Write your name here

Surname	Other names

Pearson Edexcel
International GCSE

Centre Number | | | | | |

Candidate Number | | | | |

Mathematics B

Paper 1

Monday 9 January 2017 – 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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Pearson

Answer ALL TWENTY EIGHT questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 The manager of a mail order company worked out that on each day of 2016, the company sold, on average, one article every 10 minutes of the day.

There were 366 days in 2016.

Calculate the number of articles sold by the company in 2016.

.....

(Total for Question 1 is 2 marks)

2 Factorise $16x^2 - 9y^2$

.....

(Total for Question 2 is 2 marks)

3 Find the Highest Common Factor (HCF) of 60, 84 and 120

.....

(Total for Question 3 is 2 marks)

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4 Given that $y = x^2 + \frac{2}{x^2}$

find $\frac{dy}{dx}$

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

(Total for Question 4 is 2 marks)

5 A light year is 9.461×10^{12} km.

The distance of Kapteyn's star from the Earth is 1.208×10^{14} km.

Calculate the distance, in light years, from the Earth to Kapteyn's star.
Give your answer to 3 significant figures.

.....light years

(Total for Question 5 is 2 marks)

6 Given that $x : y = 2 : 5$ and that $x : z = 7 : 3$, find $y : z$

Give your answer in its simplest form.

$y : z =$ .....

(Total for Question 6 is 2 marks)

7 A right circular cylinder has a base radius of 6 cm and a height of 8 cm.

Find the volume, in cm^3, of the cylinder.
Give your answer in terms of π.

.....cm^3

(Total for Question 7 is 2 marks)

8 One year, the total rainfall in London in November was 76 mm.
This total rainfall was 60% more than the total rainfall in London in June.

Calculate the total rainfall, in mm, in London in June.

.....mm

(Total for Question 8 is 2 marks)

9 Each internal angle of a regular polygon is 162°

Calculate the number of sides of the polygon.

.....

(Total for Question 9 is 3 marks)

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10 The points O, A, B and C are such that

$$\overrightarrow{OA} = \begin{pmatrix} 1 \\ 1 \end{pmatrix} \qquad \overrightarrow{AB} = \begin{pmatrix} 3 \\ 2 \end{pmatrix} \qquad \overrightarrow{OC} = \begin{pmatrix} 5 \\ 6 \end{pmatrix}$$

Find $\overrightarrow{BC}$ as a column vector.

$$\overrightarrow{BC} = \begin{pmatrix} \quad \\ \quad \end{pmatrix}$$

(Total for Question 10 is 2 marks)

11 In Hong Kong, Alice bought 4 books, each costing 53 HKD (Hong Kong Dollars).
Alice also bought 3 watches, each costing 490 HKD.

The exchange rate was £1 = 11.85 HKD.

Calculate the total cost of these seven items, in £, to the nearest pound.

£.....

(Total for Question 11 is 3 marks)

12 Without using a calculator, evaluate $\dfrac{\sqrt{72}+\sqrt{32}}{\sqrt{8}}$

Show all your working.

.....

(Total for Question 12 is 3 marks)

13 Simplify fully $\dfrac{82x^{-2}y^{3}}{41x^{5}y^{6}}$

.....

(Total for Question 13 is 3 marks)

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14 Arif and Hasan are climbing a vertical wall.
Arif is at the point A and Hasan is at the point H, where A is vertically above H.

Jamil is standing at the point J on level ground, 15 metres away from the wall.

The angle of elevation of H from J is 20°
The angle of elevation of A from J is 35°

Calculate how far, in metres to 3 significant figures, A is above H.

.....metres

(Total for Question 14 is 3 marks)

15 F is inversely proportional to r^2
$F = 100$ when $r = 7$

Find the positive value of r when $F = 4$

$r =$ .....

(Total for Question 15 is 4 marks)

16 A is the point with coordinates (–1, 1) and B is the point with coordinates (15, 13).

(a) Calculate the gradient of the straight line AB.

.....

(2)

(b) Calculate the length of AB.

.....

(2)

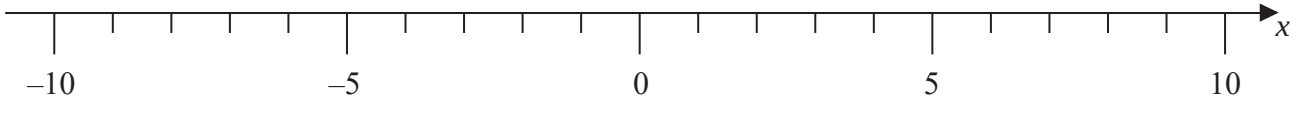
(Total for Question 16 is 4 marks)

17 (a) Solve the inequality $\frac{x+2}{5} > \frac{x-2}{3}$

.....

