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

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

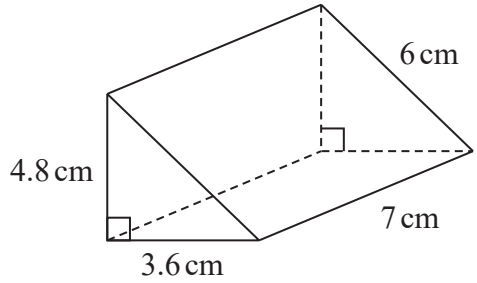


Diagram **NOT** accurately drawn

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

..... cm^2

(Total for Question 2 is 3 marks)

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.

Divya's holiday	**Yuan's holiday**
Normal price: \$1600	Normal price: \$1400
Special offer: 16% off the normal price	Special offer: k% off the normal price

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

Work out the value of k

$k =$ .....

(Total for Question 4 is 4 marks)

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

$C =$ .....

(Total for Question 5 is 3 marks)

6 Solve the simultaneous equations

$$x + 2y = 15$$
$$4x - 6y = 4$$

Show clear algebraic working.

$x =$ .....

$y =$ .....

(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)

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

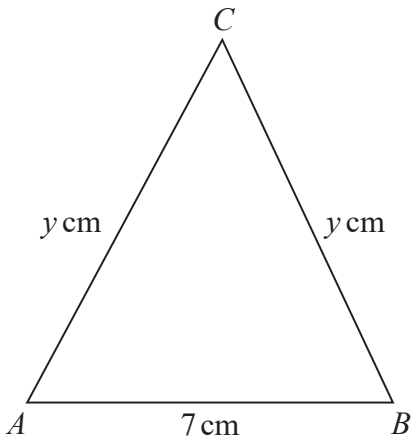


Diagram **NOT** accurately drawn

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

The area of the triangle is $42\,\text{cm}^2$

Work out the value of y

$y =$ .....

(Total for Question 9 is 4 marks)

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

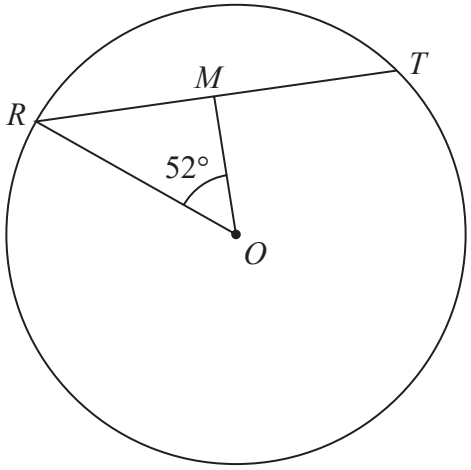


Diagram **NOT** accurately drawn

$RT = 12\,\text{cm}$
M is the midpoint of RT
Angle $ROM = 52°$

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

..... cm^2

(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.

