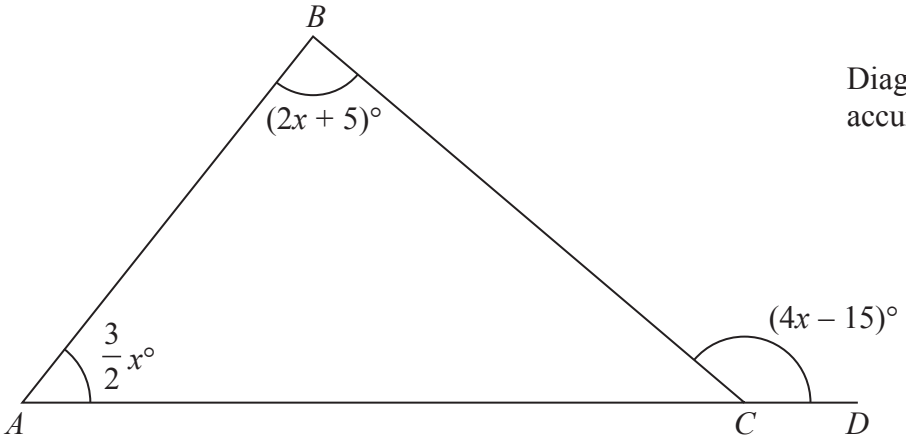


Diagram **NOT** accurately drawn

ABC is a triangle and ACD is a straight line.

$\angle BAC = \frac{3}{2}x°$, $\angle ABC = (2x + 5)°$ and $\angle BCD = (4x – 15)°$

Find the value of x.

$x =$ .....

(Total for Question 14 is 3 marks)

15 Two non-zero vectors **a** and **b** are not parallel.

Given that $n\mathbf{a} + m\mathbf{b} = \mathbf{b} + 2m(\mathbf{a} - \mathbf{b})$, where m and n are scalars, find the value of m and the value of n.

$m =$ .....

$n =$ .....

(Total for Question 15 is 3 marks)

16 Find the largest integer, x, such that $\frac{1}{2}(2x + 1) > 3x - 5$

.....

(Total for Question 16 is 3 marks)

17 Given that $\sqrt{(x^2 + 9)} = x + y$

find x in terms of y

$x =$ .....

(Total for Question 17 is 4 marks)

18 Here are 8 numbers

5.9 6.3 6.7 6.9 7.5 8.1 8.1 8.9

(a) Find the median of the 8 numbers.

.....

(2)

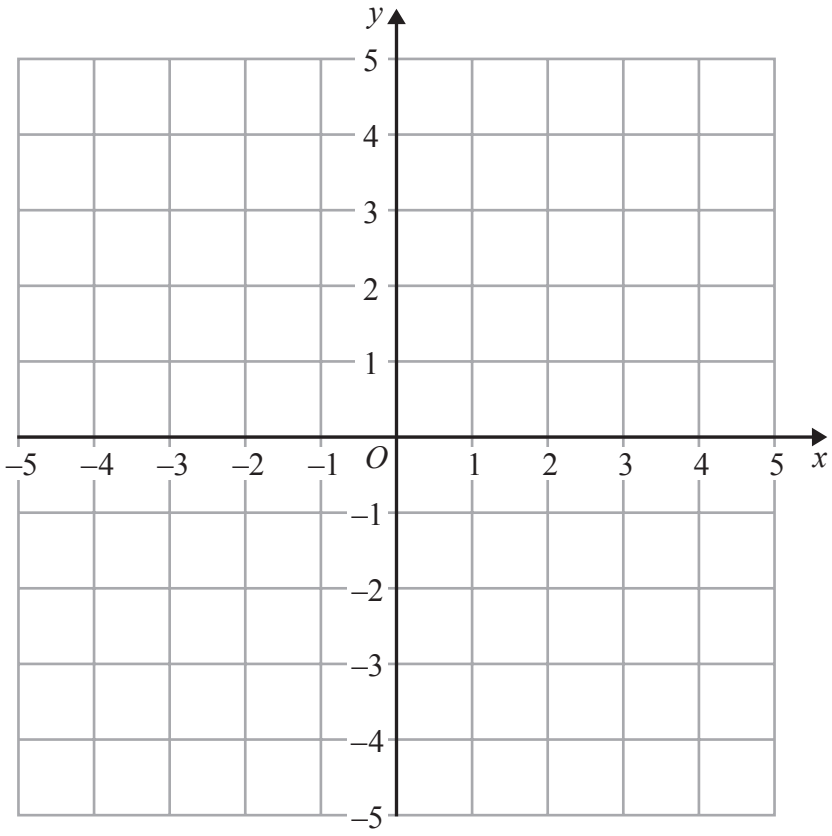
(b) Calculate the mean of the 8 numbers.

