

Please check the examination details below before entering your candidate information

Candidate surname

Other names

Centre Number

Candidate Number

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Pearson Edexcel International GCSE

Time 2 hours

Paper
reference

4MA1/1HR

Mathematics A

PAPER 1HR

Higher Tier

January 2023



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.
- Without sufficient working, correct answers may be awarded no marks.
- Answer the questions in the spaces provided
– *there may be more space than you need.*
- **Calculators may be used.**
- You must **NOT** write anything on the formulae page.
Anything you write on the formulae page will gain **NO** credit.

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.

Turn over ►

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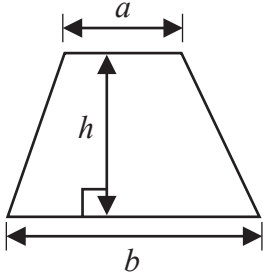
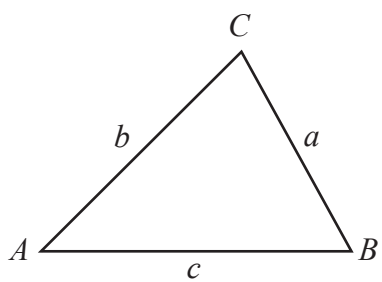
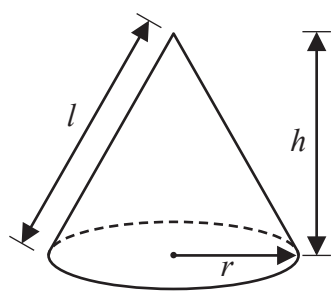
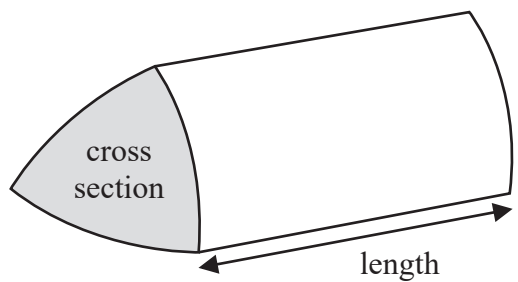
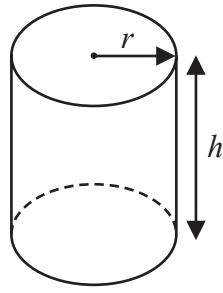
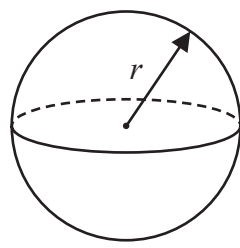
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Pearson

International GCSE Mathematics

Formulae sheet – Higher Tier

<p>Arithmetic series</p> <p>Sum to n terms, $S_n = \frac{n}{2} [2a + (n - 1)d]$</p>	<p>Area of trapezium = $\frac{1}{2}(a + b)h$</p>
<p>The quadratic equation</p> <p>The solutions of $ax^2 + bx + c = 0$ where $a \neq 0$ are given by:</p> $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$	
<p>Trigonometry</p> 	<p>In any triangle ABC</p> <p>Sine Rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$</p> <p>Cosine Rule $a^2 = b^2 + c^2 - 2bc \cos A$</p> <p>Area of triangle = $\frac{1}{2}ab \sin C$</p>
<p>Volume of cone = $\frac{1}{3}\pi r^2 h$</p> <p>Curved surface area of cone = $\pi r l$</p> 	<p>Volume of prism = area of cross section \times length</p> 
<p>Volume of cylinder = $\pi r^2 h$</p> <p>Curved surface area of cylinder = $2\pi r h$</p> 	<p>Volume of sphere = $\frac{4}{3}\pi r^3$</p> <p>Surface area of sphere = $4\pi r^2$</p> 

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Answer ALL TWENTY FOUR questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

- 1 The table shows information about the frame size, in cm, of 60 bicycles sold in a shop.

Frame size (S cm)	Frequency
$30 < S \leq 36$	4
$36 < S \leq 42$	14
$42 < S \leq 48$	18
$48 < S \leq 54$	19
$54 < S \leq 60$	5

- (a) Write down the modal class.

.....
(1)

- (b) Work out an estimate for the mean frame size.