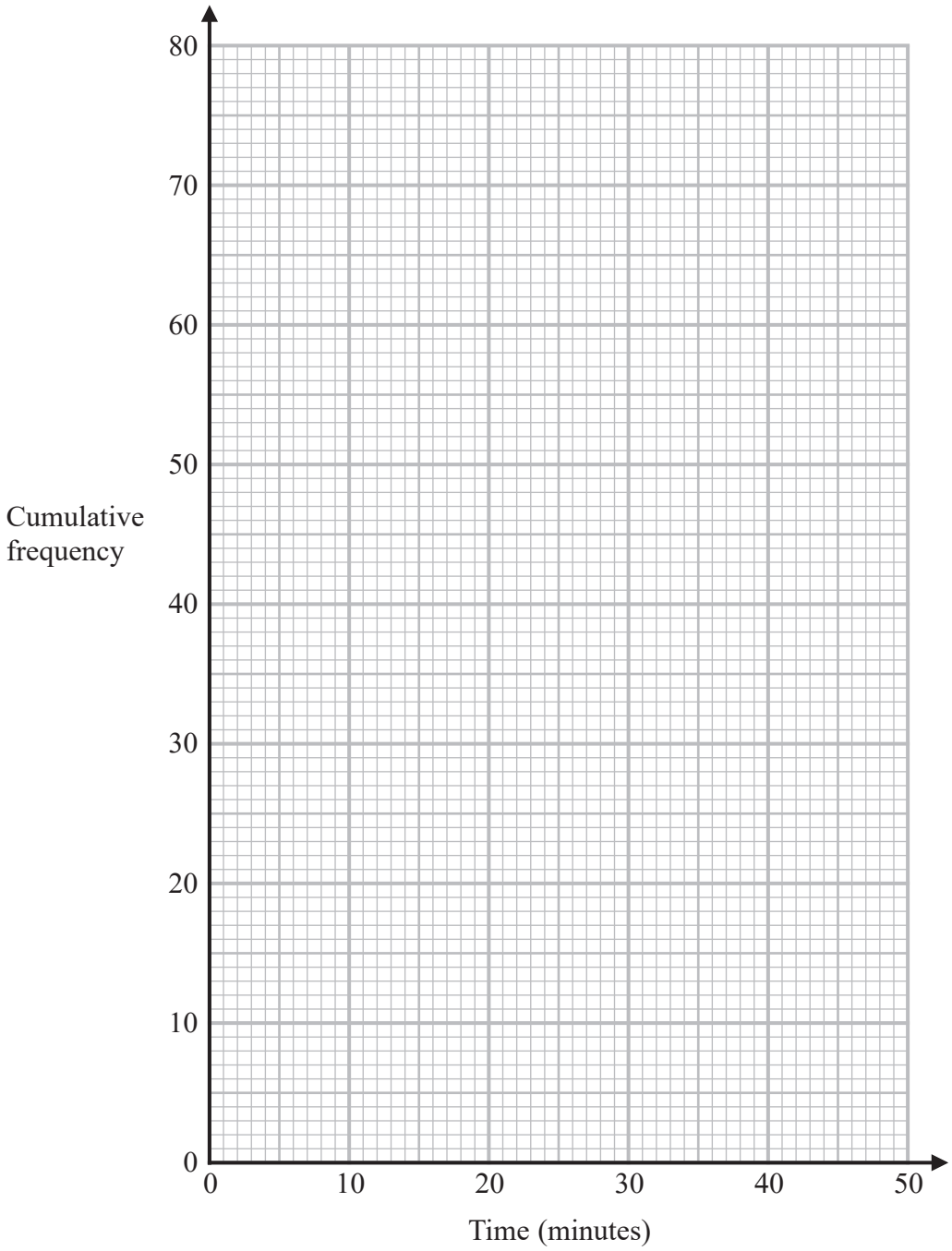
Time (W minutes)	Frequency
$0 < W \leqslant 10$	7
$10 < W \leqslant 20$	10
$20 < W \leqslant 30$	15
$30 < W \leqslant 40$	32
$40 < W \leqslant 50$	16

(a) Complete the cumulative frequency table below.

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

(1)

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



(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 $2^{-4x} = 32$

$x =$ .....

(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)

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

$p = 0.51$ 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.

.....

