

18  $X = \frac{2a - b}{f}$

$a = 7.5$  correct to 1 decimal place.

$b = 3.42$  correct to 2 decimal places.

$f = 2$  correct to the nearest whole number.

Work out the upper bound of the value of  $X$

Show your working clearly.

.....  
(Total for Question 18 is 3 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  $a = \frac{14}{3x-7}$       $x = \frac{7}{4y-3}$

Express  $a$  in the form  $\frac{py+q}{ry+s}$  where  $p, q, r$  and  $s$  are integers.

Give your answer in its simplest form.

$a = \dots\dots\dots$

**(Total for Question 19 is 3 marks)**



20 The diagram shows four identical circles drawn inside a square.

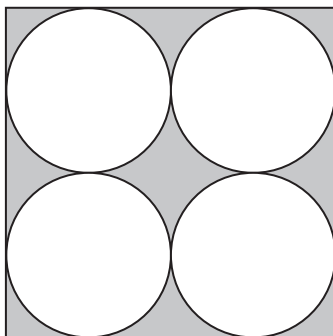


Diagram **NOT**  
accurately drawn

Each circle touches two other circles and two sides of the square.

The region inside the square that is outside the circles, shown shaded in the diagram, has a total area of  $40 \text{ cm}^2$

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

..... cm

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

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



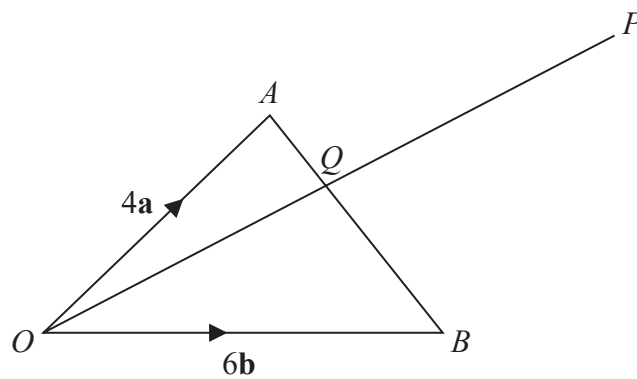


Diagram **NOT**  
accurately drawn

$OAB$  is a triangle.

$Q$  is the point on  $AB$  such that  $OQP$  is a straight line.

$$\vec{OA} = 4\mathbf{a} \quad \vec{OB} = 6\mathbf{b} \quad \vec{AP} = 2\mathbf{a} + 8\mathbf{b}$$

Using a vector method, find the ratio  $AQ:QB$

$$AQ:QB = \dots\dots\dots$$

(Total for Question 21 is 5 marks)



22  $ABCD$  is a kite, with diagonals  $AC$  and  $BD$ , drawn on a centimetre square grid, with a scale of 1 cm for 1 unit on each axis.

$A$  is the point with coordinates  $(-3, 4)$

The diagonals of the kite intersect at the point  $M$  with coordinates  $(0, 2)$

Given that  $AB = AD = 6.5$  cm and the  $x$  coordinate of  $B$  is positive,

find the coordinates of the points  $B$  and  $D$ .

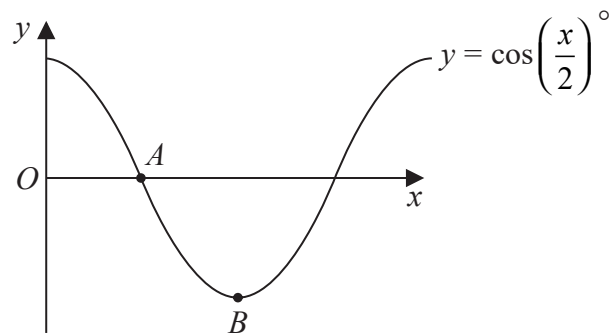


(..... , .....)

(..... , .....)

**(Total for Question 22 is 7 marks)**

23 The diagram shows a sketch of the graph of  $y = \cos\left(\frac{x}{2}\right)^\circ$



(i) Find the coordinates of the point  $A$

(..... , .....)  
(1)

(ii) Find the coordinates of the point  $B$

(..... , .....)  
(1)**(Total for Question 23 is 2 marks)**

24

$$\frac{18 \times (\sqrt{27})^{4n+6}}{6 \times 9^{2n+8}} = 3^x$$

Express  $x$  in terms of  $n$   
Show your working clearly and simplify your expression.

$x = \dots\dots\dots$

(Total for Question 24 is 3 marks)

TOTAL FOR PAPER IS 100 MARKS

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