.....

(2)

(Total for Question 18 is 4 marks)

19



(a) On the grid, draw and label

(i) the line with equation $y = -x$

(ii) the line with equation $y = x + 2$

(2)

ABCDE is a pentagon. The pentagon has the line with equation $y = -x$ as its axis of symmetry.
The point *A* has coordinates (3, 0), the point *D* has coordinates (–4, 4) and the point *E* has coordinates (1, 3).

(b) Find the coordinates of *B* and the coordinates of *C*.

B (..... , ...)

C (..... , ...)

(2)

(Total for Question 19 is 4 marks)

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20 y varies inversely as the cube of x

$y = 256$ when $x = \frac{1}{2}$

Find the value of x when $y = \frac{4}{27}$

$x =$ .....

(Total for Question 20 is 4 marks)

21 The nth term of a sequence is given by $u_n = 2^n$ where $n = 1, 2, 3, 4, ...$

(a) Write down the first four terms of this sequence.

.....

(2)

(b) Find the value of $\frac{u_{500}}{u_{488}}$ giving your answer as a power of 8

.....

(3)

(Total for Question 21 is 5 marks)

22 A particle P is moving along a straight line. At time t seconds ($t \geqslant 0$), the displacement, s metres, of P from a fixed point O of the line is given by

$$s = \frac{5}{3}t^3 - \frac{9}{2}t^2 - 2t$$

At time t seconds, the velocity of P is v m/s.

(a) Find an expression for v in terms of t.

$v =$ .....

(2)

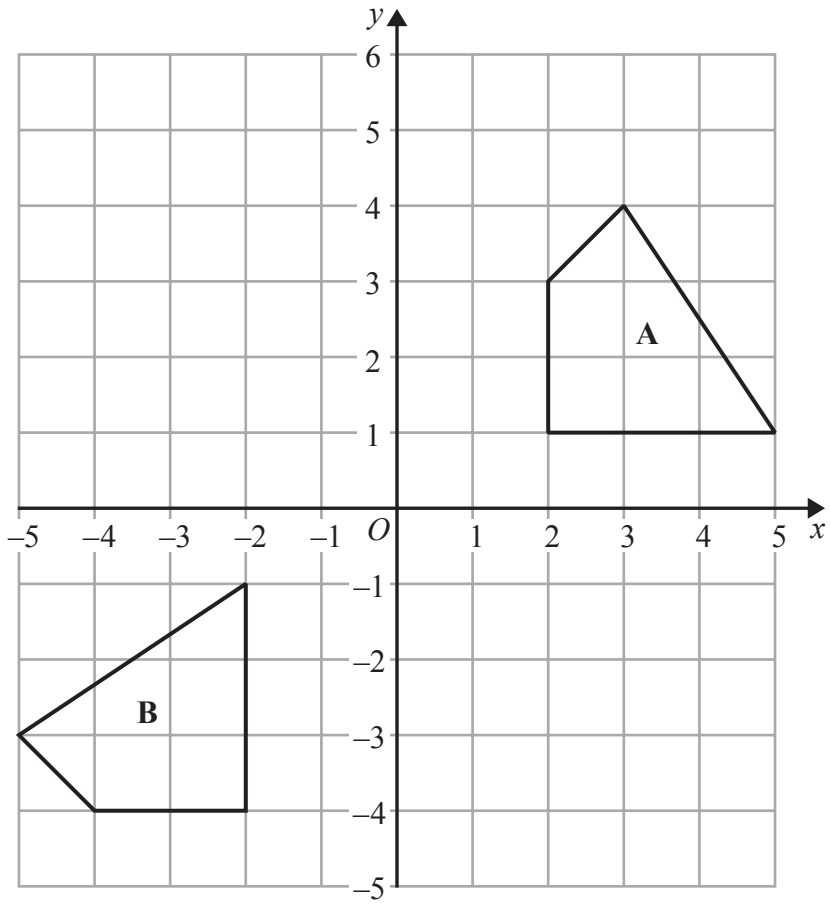
(b) Find the value of t when P is instantaneously at rest.