..... cm
(4)

(Total for Question 1 is 5 marks)



2 The diagram shows a solid triangular prism.

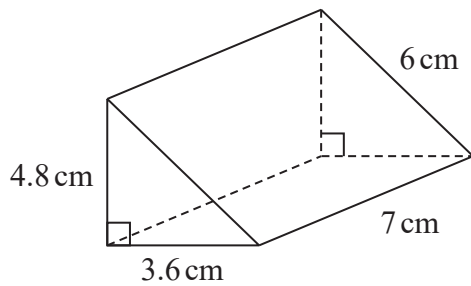


Diagram **NOT** accurately drawn

Work out the **total** surface area of the triangular prism.
Give your answer correct to 3 significant figures.

..... cm²

(Total for Question 2 is 3 marks)

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3 Here is a list of six numbers written in order of size.

x 5 y z 10 12

The numbers have

a range of 9

a median of 8

a mode of 10

Find the value of x , the value of y and the value of z

$x =$

$y =$

$z =$

(Total for Question 3 is 3 marks)



4 Divya and Yuan each pay for a holiday at a special offer price.

<p>Divya's holiday</p> <p>Normal price: \$1600</p> <p>Special offer: 16% off the normal price</p>
--

<p>Yuan's holiday</p> <p>Normal price: \$1400</p> <p>Special offer: $k\%$ off the normal price</p>
--

The amount that Divya pays is the same as the amount that Yuan pays.

Work out the value of k

$k = \dots\dots\dots$

(Total for Question 4 is 4 marks)

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- 5 C grams of chocolate is shared in the ratios 2:5:8
The difference between the largest share and the smallest share is 390 grams.

Work out the value of C

$$C = \dots\dots\dots$$

(Total for Question 5 is 3 marks)

- 6 Solve the simultaneous equations

$$\begin{aligned}x + 2y &= 15 \\4x - 6y &= 4\end{aligned}$$

Show clear algebraic working.

$$x = \dots\dots\dots$$

$$y = \dots\dots\dots$$

(Total for Question 6 is 3 marks)



7 (a) Write 9.32×10^{-5} as an ordinary number.

.....
(1)

(b) Work out $3 \times 10^5 - 6 \times 10^4$
Give your answer in standard form.

.....
(2)

(c) Work out $(3 \times 10^{55}) \times (6 \times 10^{65})$
Give your answer in standard form.

.....
(2)

(Total for Question 7 is 5 marks)



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8 (a) Factorise fully $18c^3d^2 - 21c^2$

.....
(2)

(b) (i) Factorise $y^2 - 3y - 18$

.....
(2)

(ii) Hence, solve $y^2 - 3y - 18 = 0$

.....
(1)

(Total for Question 8 is 5 marks)



9 The diagram shows an isosceles triangle ABC

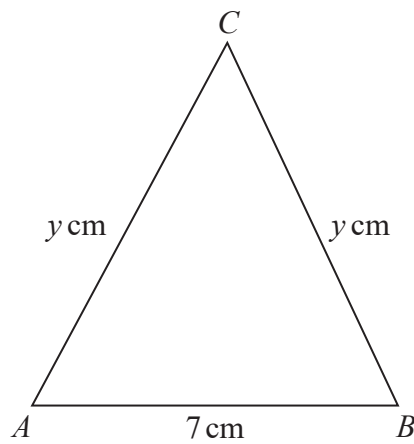


Diagram **NOT** accurately drawn

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$$AB = 7 \text{ cm} \quad AC = BC = y \text{ cm}$$

The area of the triangle is 42 cm^2

Work out the value of y

$$y = \dots\dots\dots$$

(Total for Question 9 is 4 marks)



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10 R and T are points on a circle, centre O

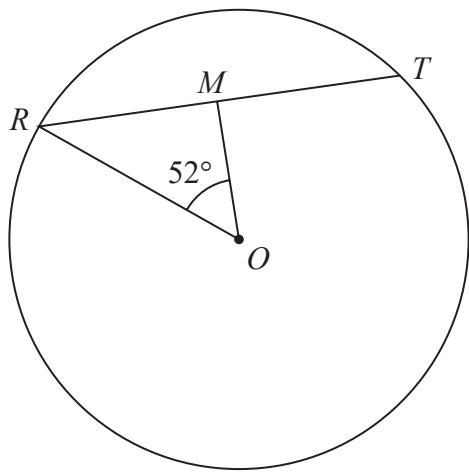


Diagram NOT accurately drawn

$RT = 12$ cm
 M is the midpoint of RT
 Angle $ROM = 52^\circ$

Work out the area of the circle.
 Give your answer correct to 3 significant figures.

