

Welcome to Year 12 Maths

20 Questions
for the Summer

Name:

Your completed booklet will be taken
in on the first day back.

Leave blank

1. (a) Write down the value of $16^{\frac{1}{2}}$.

(1)

(b) Find the value of $16^{-\frac{3}{2}}$.

(2)

Lined area for writing answers.

(Total 3 marks)

Q1

5. (a) Write $\sqrt{45}$ in the form $a\sqrt{5}$, where a is an integer.

(1)

(b) Express $\frac{2(3+\sqrt{5})}{(3-\sqrt{5})}$ in the form $b + c\sqrt{5}$, where b and c are integers.

(5)

A series of horizontal lines for writing the solution to the problem.



1. Factorise completely

$$x^3 - 4x^2 + 3x.$$

(3)

Handwritten solution area with horizontal lines.

(Total 3 marks)

Q1



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17 Simplify fully $\frac{3x^2 - 8x - 3}{2x^2 - 6x}$

(Total for Question 17 is 3 marks)



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19 $2 - \frac{x+2}{x-3} - \frac{x-6}{x+3}$ can be written as a single fraction in the form $\frac{ax+b}{x^2-9}$

where a and b are integers.

Work out the value of a and the value of b .

$a = \dots\dots\dots$

$b = \dots\dots\dots$

(Total for Question 19 is 4 marks)



P 4 8 1 4 8 R A 0 1 9 2 4

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21 The functions f and g are such that

$$f(x) = 3x - 1 \quad \text{and} \quad g(x) = x^2 + 4$$

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

$$f^{-1}(x) = \dots\dots\dots (2)$$

Given that $fg(x) = 2gf(x)$,

(b) show that $15x^2 - 12x - 1 = 0$

(5)

(Total for Question 21 is 7 marks)



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19 Given that $x^2 - 6x + 1 = (x - a)^2 - b$ for all values of x ,

(i) find the value of a and the value of b .

$$a = \dots\dots\dots$$

$$b = \dots\dots\dots$$

(2)

(ii) Hence write down the coordinates of the turning point on the graph of $y = x^2 - 6x + 1$

$$(\dots\dots\dots, \dots\dots\dots)$$

(1)

(Total for Question 19 is 3 marks)



Leave blank

4. Solve the simultaneous equations

$$x + y = 2$$

$$x^2 + 2y = 12.$$

(6)

Lined area for student response.

(Total 6 marks)

Q4

19 Solve $2x^2 + 3x - 2 > 0$

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(Total for Question 19 is 3 marks)



P 5 0 5 4 9 A 0 1 9 2 0

20 n is an integer such that $3n + 2 \leq 14$ and $\frac{6n}{n^2 + 5} > 1$

Find all the possible values of n .

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(Total for Question 20 is 5 marks)

TOTAL FOR PAPER IS 80 MARKS



4. The point $A(-6, 4)$ and the point $B(8, -3)$ lie on the line L .

(a) Find an equation for L in the form $ax + by + c = 0$, where a , b and c are integers. (4)

(b) Find the distance AB , giving your answer in the form $k\sqrt{5}$, where k is an integer. (3)

Handwritten area with horizontal lines for student response.

(Total 7 marks)

Q4



- 16 The straight line **L** has the equation $3y = 4x + 7$
The point *A* has coordinates (3, -5)

Find an equation of the straight line that is perpendicular to **L** and passes through *A*.

