Please check the examination details below before entering your candidate information

Candidate surname	Other names

Centre Number | Candidate Number

Pearson Edexcel International GCSE

Thursday 18 May 2023

Morning (Time: 1 hour 30 minutes)

Paper reference **4MB1/01**

Mathematics B
PAPER 1

You must have: Ruler graduated in centimetres and millimetres, protractor, pair of 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 7 2 9 1 8 A 0 1 2 4

Pearson

Answer all TWENTY EIGHT questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 Write down two of the following six numbers that are irrational numbers.

$$\frac{3\pi}{2} \qquad \sqrt{36} \qquad 0.\dot{2} \qquad 3 \qquad -1 \qquad \sqrt{18}$$

..... , ...

(Total for Question 1 is 2 marks)

2 The nth term of a sequence is given by $12 - 5n$

Find the sum of the 2nd term and the 6th term of the sequence.

.....

(Total for Question 2 is 2 marks)

3 Find the value of $k^2 - 5k$ when $k = -4$

.....

(Total for Question 3 is 2 marks)

4 Using ruler and compasses only and **showing all your construction lines**, construct the perpendicular bisector of AB

(Total for Question 4 is 2 marks)

5

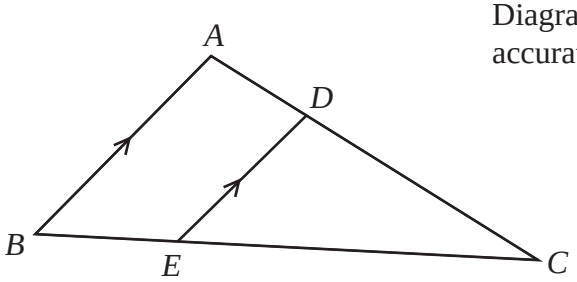


Diagram **NOT** accurately drawn

The diagram shows the triangle *ABC*

D is a point on the line *AC*
E is a point on the line *BC*

BA is parallel to *ED*

BC = 10.8 cm *EC* = 8.1 cm *DE* = 3.6 cm

Work out the length, in cm to one decimal place, of *BA*

..... cm

(Total for Question 5 is 2 marks)

6 Solve the inequality $4x - 3 < 6x + 5$

.....

(Total for Question 6 is 2 marks)

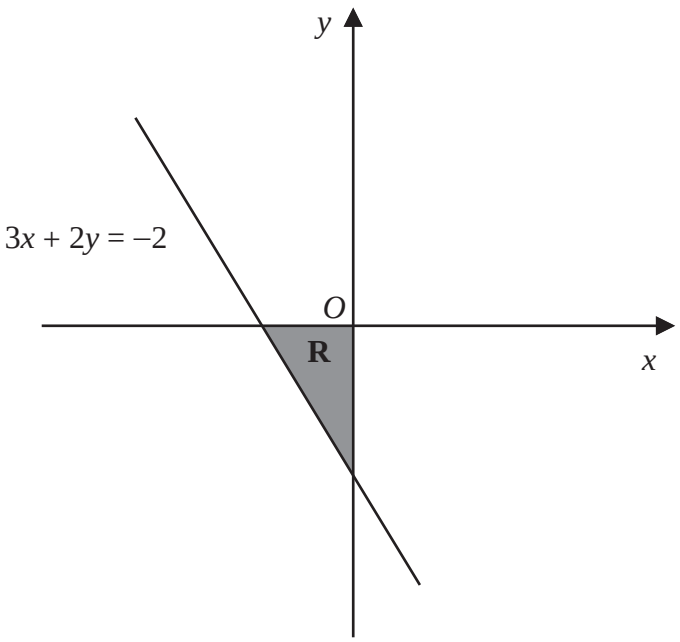
7 The price of a cup of coffee is decreased by 8%
The price of a cup of coffee after the price decrease is \$2.53

Calculate, in \$, the price of this cup of coffee before the decrease.

\$.....

(Total for Question 7 is 2 marks)

8



The diagram shows the shaded finite region **R** which has three straight boundary lines.

Write down the three inequalities that define the shaded region **R**

.....

.....

.....

(Total for Question 8 is 2 marks)

9 Given that, for all values of x,

$$x^2 - 6x + 5 = (x - a)^2 + b$$

find the value of a and the value of b

$a =$ .....

$b =$ .....

(Total for Question 9 is 2 marks)

10 Without using a calculator and showing all your working, work out

$$2\frac{3}{5} + 3\frac{5}{7}$$

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

.....

(Total for Question 10 is 3 marks)

11 Make x the subject of $y = \dfrac{3(x - 5)}{4}$

.....