$t =$ .....

(3)

(Total for Question 22 is 5 marks)

23



Quadrilateral **A** is transformed to quadrilateral **B** by an anticlockwise rotation about the origin followed by a translation.

(a) Write down the angle of rotation.

.....

(1)

(b) Find the 2×2 matrix which represents this rotation.

( )

(2)

(c) Find the column vector which represents the translation.

$\begin{pmatrix} \quad \\ \quad \end{pmatrix}$

(2)

(Total for Question 23 is 5 marks)

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24 Given that for all values of x,

$$6x^3 - 19x^2 - 26x + 24 = (6x^2 + kx - 6)(x - 4) \qquad \text{where } k \text{ is a constant,}$$

(a) show that $k = 5$

(2)

(b) Hence factorise completely $6x^3 - 19x^2 - 26x + 24$

(3)

(Total for Question 24 is 5 marks)

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25

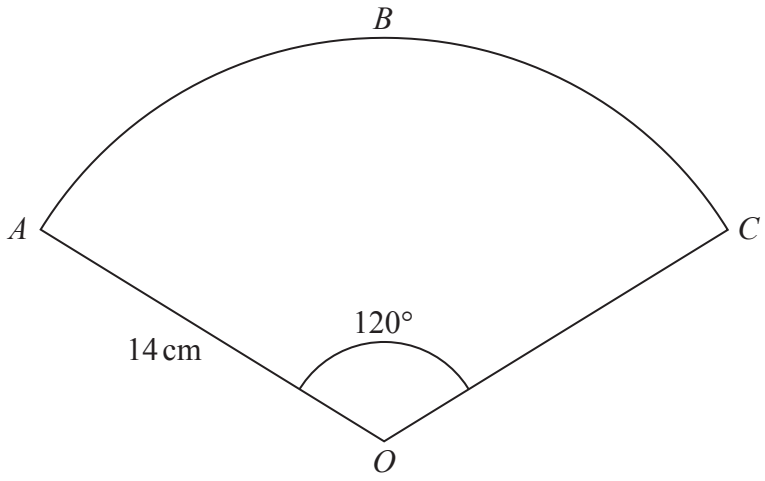


Diagram **NOT** accurately drawn

The diagram shows a piece of card in the shape of a sector, *OABC,* of a circle of radius 14 cm and centre *O*. The arc *ABC* subtends an angle of 120° at the centre of the circle.

(a) Calculate the length, in cm to 3 significant figures, of the arc *ABC*.

..... cm

(2)

A hollow right circular cone is formed by joining *OA* and *OC* together.

Calculate, in cm to 3 significant figures,

(b) the radius of the cone,

..... cm

(2)

(c) the height of the cone.