..... cm²

(Total for Question 10 is 4 marks)



- 11 The table shows information about the times, in minutes, that 80 patients had to wait to see a doctor.

Time (W minutes)	Frequency
$0 < W \leq 10$	7
$10 < W \leq 20$	10
$20 < W \leq 30$	15
$30 < W \leq 40$	32
$40 < W \leq 50$	16

- (a) Complete the cumulative frequency table below.

Time (W minutes)	Cumulative frequency
$0 < W \leq 10$	
$0 < W \leq 20$	
$0 < W \leq 30$	
$0 < W \leq 40$	
$0 < W \leq 50$	

(1)

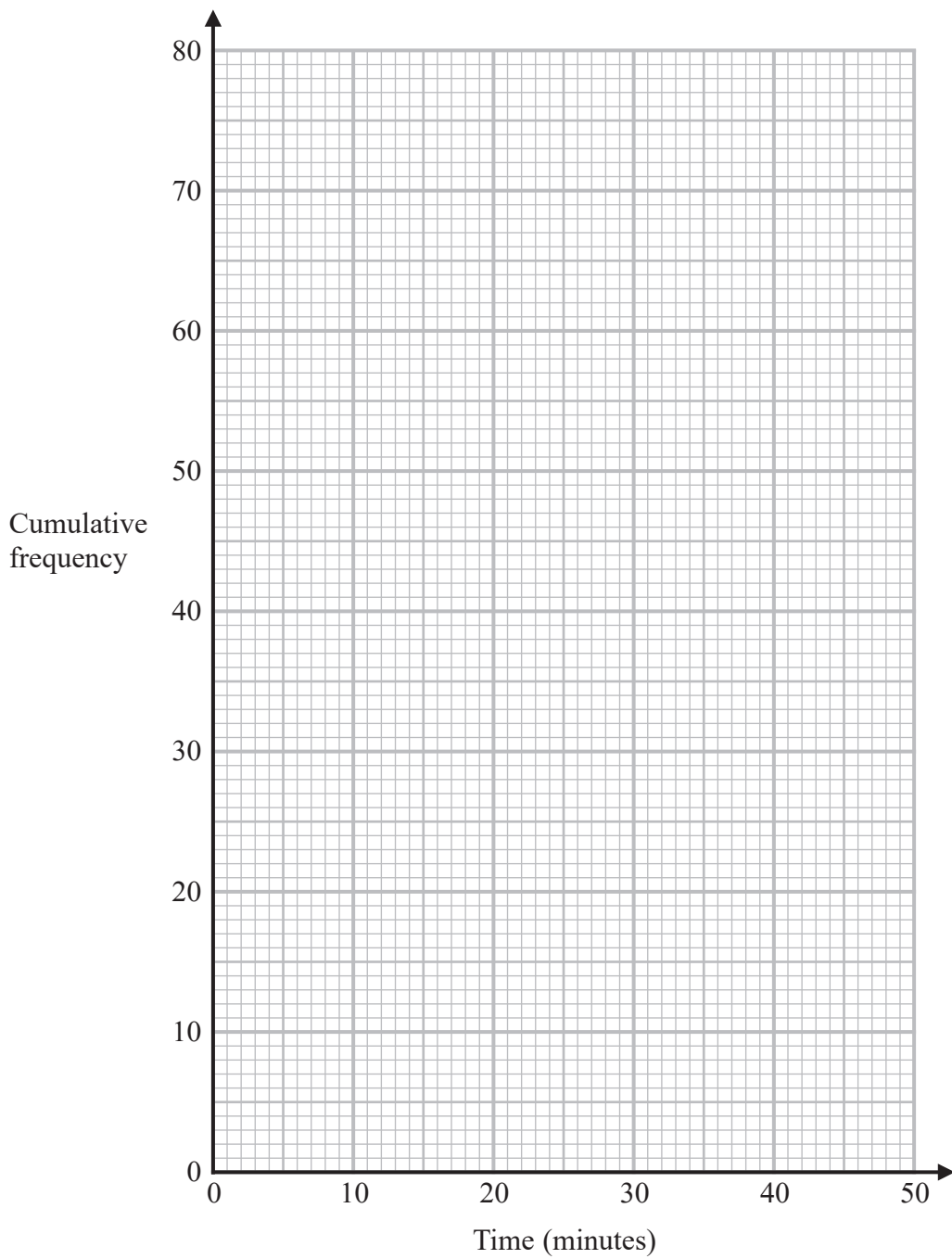
- (b) On the grid opposite, draw a cumulative frequency graph for your table.