(Total for Question 11 is 3 marks)

12 Calculate $\dfrac{25.5 \times 10^{8}}{2 \times 10^{-180} + 4 \times 10^{-182}}$

Give your answer in standard form.

.....

(Total for Question 12 is 3 marks)

13 (a) Factorise fully $8ab + 28b^2$

.....

(2)

(b) Factorise $5y^2 + 9y - 18$

.....

(2)

(Total for Question 13 is 4 marks)

14

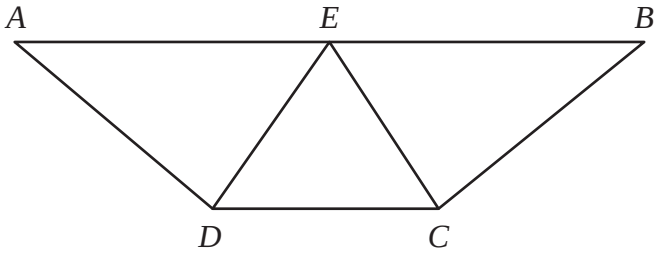


Diagram **NOT** accurately drawn

The diagram shows the trapezium $ABCD$
E is the midpoint of AB and DEC is an equilateral triangle.

Prove that ΔAED is congruent to ΔBEC

(Total for Question 14 is 3 marks)

15 Without using a calculator and showing all your working express

$$3\sqrt{180} - 2\sqrt{245}$$

in the form $\sqrt{a}$ where a is an integer.

.....

(Total for Question 15 is 3 marks)

16 The position vector of A is $\begin{pmatrix} -3 \\ 8 \end{pmatrix}$

The point B has coordinates $(2, -4)$

Find $\left|\overrightarrow{AB}\right|$

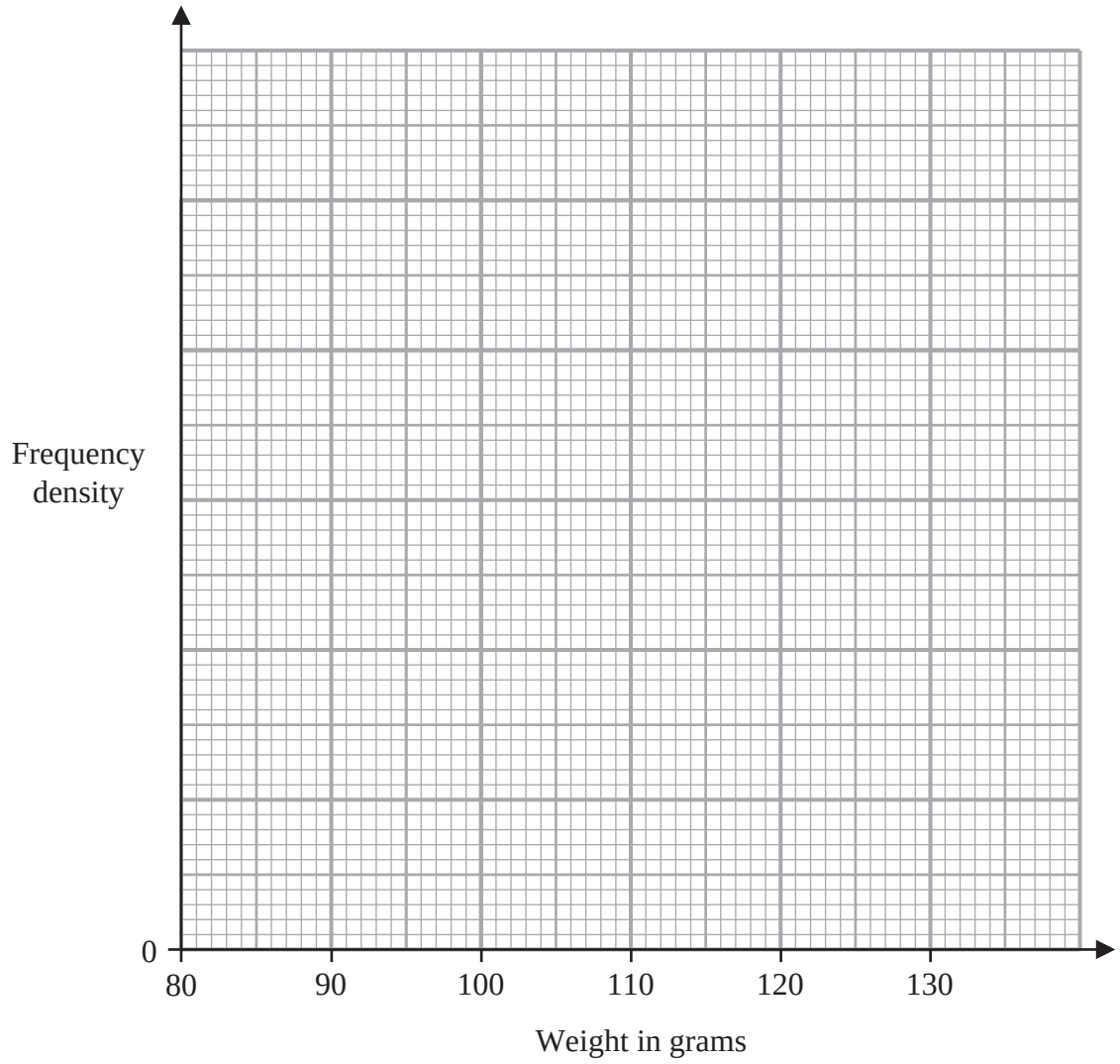
$\left|\overrightarrow{AB}\right|$ = ...