(3)

(b) Represent, on the number line below, your solution of the inequality in part (a).



(1)

(Total for Question 17 is 4 marks)

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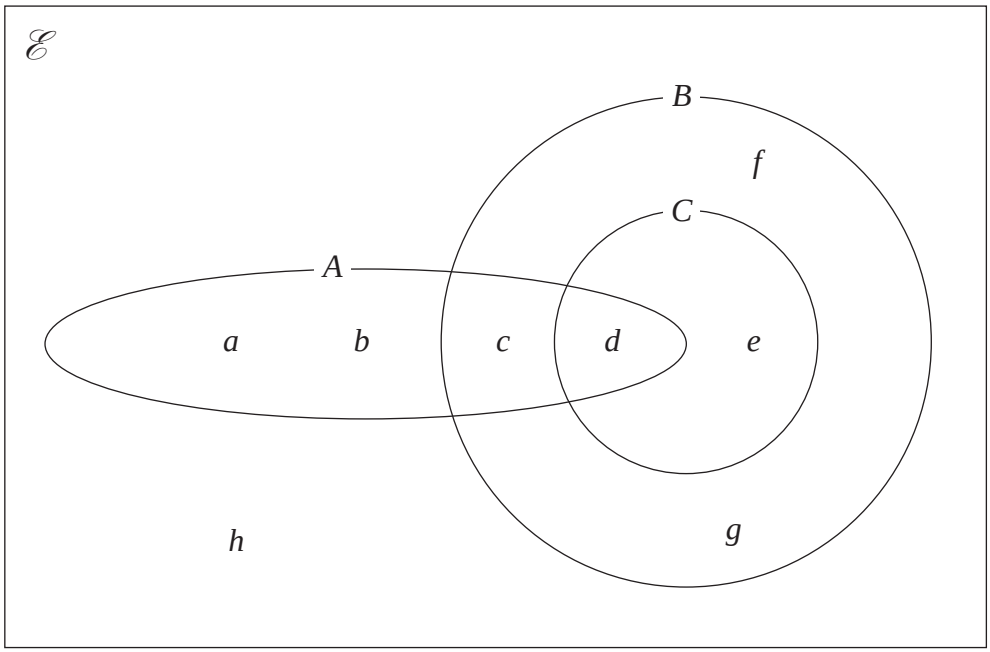
18 The Venn diagram shows information about the sets A, B and C.



(a) List the elements of the set $A \cap B \cap C$

.....

(1)

(b) List the elements of the set $(A \cup C) \cap B$

.....

(1)

(c) List the elements of the set $(A \cup C)' \cap B$

.....

(1)

(d) Find $A \cap B' \cap C$

.....

(1)

(Total for Question 18 is 4 marks)

19

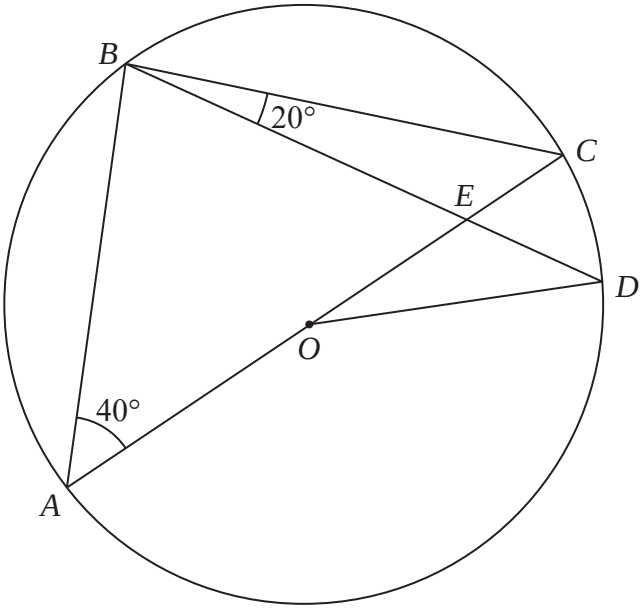


Diagram **NOT** accurately drawn

In the diagram, *ABCD* is a circle, centre *O*, and *AOC* is a diameter of the circle.
$\angle BAC = 40°$ and the chord *BD* is such that $\angle CBD = 20°$

The chord *BD* and the diameter *AOC* intersect at the point *E*.

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

$\angle ODB =$ ..... °

(Total for Question 19 is 4 marks)

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20 Given that $d > 0$ and that $b > ac^2$, make d the subject of $a = b\left(\frac{1}{c^2} - \frac{1}{d^2}\right)$

Simplify your answer.