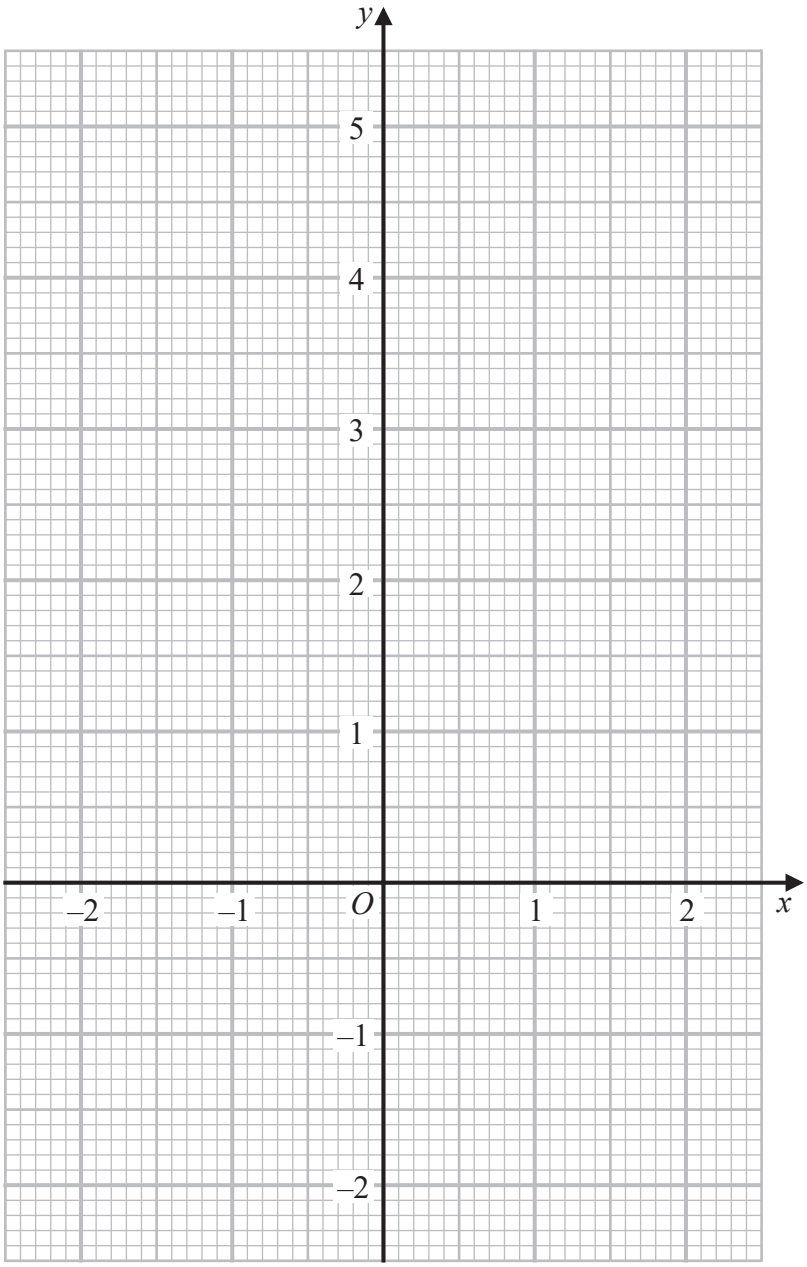
(Total for Question 14 is 2 marks)

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	

(2)

(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)

16 The function f is such that

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

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

.....

(1)

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

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

(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

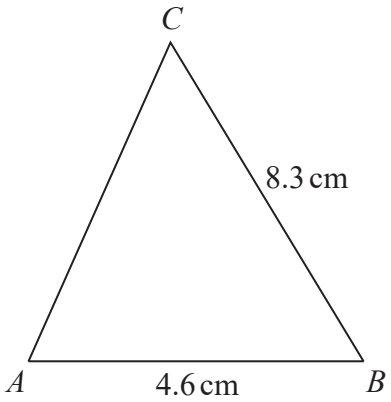


Diagram **NOT** accurately drawn

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

The area of triangle ABC is $12\,\text{cm}^2$

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

..... cm

(Total for Question 17 is 5 marks)

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.

$x =$ .....