(Total for Question 16 is 3 marks)

17 The table gives information about the weights, in grams, of 100 birds.

Weight (w grams)	**Frequency**
$85 < w \leqslant 95$	15
$95 < w \leqslant 100$	25
$100 < w \leqslant 105$	22
$105 < w \leqslant 110$	20
$110 < w \leqslant 130$	18

Use the information in the table to draw a histogram on the grid below.



(Total for Question 17 is 3 marks)

18 Here are eight numbers written in ascending order.

$$-20 \quad -15 \quad 3 \quad 5 \quad x \quad 77 \quad 85 \quad 90$$

The mean of the eight numbers is 2 more than the median of the eight numbers.

Find the value of x

$x =$ .....

(Total for Question 18 is 4 marks)

19 A biased dice has six faces numbered 2, 4, 6, 8, 10 and 12

The table below shows information about the probability that, when the dice is thrown once, it will land on each of the numbers.

Number	2	4	6	8	10	12
Probability	a	$0.22 - a$	0.20	$1.5a$	$a + 0.03$	$2a + 0.01$

The dice is thrown once.

(a) Calculate the probability that the number the dice lands on is less than 7

.....

(1)

The dice is thrown 80 times.

(b) Calculate the expected number of times the dice will land on 12

.....

(3)

(Total for Question 19 is 4 marks)

20 y is directly proportional to $\sqrt{w}$

Given that $y = 10$ when $w = 25$

(a) find a formula for y in terms of w

.....

(3)

x is inversely proportional to t^3

(b) Write down an expression for x in terms of t and c where c is a constant.

.....

(1)

(Total for Question 20 is 4 marks)

21 The curve C has equation $y = x^2 - \frac{b}{x} + 5$ where b is a constant.

C has a stationary point when $x = 1.5$

Find the value of b

$b =$ .....

(Total for Question 21 is 4 marks)

22

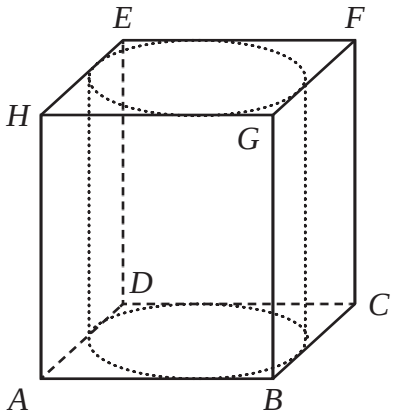


Diagram **NOT** accurately drawn

A solid cylinder with diameter x cm and height x cm is placed inside a hollow cube $ABCDEFGH$ of side x cm.

Given that $AF = 27$ cm,

find the volume, in cm^3 to 3 significant figures, of the space inside the cube that is not taken up by the cylinder.

..... cm^3

(Total for Question 22 is 5 marks)

23 Express $\left(\frac{2}{y-3}-\frac{3}{3y+4}\right)\div\left(\frac{6y+34}{6y^2-7y-20}\right)$ as a single fraction in its simplest form.

Show clear algebraic working.

.....

(Total for Question 23 is 5 marks)

24

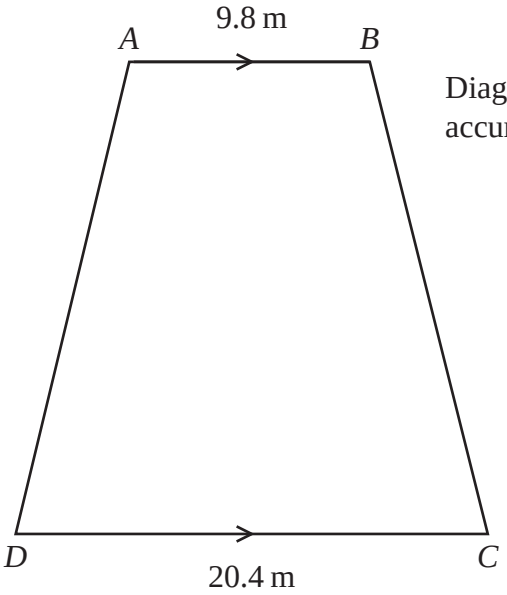


Diagram **NOT** accurately drawn

The diagram shows a horizontal garden *ABCD* in the shape of a trapezium with *AB* parallel to *DC*