(Total for Question 16 is 3 marks)

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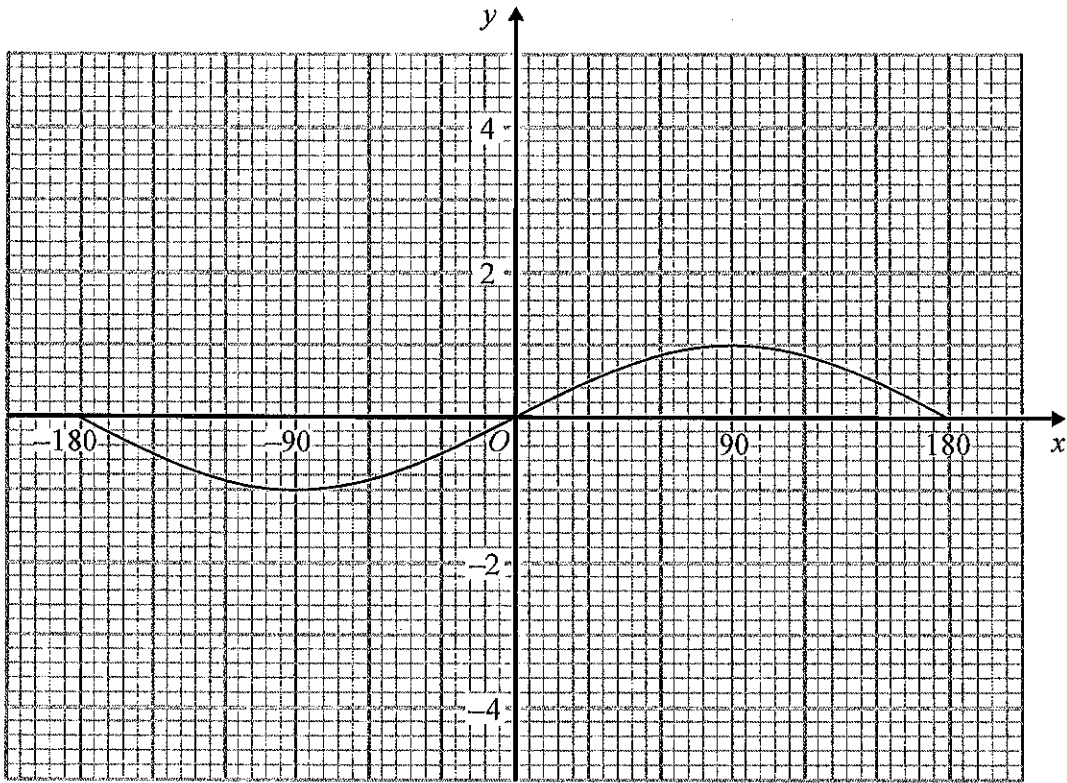


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18 Here is the graph of $y = \sin x^\circ$ for $-180 \leq x \leq 180$



On the grid, sketch the graph of $y = \sin x^\circ - 2$ for $-180 \leq x \leq 180$

(Total for Question 18 is 2 marks)



6.

Figure 1

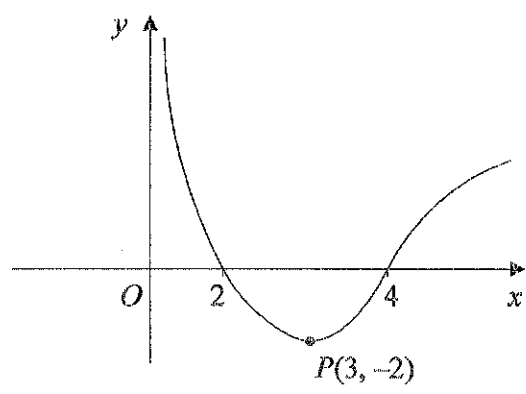


Figure 1 shows a sketch of the curve with equation $y = f(x)$. The curve crosses the x -axis at the points $(2, 0)$ and $(4, 0)$. The minimum point on the curve is $P(3, -2)$.

In separate diagrams sketch the curve with equation

(a) $y = -f(x)$, (3)

(b) $y = f(2x)$. (3)

On each diagram, give the coordinates of the points at which the curve crosses the x -axis, and the coordinates of the image of P under the given transformation.