..... cm

(2)

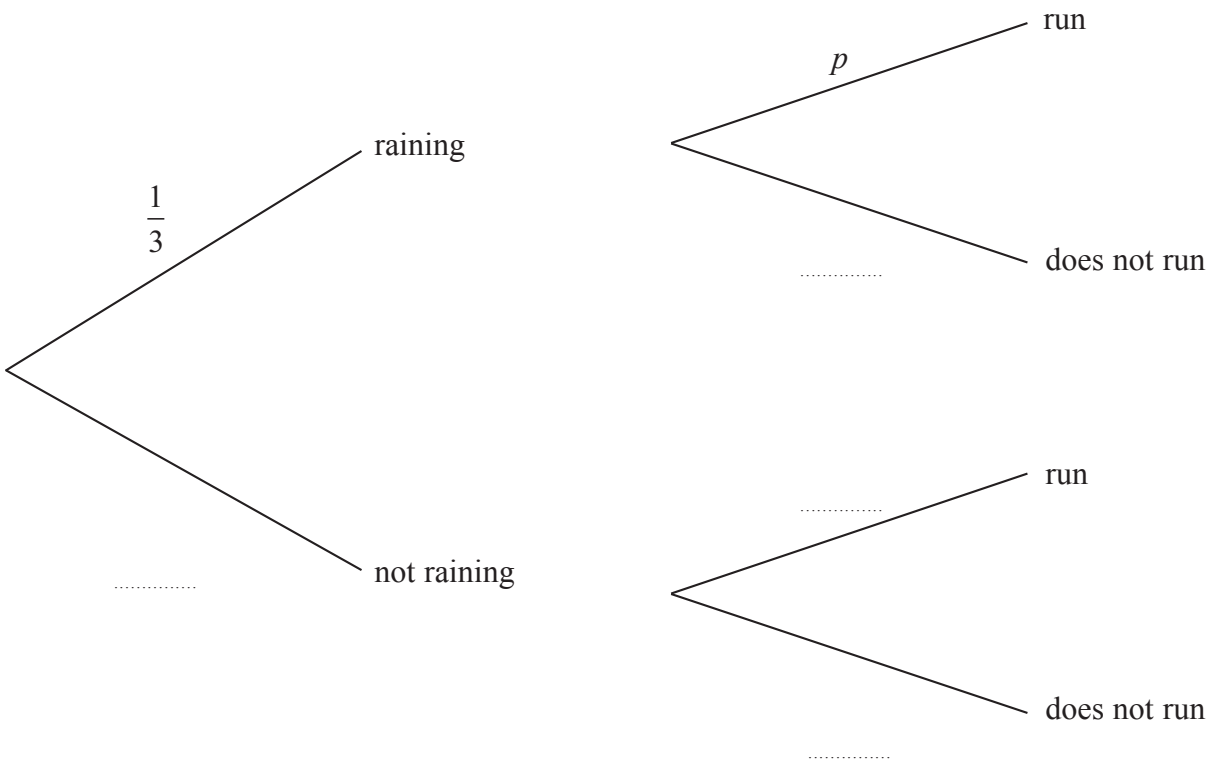
(Total for Question 25 is 6 marks)

26 The probability that it rains on any morning in the town of *Lloviendo* is $\frac{1}{3}$

If it is raining on a morning, the probability that Maria goes for a run is p

If it is not raining on a morning, the probability that Maria goes for a run is $\frac{4}{5}$

(a) Complete the probability tree diagram.



(3)

The probability that Maria goes for a run on any morning is $\frac{37}{60}$

(b) Using your tree diagram and this information, form an equation in p

.....

(2)

(c) Find the value of p

$p =$ .....

(2)

(Total for Question 26 is 7 marks)