AB = 9.8 m *DC* = 20.4 m *AD* = *BC*

Point *B* is due east of point *A*

The area of the garden is 392.6 m^2

Calculate the bearing, in degrees to the nearest degree, of *D* from *A*

.....°

(Total for Question 24 is 6 marks)

25 $\mathbf{A} = \begin{pmatrix} -3 & 2 \\ -1 & 4 \end{pmatrix}$ $\mathbf{B} = \begin{pmatrix} 1 & 3 \\ -2 & -4 \end{pmatrix}$

Find

(a) $\mathbf{A} - \mathbf{B}$

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

(2)

(b) $5\mathbf{A} + 2\mathbf{B}$

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

(2)

(c) $\mathbf{B}^{-1}$

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

(2)

(Total for Question 25 is 6 marks)

26 Solve the simultaneous equations

$$3x - 4y = 25$$

$$x^2 + y^2 = 26$$

Show clear algebraic working.

.....

(Total for Question 26 is 6 marks)

27

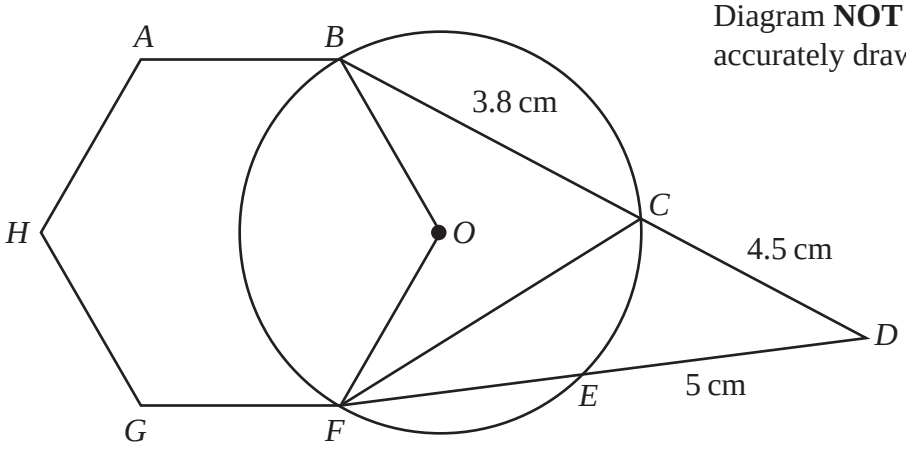


Diagram **NOT** accurately drawn

In the diagram *B*, *C*, *E* and *F* are points on a circle centre *O*

ABOFGH is a regular hexagon such that *OB* and *OF* are radii of the circle.

BCD and *FED* are straight lines.

$BC = 3.8$ cm $CD = 4.5$ cm $ED = 5$ cm

Calculate the area, in cm^2 to 3 significant figures, of triangle *CDF*

..... cm^2

(Total for Question 27 is 7 marks)

Turn over for Question 28

28

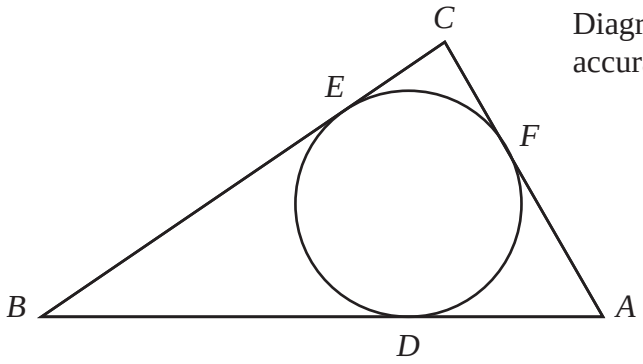


Diagram **NOT** accurately drawn

The diagram shows a triangle *ABC* and a circle *DEF*

BEC is the tangent to the circle at the point *E* with *BC* = 16 cm.
CFA is the tangent to the circle at the point *F* with *CA* = 10 cm.
ADB is the tangent to the circle at the point *D* with *BA* = 20 cm.

Calculate the radius, in cm to one decimal place, of the circle.

..... cm

(Total for Question 28 is 6 marks)

TOTAL FOR PAPER IS 100 MARKS