Please check the examination details below before entering your candidate information

| Candidate surname | Other names |
|---|---|
| | |

**Pearson Edexcel International GCSE**

Centre Number | Candidate Number

**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.
- Good luck with your examination.

*Turn over* ▶

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P 6 5 9 2 0 A 0 1 2 4

Pearson

**Answer all TWENTY SEVEN questions.**

**Write your answers in the spaces provided.**

**You must write down all the stages in your working.**

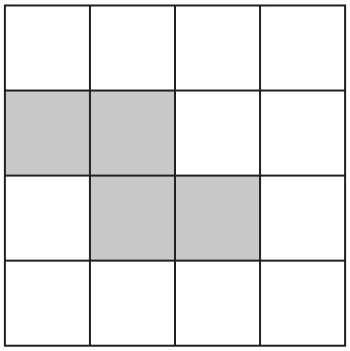
**1** Factorise fully $8xy^2 - 18xy$

.....

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

**2** A pattern is made using a four by four grid with both grey squares and white squares.

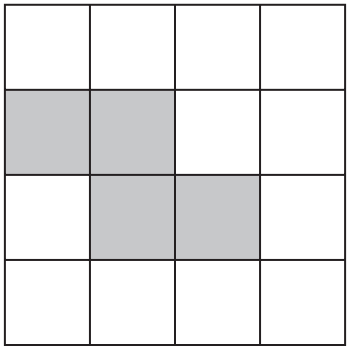
(a)



Shade **one** more square to make a pattern with exactly one line of symmetry.

**(1)**

(b)



Shade **two** more squares to make a pattern that has rotational symmetry of order 2

**(1)**

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

**3** Make $x$ the subject of $y = tx + 4y^2$

.....

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

**4** Each time Arhan plays a game of chess, the probability that he does **not** win is 0.64
Arhan plays 75 games of chess.

Calculate an estimate for the number of games he wins.

.....

**(Total for Question 4 is 2 marks)**

**5** Solve the simultaneous equations $4x + 4y = 18$
$4x + 6y = 35$

Show clear algebraic working.

$x =$ .....

$y =$ .....

**(Total for Question 5 is 3 marks)**

DO NOT WRITE IN THIS AREA

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**6**

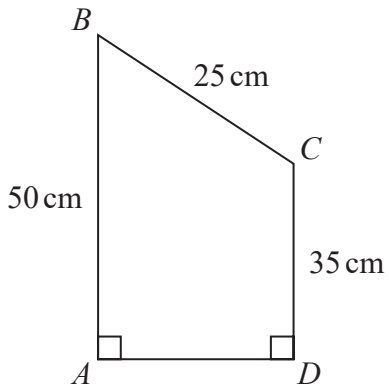



Diagram **NOT** accurately drawn

The diagram shows a quadrilateral $ABCD$ in which

$BC = 25\,\text{cm}$ $AB = 50\,\text{cm}$ $CD = 35\,\text{cm}$ angle $BAD$ = angle $CDA = 90°$

Calculate the perimeter, in cm, of quadrilateral $ABCD$.

..... cm

**(Total for Question 6 is 3 marks)**

**7** Michael's age is $n$ years.
Navtej's age is three times Michael's age.
Indre is 8 years younger than Navtej and 20 years older than Michael.

Find the value of $n$.
Show clear algebraic working.

$n =$ .....

**(Total for Question 7 is 3 marks)**

**8**


The diagram shows the rectangle *ABCD*.

The region *R* consists of all the points inside the rectangle that are

(i) greater than 4 cm from *B*,

(ii) closer to *BA* than to *CD*.

Using ruler and compasses only and showing all your construction lines, show, by shading, the region *R*.
Label the region *R*.

**(Total for Question 8 is 3 marks)**

**9** A shopkeeper sells a radio for $27
For this selling price, the shopkeeper makes a profit of 8%

Calculate the selling price of the radio so that the shopkeeper would make a profit of 35%

$ .....