Question 6 continued

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blank

(Total 6 marks)

Q6

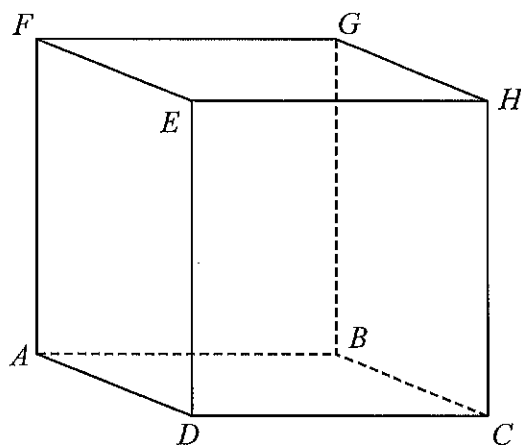
3. Given that $f(x) = \frac{1}{x}, x \neq 0,$

(a) sketch the graph of $y = f(x) + 3$ and state the equations of the asymptotes. (4)

(b) Find the coordinates of the point where $y = f(x) + 3$ crosses a coordinate axis. (2)



18 $ABCDEFGH$ is a cuboid.



$$AB = 7.3 \text{ cm}$$

$$CH = 8.1 \text{ cm}$$

$$\text{Angle } BCA = 48^\circ$$

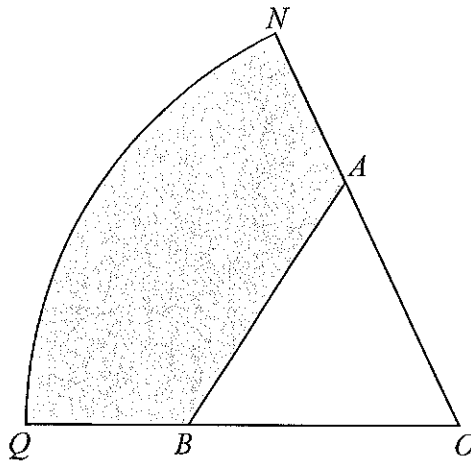
Find the size of the angle between AH and the plane $ABCD$.

Give your answer correct to 1 decimal place.

(Total for Question 18 is 4 marks)



17



ONQ is a sector of a circle with centre O and radius 11 cm.

A is the point on ON and B is the point on OQ such that AOB is an equilateral triangle of side 7 cm.

Calculate the area of the shaded region as a percentage of the area of the sector ONQ .
Give your answer correct to 1 decimal place.

.....%

(Total for Question 17 is 5 marks)



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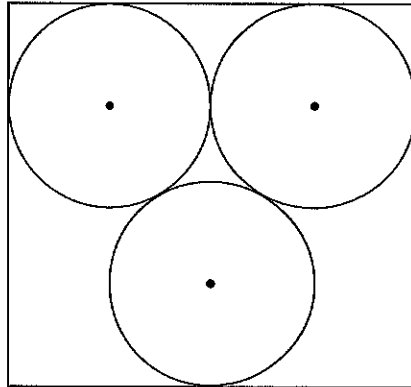
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- 21 The diagram shows 3 identical circles inside a rectangle.
Each circle touches the other two circles and the sides of the rectangle, as shown in the diagram.



The radius of each circle is 24 mm.

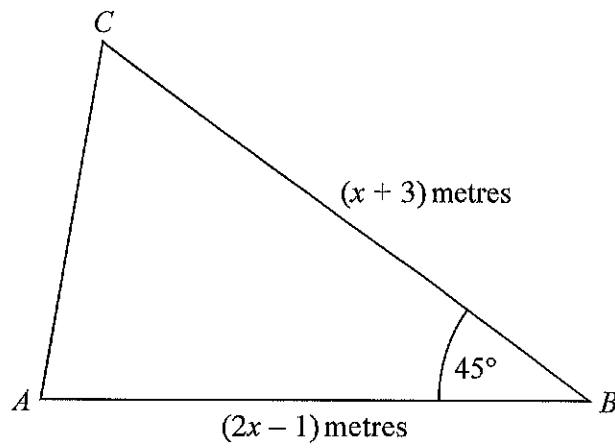
Work out the area of the rectangle.
Give your answer correct to 3 significant figures.