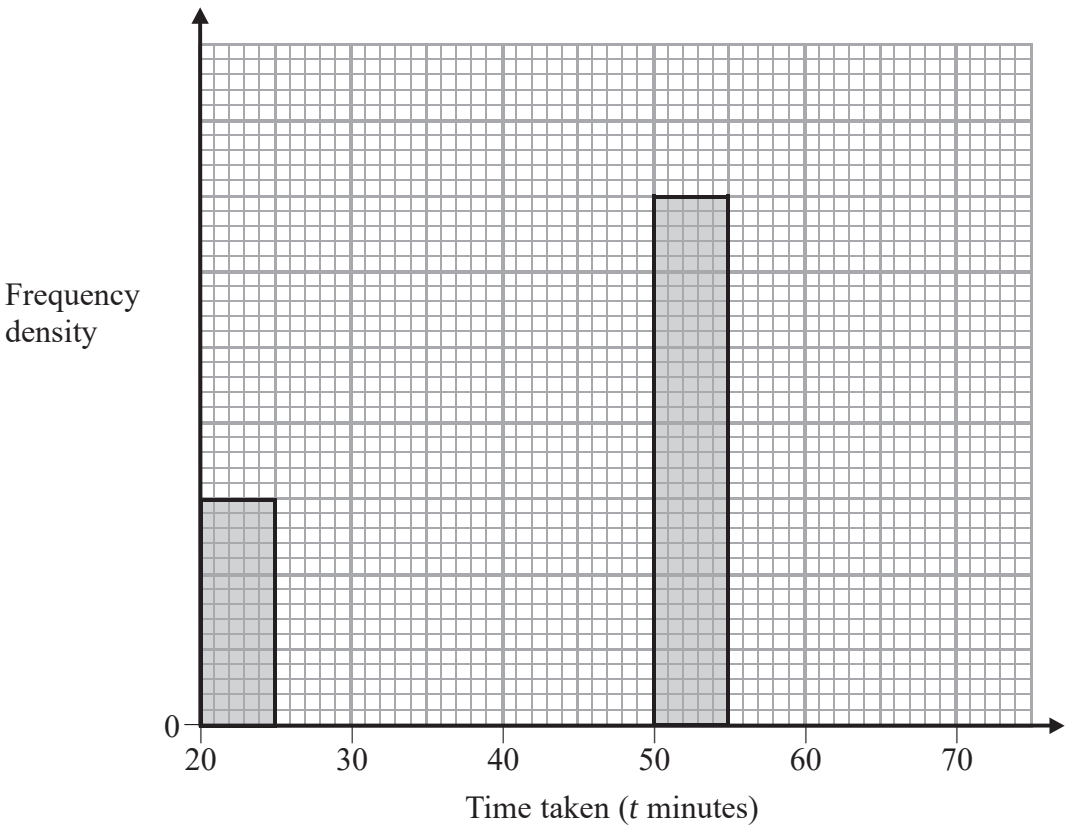
.....

(Total for Question 20 is 5 marks)

21 320 students sat a test. The incomplete table and the incomplete histogram give information about the times taken (t minutes) by the students to complete the test.
No student took less than 20 minutes to complete the test and no student took longer than 65 minutes to complete the test.

Use this information to complete the table and the histogram.

Time taken (t minutes)	Number of students
$20 < t \leqslant 25$	
$25 < t \leqslant 40$	60
$40 < t \leqslant 50$	60
$50 < t \leqslant 55$	70
$55 < t \leqslant 65$	



(Total for Question 21 is 5 marks)

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22 (a) Given that m is an integer, express $2^{101} + 2^{103}$ in the form $m \times 2^{100}$

.....

(1)

(b) Without using a calculator, express $2^{101} + 2^{103}$ in the form $n \times 4^{48}$ where n is an integer.

Show all your working.

.....

(4)

(Total for Question 22 is 5 marks)

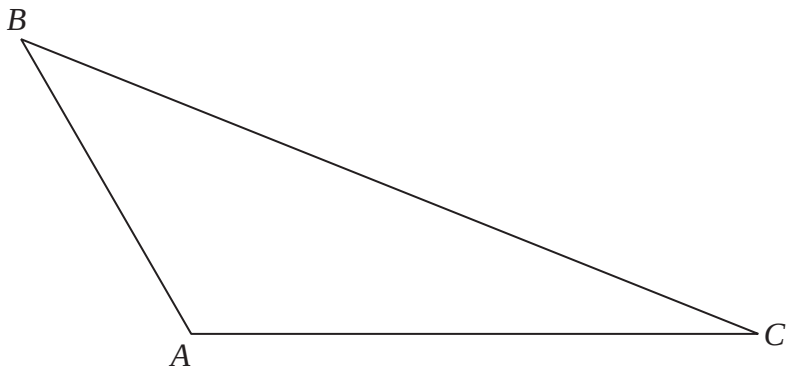
23 The determinant of the matrix $\begin{pmatrix} x & 3x-1 \\ 4 & 2x \end{pmatrix}$ is equal to –6

Find the values of x.