**(Total for Question 9 is 3 marks)**

**10** The integer $N$ is greater than 120

When $N$ is divided by 28 the remainder is 3
When $N$ is divided by 120 the remainder is 3

Find the least value of $N$.
You must show your working.

.....

**(Total for Question 10 is 3 marks)**

**11** Greg is organising a day out for his students.
Each of his students has to choose to take part in at least one activity chosen from rock climbing ($R$) and canoeing ($C$).

The cost for rock climbing is \$42
The cost for canoeing is \$34
The total cost for all the activities chosen by the students is \$3702

Given that $n(R \cap C') = 32$ and that $n(R \cup C) = 68$

find the number of Greg's students who chose to take part in both rock climbing and canoeing.

.....

**(Total for Question 11 is 3 marks)**

**12** Write as a single fraction in its simplest form

$$\frac{x-6}{3} - \frac{8x+2}{4}$$

Show clear algebraic working.

.....

**(Total for Question 12 is 3 marks)**

**13**

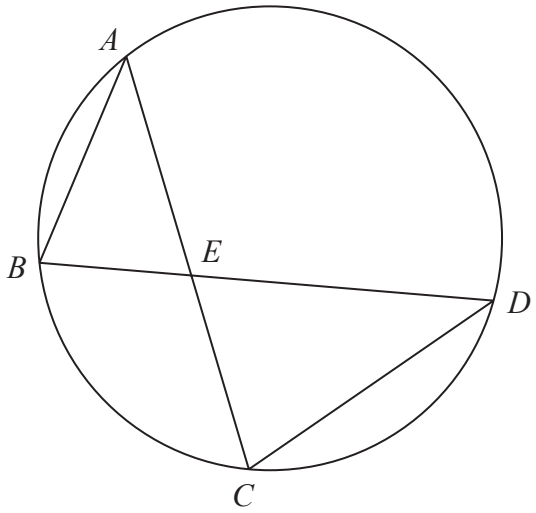



Diagram **NOT** accurately drawn

In the diagram, $A$, $B$, $C$ and $D$ are points on a circle.
$BED$ and $AEC$ are straight lines.

Prove that triangle $ABE$ is similar to triangle $DCE$.

**(Total for Question 13 is 3 marks)**

**14**

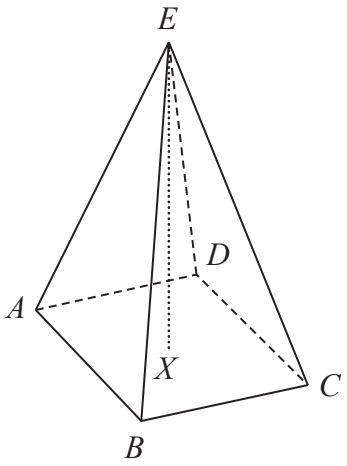



Diagram **NOT** accurately drawn

The diagram shows a square based right pyramid $ABCDE$. The point $X$ is the centre of the base so that the point $E$ is vertically above $X$.

$EX = 15\,\text{cm}$ $\quad$ $AB = 8\,\text{cm}$

Calculate the size, in degrees to 3 significant figures, of the acute angle between $AE$ and $AX$.

.....°

**(Total for Question 14 is 3 marks)**

**15** Without using a calculator and showing all your working, express

$$\frac{4-\sqrt{12}}{4+\sqrt{12}}$$

in the form $a - \sqrt{b}$ where $a$ and $b$ are integers.

.....

**(Total for Question 15 is 3 marks)**

**16** (a) Simplify fully $\left(5a^2b^3\right)^2$

.....

**(2)**

(b) Simplify fully $\dfrac{\left(9x^4y^2\right)^{\frac{1}{2}}}{3x^2y^{-4}}$

.....