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(2)

(c) Use your graph to find an estimate for the median.

..... minutes
(1)

(d) Use your graph to find an estimate for the interquartile range.

..... minutes
(2)

(Total for Question 11 is 6 marks)



12 Solve $2^{-4x} = 32$

$$x = \dots\dots\dots$$

(Total for Question 12 is 2 marks)

13 Use algebra to show that $0.3\dot{8}\dot{1} = \frac{21}{55}$

(Total for Question 13 is 2 marks)



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14 $T = \frac{p}{r}$

$p = 0.51$ correct to 2 significant figures.

$r = 6.3$ correct to 2 significant figures.

Work out the upper bound for the value of T
Show your working clearly.

.....
(Total for Question 14 is 2 marks)



15 (a) Complete the table of values for $y = x^3 - 3x + 2$

x	-2	-1	-0.5	0	1	1.5	2
y		4	3.4		0	0.9	

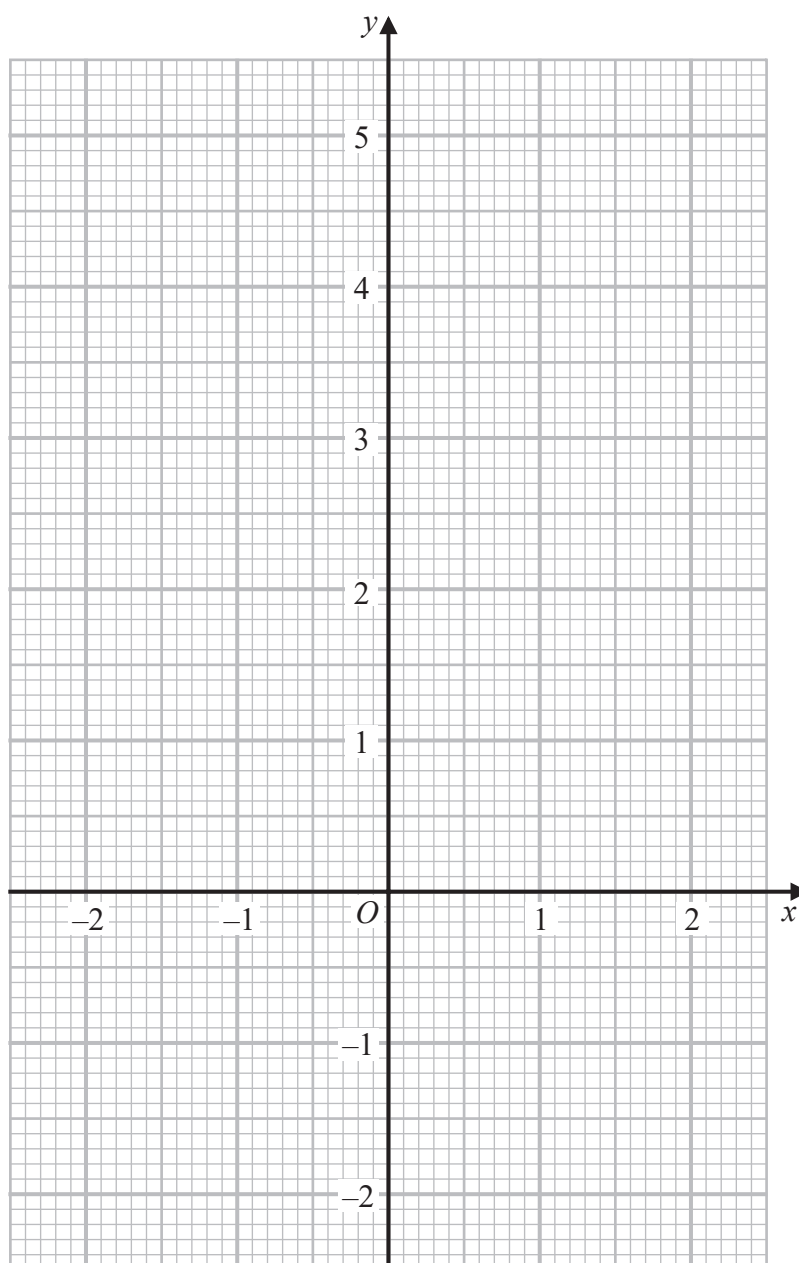
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(b) On the grid, draw the graph of $y = x^3 - 3x + 2$ for values of x from -2 to 2