.....

(Total for Question 23 is 5 marks)

24



ABC is a triangle.

Showing all your construction lines, construct

(a) the bisector of $\angle BAC$,

(2)

(b) the perpendicular bisector of *AC*.

(2)

The point *P* is equidistant from the sides *AB* and *AC* of the triangle **and** equidistant from the vertices *A* and *C* of the triangle.

(c) Measure and write down the size, in degrees to the nearest degree, of $\angle BCP$.

$\angle BCP =$ ..... °

(1)

(Total for Question 24 is 5 marks)

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25 The table shows information about the ages, in years, of 100 students attending a school.

Age (years)	8	9	10	11	12	13	14	15
Number of students	8	32	7	1	10	29	10	3

(a) Write down the mode of the ages of these students.

.....years

(1)

(b) Find the median age of these students.

.....years

(1)

(c) Calculate the mean age of these students.

.....years

(3)

(Total for Question 25 is 5 marks)

26

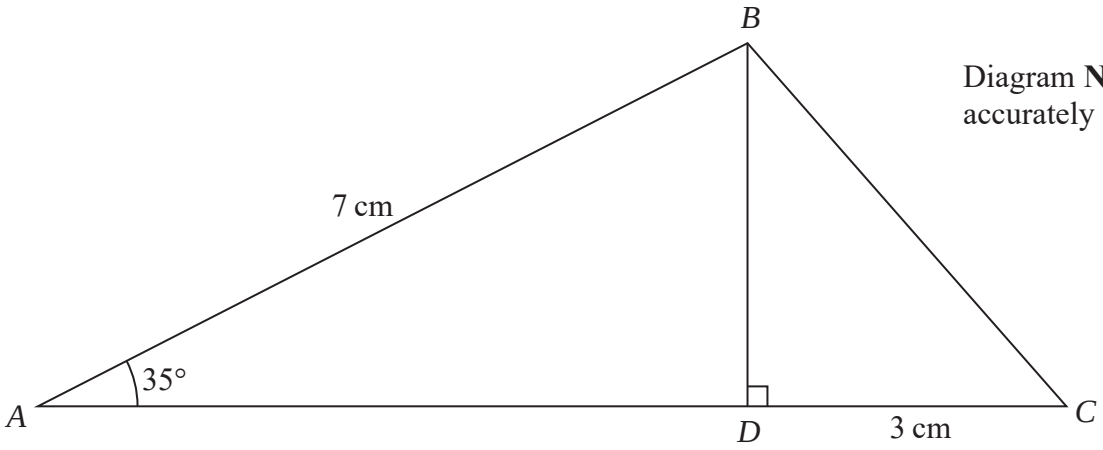

Diagram **NOT** accurately drawn

The diagram shows triangle ABC in which $\angle BAC = 35°$ and $AB = 7$ cm.
D is a point on AC such that BD is perpendicular to AC and $DC = 3$ cm.

Calculate, to 3 significant figures,

(a) the length, in cm, of BD,

.....cm

(2)

(b) the area, in cm^2, of triangle ABC.

.....cm^2

(3)

(Total for Question 26 is 5 marks)

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27

$$f(x) = 14x^3 - 9x^2 - 69x + 10$$

(a) Use the factor theorem to show that $(x + 2)$ is a factor of $f(x)$.

(2)

$f(x) = (x + 2)(ax^2 + bx + c)$ where a, b and c are integers.

(b) Find the value of a, the value of b and the value of c.

$a =$ .....

$b =$ .....

$c =$ .....

(4)

(Total for Question 27 is 6 marks)

28 f and g are two functions such that

$$f : x \mapsto 2x + 3$$

$$g : x \mapsto 1 + \frac{1}{x} \qquad x \neq 0$$

(a) Express the composite function gf in the form $gf : x \mapsto \ldots$

$gf : x \mapsto$ .....

(1)

(b) (i) Express the inverse function $(gf)^{-1}$ in the form $(gf)^{-1} : x \mapsto \ldots$

Write your answer as a simplified single algebraic fraction.

$(gf)^{-1} : x \mapsto$ .....

(ii) State the value of x which must be excluded from any domain of $(gf)^{-1}$

.....

(5)

(Total for Question 28 is 6 marks)

TOTAL FOR PAPER IS 100 MARKS

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