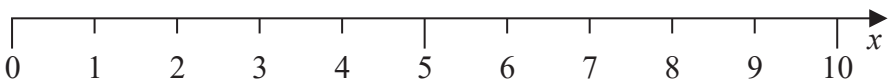
**(2)**

**(Total for Question 16 is 4 marks)**

**17** (a) Find the set of values of $x$ for which $-2x + 4 \leqslant 3x - 6 < 2x + 2$

**(3)**

(b) On the number line below, represent the set of values of $x$ for which $-2x + 4 \leqslant 3x - 6 < 2x + 2$




**(1)**

**(Total for Question 17 is 4 marks)**

**18**

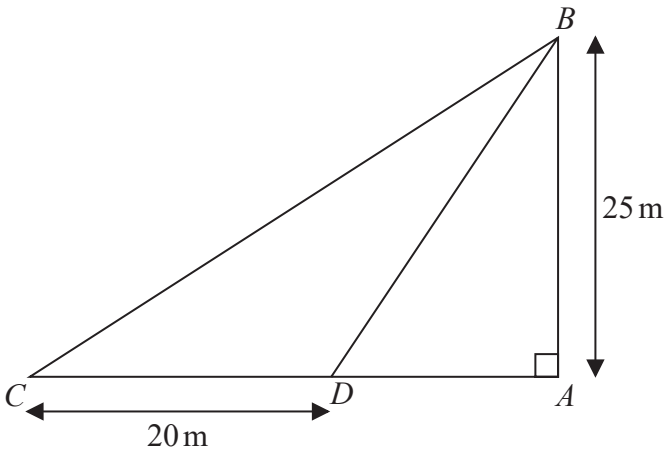



Diagram **NOT** accurately drawn

In the diagram, $AB$ represents a vertical cliff of height 25 m.

The points $C$ and $D$ are buoys on the surface of the sea so that $CDA$ is a horizontal straight line.

The angle of elevation of $B$ from $C$ is 33° and $CD = 20$ m.

Calculate the size, in degrees to 3 significant figures, of the angle of depression of $D$ from $B$.

.....°

**(Total for Question 18 is 4 marks)**

**19**

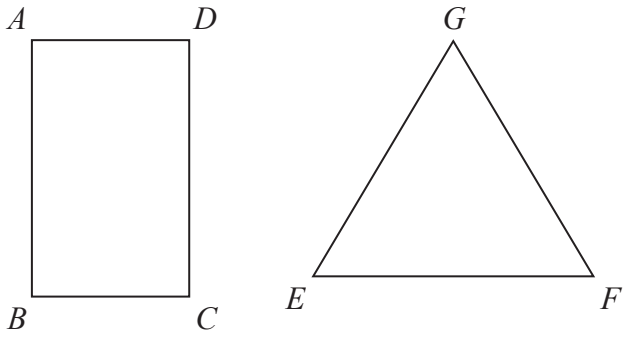



Diagram **NOT** accurately drawn

*ABCD* is a rectangle in which $AB = x\sqrt{3}$ cm and $BC = x$ cm.
*EFG* is an equilateral triangle with sides of length $y$ cm.

The area of rectangle *ABCD* is equal to the area of triangle *EFG*.

Find the ratio

the perimeter of the rectangle *ABCD* : the perimeter of the triangle *EFG*.

Give your answer in the form $\left(a + \sqrt{b}\right) : b$ where $a$ and $b$ are integers.

.....

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

**20** A solid right circular cone is made of brass.

The mass of the cone is 5080 grams, to the nearest 10 grams.

The radius of the base of the cone is 8.5 cm, to 2 significant figures.

The density of the brass is 8.73 g / cm$^3$, to 3 significant figures.

Given that

$$\text{density} = \frac{\text{mass}}{\text{volume}}$$

and taking the value of $\pi$ as 3.142

calculate the upper bound of the height of the cone.
Give your answer to one decimal place.

..... cm

**(Total for Question 20 is 4 marks)**

**21** $A$ and $B$ are two mathematically similar containers.

Container $A$ has surface area of $1550\,\text{mm}^2$ and container $B$ has surface area of $10\,478\,\text{mm}^2$

Given that

$$\text{volume of container } B - \text{volume of container } A = 62\,160\,\text{mm}^3$$

calculate the volume, in $\text{mm}^3$, of container $A$.