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27

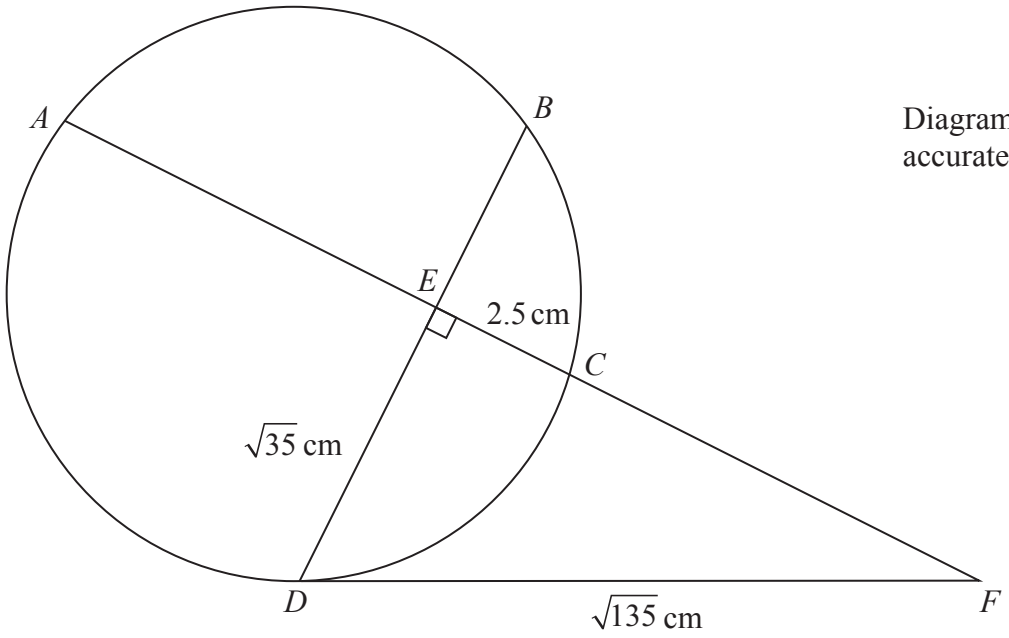

Diagram **NOT** accurately drawn

ABCD is a circle. The chords *AC* and *DB* intersect at right angles at the point *E*. The point *F* is such that *AECF* is a straight line and *FD* is the tangent to the circle at *D*.

EC = 2.5 cm, *DE* = $\sqrt{35}$ cm and *DF* = $\sqrt{135}$ cm.

(a) Calculate the length, in cm, of *EF*.

..... cm

(2)

(b) Show that *AE* = 8 cm.

(3)

(c) Calculate the length, in cm to 3 significant figures, of *EB*.

..... cm

(2)

(Total for Question 27 is 7 marks)

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Turn over for Question 28

28

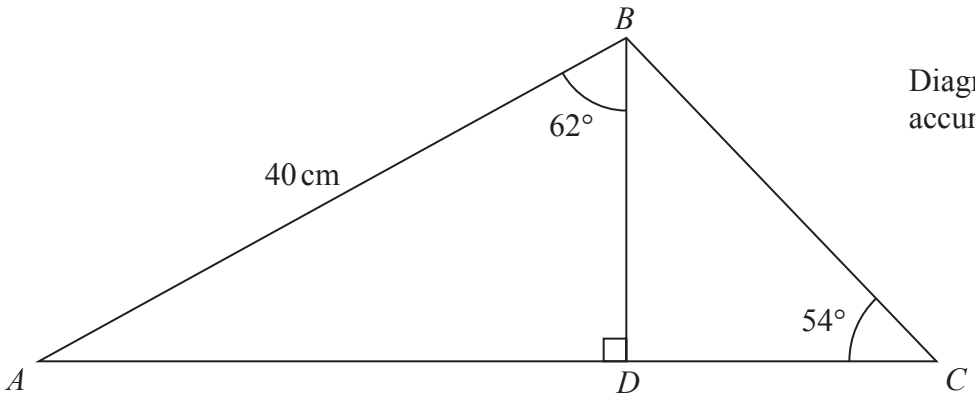

Diagram **NOT** accurately drawn

ABC is a triangle.
D is the point on *AC* such that *BD* is perpendicular to *AC*.
AB = 40 cm, $\angle ABD = 62°$ and $\angle BCD = 54°$

Calculate the area, in cm^2, of triangle *ABC*. Give your answer to 3 significant figures.

..... cm^2

(Total for Question 28 is 6 marks)

TOTAL FOR PAPER IS 100 MARKS