(2)



(c) By drawing a suitable straight line on the grid, use your graph to find an estimate for the solution of

$$2x^3 - 3x + 4 = 0$$

Give your answer correct to one decimal place.

.....
(3)

(Total for Question 15 is 7 marks)

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P 7 2 4 3 8 A 0 1 7 2 8

16 The function f is such that

$$f(x) = \frac{2}{3x - 5} \quad \text{where } x \neq \frac{5}{3}$$

(a) Find $f\left(\frac{1}{3}\right)$

.....
(1)

(b) Find $f^{-1}(x)$

$$f^{-1}(x) = \text{.....}$$

(2)

The function g is such that

$$g(x) = 5x^2 - 20x + 23$$

(c) Express $g(x)$ in the form $a(x - b)^2 + c$

.....
(3)

(Total for Question 16 is 6 marks)



17

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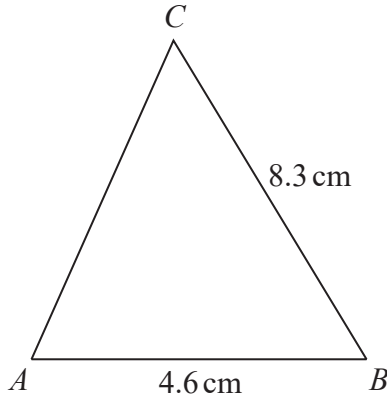


Diagram NOT accurately drawn

$AB = 4.6 \text{ cm}$ $BC = 8.3 \text{ cm}$ angle ABC is acute

The area of triangle ABC is 12 cm^2

Work out the perimeter of triangle ABC
Give your answer correct to 3 significant figures.

..... cm

(Total for Question 17 is 5 marks)



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18 Solve $\sqrt{3}(x - 2\sqrt{3}) = x + 2\sqrt{3}$

Give your answer in the form $a + b\sqrt{3}$ where a and b are integers.
Show your working clearly.

$x = \dots\dots\dots$

(Total for Question 18 is 4 marks)



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19 P is inversely proportional to y^2

When $y = 4$, $P = a$

(a) Find a formula for P in terms of y and a

.....
(3)

Given also that y is directly proportional to \sqrt{x}
and when $x = a$, $P = 4a$

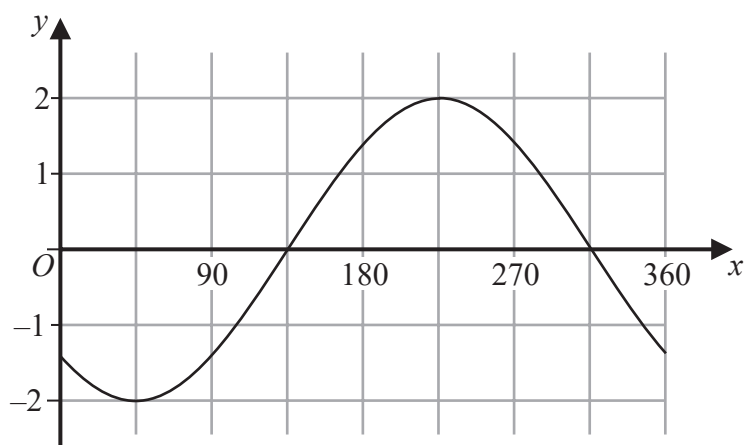
(b) find a formula for P in terms of x and a

.....
(3)

(Total for Question 19 is 6 marks)



