GCSE Maths

Test 1

Time Allowed: 1 Hour

Total Marks: 60

26 September 2023

Calculator Allowed

Full Name of Student: ……………………………………………………………

1.

Factorise

(a) $x^2 - 100$

....
(1)

(b) $x^2 - x - 12$

....
(2)

(c) $3x^2 + 7x + 2$

....
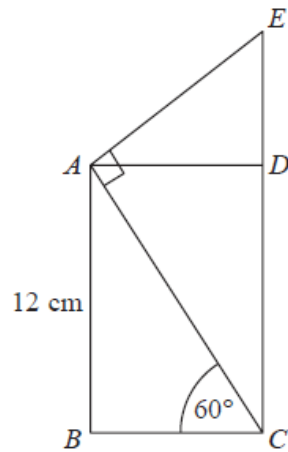**(2)**

[Total for Question 1 = 5 marks]

2.

Diagram **NOT** accurately drawn

ABCD is a rectangle.
CDE is a straight line.

AB = 12 cm
Angle *ACB* = 60°
Angle *EAC* = 90°

Calculate the length of *CE*.
You must show all your working.

.... cm

[Total for Question 2 = 4 marks]

3.

Steve travelled from Ashton to Barnfield.

He travelled 235 miles, correct to the nearest 5 miles.
The journey took him 200 minutes, correct to the nearest 5 minutes.

Calculate the lower bound for the average speed of the journey.
Give your answer in **miles per hour**, correct to 3 significant figures.
You must show all your working.

.... mph

[Total for Question 3 = 4 marks]

4.

(a) Expand $(1+\sqrt{3})^2$
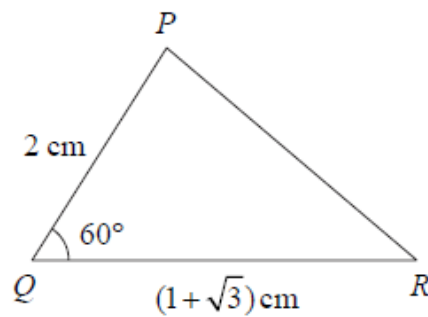Give your answer in the form $a + b\sqrt{3}$ where a and b are integers.

....

(2)

(b)

Diagram **NOT**
accurately drawn

Calculate the exact length of *PR*.
Give your answer as a surd.

.... cm

(4)

[Total for Question 4 = 6 marks]

5.

A wind turbine generates a power of P kilowatts when the wind speed is w m/s.

P is proportional to w^3.

$P = 300$ when $w = 12$

(a) Find a formula for P in terms of w.

....

(3)

(b) Calculate the value of P when $w = 7.5$
Give your answer correct to 3 significant figures.

$P = $ ....

(2)

(c) When the wind speed is x m/s, the wind turbine generates twice as much power as it does when the wind speed is 10 m/s.
Calculate the value of x.
Give your answer correct to 3 significant figures.

$x = $ ....

(4)

[Total for Question 5 = 9 marks]

6.

f is the function such that $f(x) = 2x - 5$

g is the function such that $g(x) = x^2 - 10$

(a) Find f(4)

....
(1)

(b) Find fg(−4)

....
(2)