(Total for Question 18 is 4 marks)

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

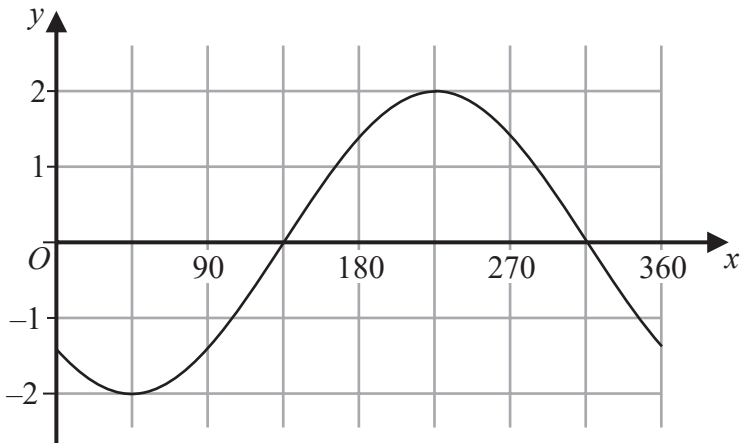
(b) find a formula for P in terms of x and a

.....

(3)

(Total for Question 19 is 6 marks)

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



Given that $0 < b < 180$

find the value of a and the value of b

$a =$ .....

$b =$ .....

(Total for Question 20 is 2 marks)

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

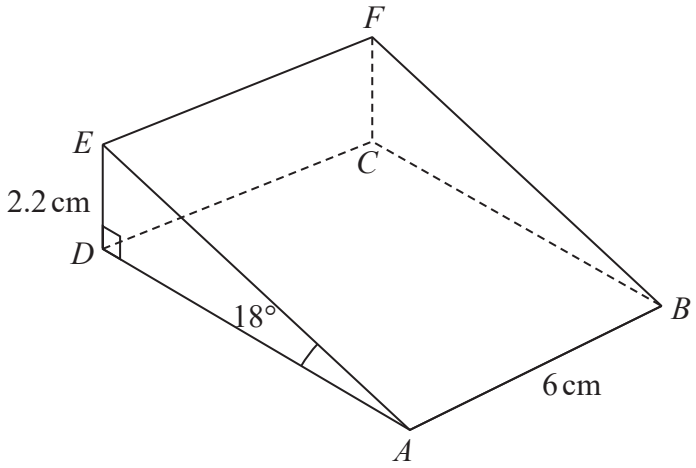


Diagram **NOT** accurately drawn

AB = 6 cm *DE* = 2.2 cm angle *DAE* = 18° angle *ADE* = 90°

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

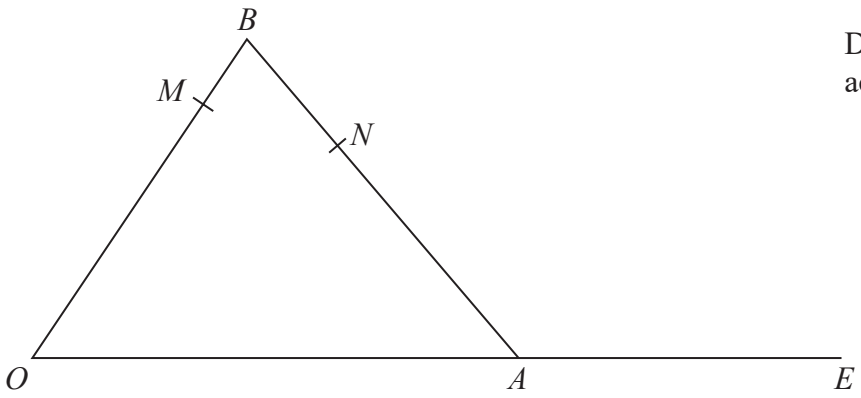


Diagram **NOT** accurately drawn

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

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 $\overrightarrow{ON}$ in terms of **a** and **b**
Give your answer in its simplest form.

$\overrightarrow{ON} =$ .....

(2)

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

(3)

(Total for Question 22 is 5 marks)

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.

.....

(Total for Question 23 is 5 marks)

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.

$k =$ .....

(Total for Question 24 is 5 marks)