20 Here is a sketch of the curve $y = a \cos(x + b)^\circ$ for $0 \leq x \leq 360$



Given that $0 < b < 180$

find the value of a and the value of b

$a = \dots\dots\dots$

$b = \dots\dots\dots$

(Total for Question 20 is 2 marks)



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21 The diagram shows a triangular prism, $ABCDEF$, with a rectangular base $ABCD$

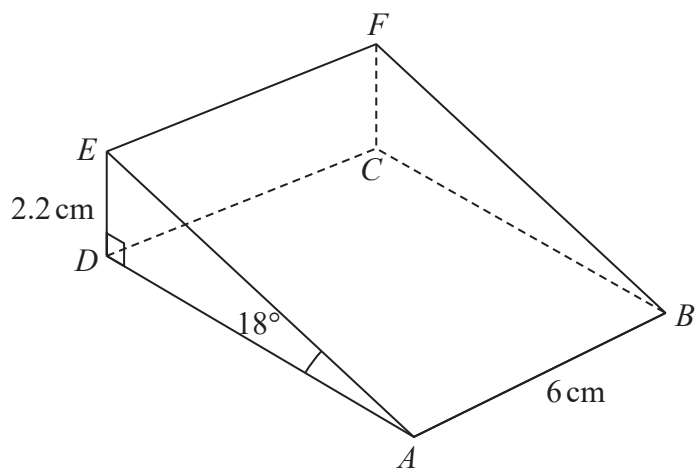


Diagram NOT accurately drawn

$AB = 6 \text{ cm}$

$DE = 2.2 \text{ cm}$

angle $DAE = 18^\circ$

angle $ADE = 90^\circ$

Work out the angle that BE makes with the plane $ABCD$
Give your answer correct to one decimal place.

(Total for Question 21 is 4 marks)



22 The diagram shows triangle OAB with OA extended to E

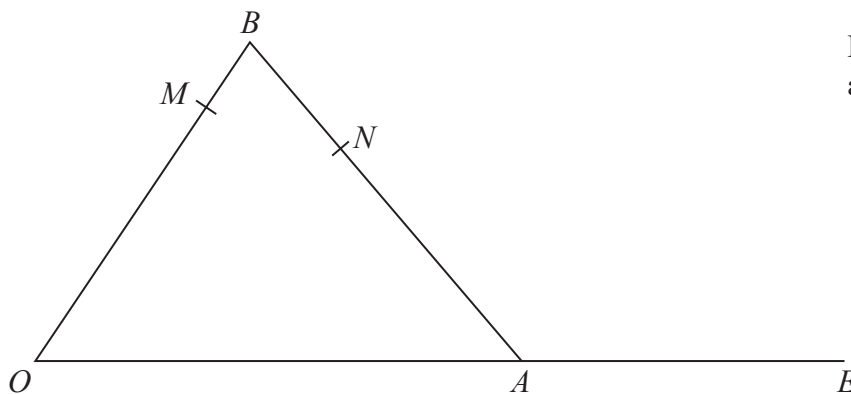


Diagram **NOT** accurately drawn

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$\vec{OA} = \mathbf{a}$ $\vec{OB} = \mathbf{b}$

M is the point on OB such that $OM:MB = 4:1$

N is the point on AB such that $AN:NB = 3:2$

$OA:AE = 5:3$

- (a) Find an expression for \vec{ON} in terms of \mathbf{a} and \mathbf{b}
 Give your answer in its simplest form.

$\vec{ON} = \dots\dots\dots$
 (2)



(b) Use a vector method to show that MNE is a straight line.

(3)

(Total for Question 22 is 5 marks)

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P 7 2 4 3 8 A 0 2 5 2 8

- 23 G is the point on the curve with equation $y = 8x^2 - 14x - 6$ where the gradient is 10
The straight line Q passes through the point G and is perpendicular to the tangent at G

Find an equation for Q

Give your answer in the form $ax + by + c = 0$ where a , b and c are integers.

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



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24 An arithmetic sequence has first term 8 and common difference 11
The sequence has k terms, where $k > 21$

The sum of the last 20 terms of the sequence is 10 170

Find the value of k

Show clear algebraic working.

$k = \dots\dots\dots$

(Total for Question 24 is 5 marks)

TOTAL FOR PAPER = 100 MARKS



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