..... mm²

(Total for Question 21 is 4 marks)



15



The area of triangle ABC is $6\sqrt{2}$ m².

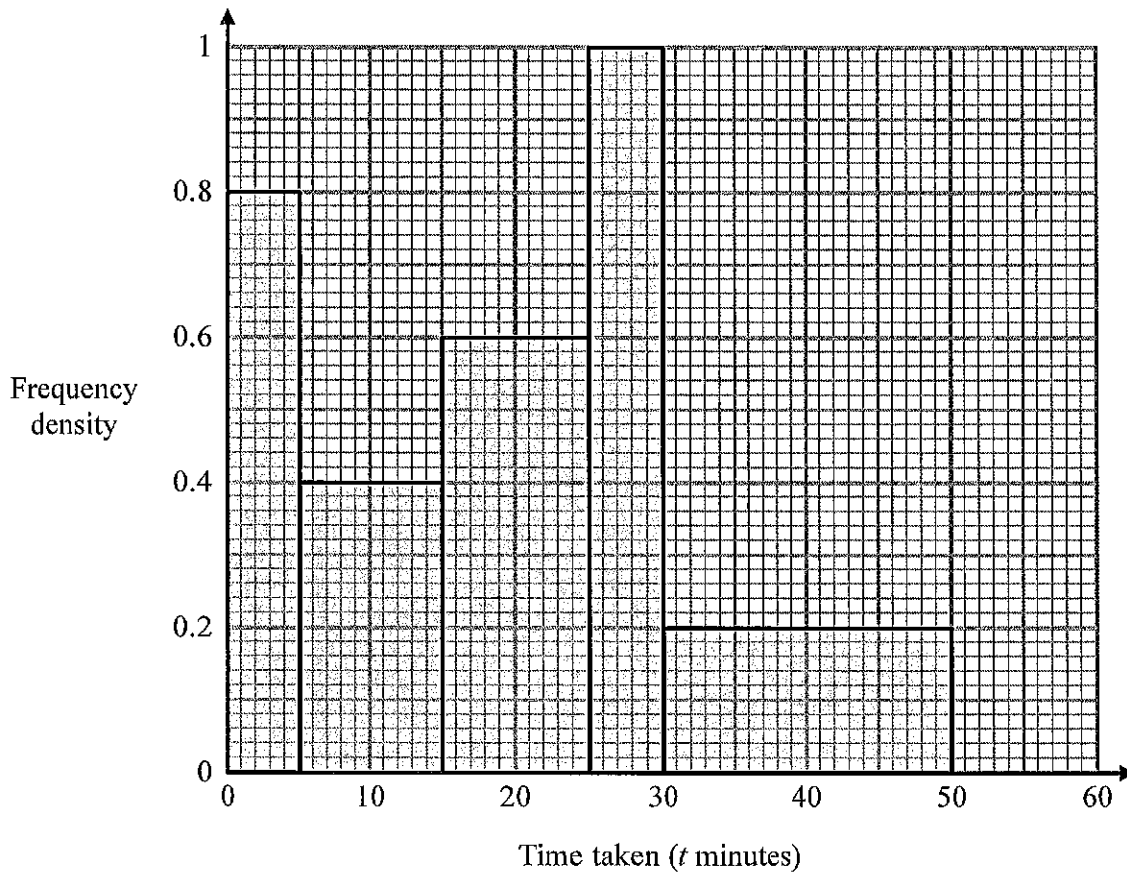
Calculate the value of x .

Give your answer correct to 3 significant figures.

(Total for Question 15 is 5 marks)



17 The histogram shows information about the times taken by some students to finish a puzzle.



(a) Complete the frequency table for this information.

Time taken (t minutes)	Frequency
$0 < t \leq 5$	4
$5 < t \leq 15$	
$15 < t \leq 25$	
$25 < t \leq 30$	
$30 < t \leq 50$	

(2)



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(b) Find an estimate for the lower quartile of the times taken to finish the puzzle.

..... minutes

(2)

(Total for Question 17 is 4 marks)

