

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)

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

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 $x = a$, $P = 4a$

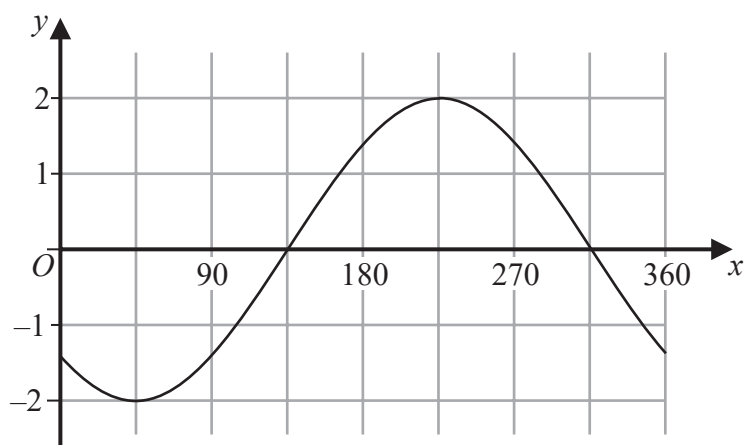
(b) find a formula for P in terms of x and a

.....
(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)



DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

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

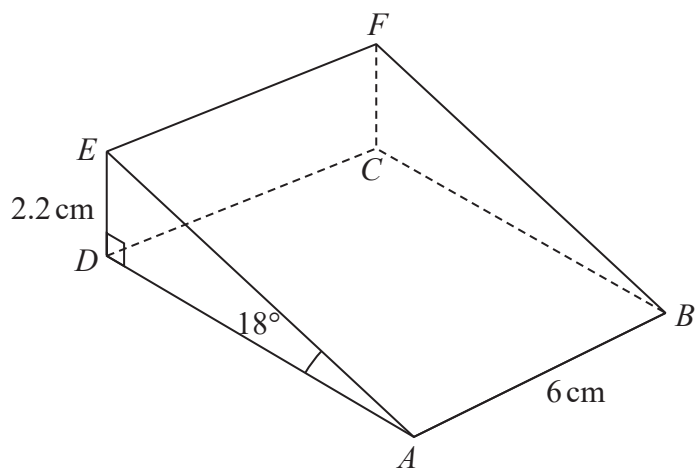


Diagram NOT accurately drawn

$AB = 6 \text{ cm}$

$DE = 2.2 \text{ cm}$

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

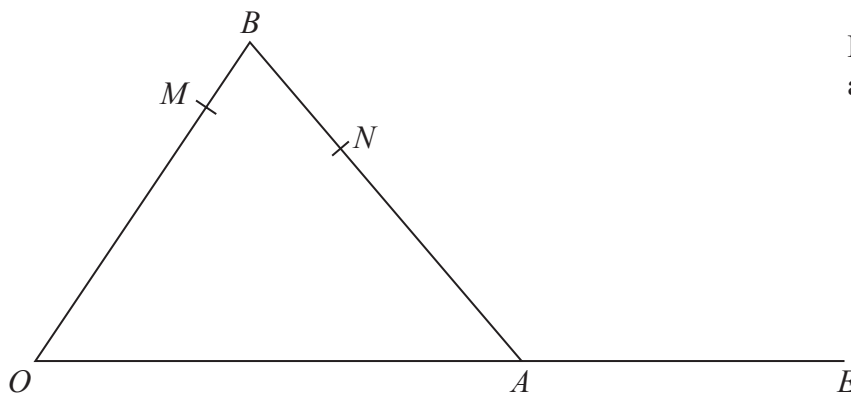


Diagram **NOT** accurately drawn

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

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.

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

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



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

(3)

(Total for Question 22 is 5 marks)

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



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.

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

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



DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

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