..... $\text{mm}^3$

**(Total for Question 21 is 5 marks)**

**22**

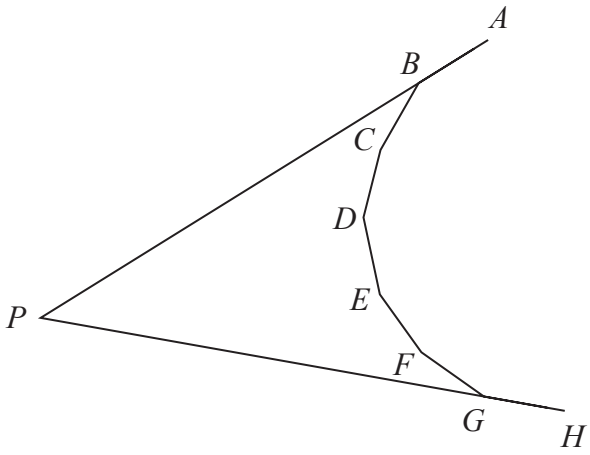



Diagram **NOT** accurately drawn

In the diagram $AB$, $BC$, $CD$, $DE$, $EF$, $FG$ and $GH$ are seven sides of a regular $n$-sided polygon.

$ABP$ and $HGP$ are straight lines.

The size of each exterior angle of the polygon is $x°$
The size of each interior angle of the polygon is $7x°$

Calculate the size of $\angle GPB$
Show your working clearly.

.....°

**(Total for Question 22 is 5 marks)**

**23** In a region of a country, two types of eagle, type *A* and type *B*, can be found.

In 2003 the ratio of the number of type *A* eagles to the number of type *B* eagles was 2 : 5
In 2015 the ratio of the number of type *A* eagles to the number of type *B* eagles was 4 : 3

From 2003 to 2015, the number of type *A* eagles had increased by 16
From 2003 to 2015, the number of type *B* eagles had decreased by 107

Calculate the number of type *B* eagles in this region in 2015

.....

**(Total for Question 23 is 5 marks)**

**24** One solution of the equation $6x^3 + 17x^2 - 5x - 6 = 0$ is $-\frac{1}{2}$

Find the other 2 solutions of the equation.
Show clear algebraic working.

.....

.....

**(Total for Question 24 is 5 marks)**

**25** A particle $P$ is moving along a straight line.

At time $t$ seconds, $t \geqslant 0$, the displacement, $x$ metres, of $P$ from a fixed point $O$ on the line is given by

$$x = k + 6t - 2kt^2$$

where $k$ is a constant.

When $t = 0$, $P$ is at the point $A$ on the line.
When $P$ is at the point $B$ on the line, $P$ is instantaneously at rest.

Given that $AB = 0.9\,\text{m}$, calculate the value of $k$.
Show your working clearly.

$k =$ .....

**(Total for Question 25 is 5 marks)**

**26** There are 30 students in a class.

All the students in the class take a test.
Here are the marks in the test for the 12 girls in the class.

35 42 67 83 21 24 56 32 69 98 $x$ 49

where $x > 70$

(a) Find the median of the girls' marks.

.....

**(2)**

The mean mark for the 12 girls is 54.5

(b) Find the value of $x$.

$x =$ .....

**(2)**

The mean mark for the boys is 56

(c) Calculate the mean mark for the 30 students in the class.

.....

**(3)**

**(Total for Question 26 is 7 marks)**

**27** $\mathbf{A} = \begin{pmatrix} 3 & -1 \\ 2 & -2 \end{pmatrix}$

(a) Given that the inverse of matrix **A** is $\frac{1}{a}\begin{pmatrix} 2 & -1 \\ 2 & -3 \end{pmatrix}$

find the value of $a$.

$a =$ .....

**(2)**

(b) Hence find the matrix **B** such that $\mathbf{ABA}^{-1} = \begin{pmatrix} 9 & -11 \\ 8 & -11 \end{pmatrix}$

**(5)**

**(Total for Question 27 is 7 marks)**

**TOTAL FOR PAPER IS 100 MARKS**

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