(c) Express the inverse function f^{-1} in the form $f^{-1}(x) = ...$

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

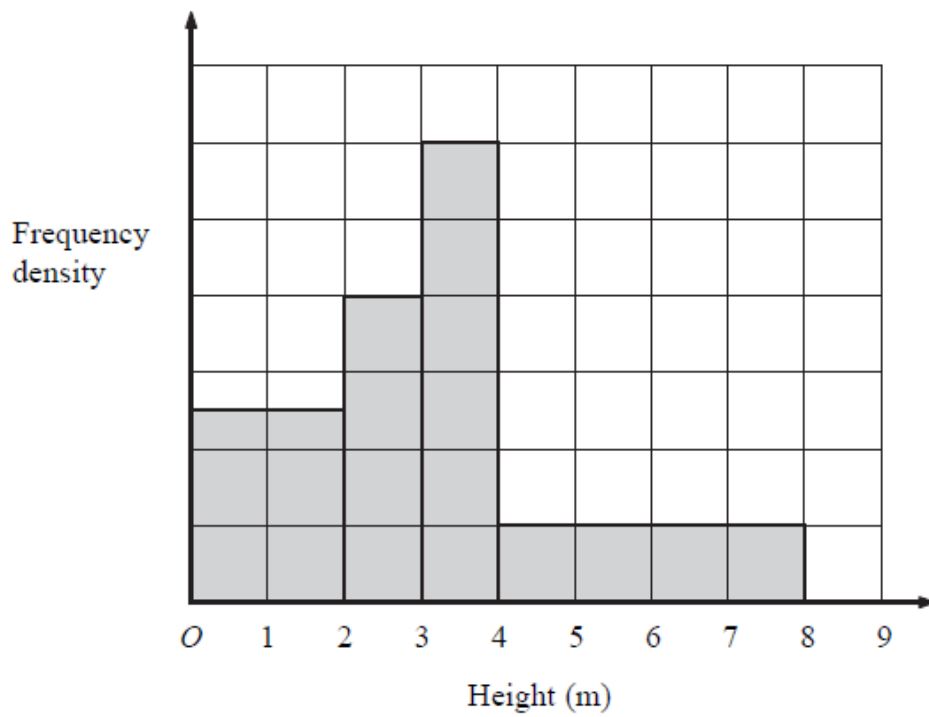(d) Solve $gf(x) = -1$

....
(4)

[Total for Question 6 = 9 marks]

7.

The histogram shows information about the height, h metres, of some trees.

The number of trees with heights in the class $2 < h \leqslant 3$ is 20

Find the number of trees with heights in the class

(i) $4 < h \leqslant 8$

....

(ii) $3 < h \leqslant 4$

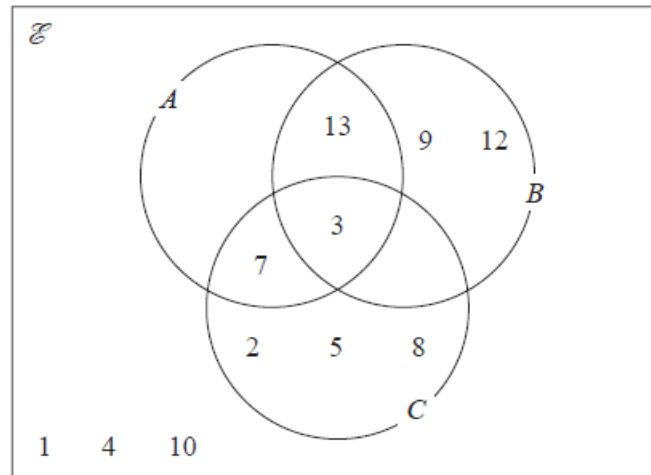.............................

[Total for Question 7 = 3 marks]

8.

$\mathscr{E}= \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13\}$
$A = \{3, 7, 11, 13\}$
$B = \{3, 6, 9, 12, 13\}$
$C = \{2, 3, 5, 6, 7, 8\}$

(a) Complete the Venn diagram.

$\mathscr{E}$

A 13 9 12 B

3

7

2 5 8 C

1 4 10

(1)

(b) List the members of the set $B' \cap C$

....

(1)

(c) List the members of the set $(A \cup C)' \cap B$

....

(1)

(d) Find $\mathrm{n}(A' \cap B')$

....

(1)

[Total for Question 8 = 4 marks]

9.

There are 9 counters in a bag.
There is a number on each counter.

$$\boxed{1}\ \boxed{1}\ \boxed{2}\ \boxed{2}\ \boxed{2}\ \boxed{3}\ \boxed{3}\ \boxed{3}\ \boxed{3}$$

Kal takes at random 3 counters from the bag.

He adds together the numbers on the 3 counters to get his Total.

Work out the probability that his Total is 6

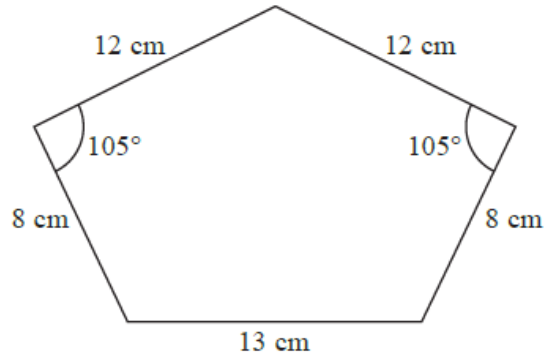**[Total for Question 9 = 5 marks]**

10.

The diagram shows a pentagon.

12 cm   12 cm

Diagram **NOT** accurately drawn

105°   105°

8 cm   8 cm

13 cm

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

.... cm^2

[Total for Question 10 = 6 marks]

11.

Solve the equation $\dfrac{6}{x-2} - \dfrac{6}{x+1} = 1$

Show clear algebraic working.

....

[Total for Question 11 = 5 marks]

- End of Test -