Year 11 Mathematics

Test

Time Allowed: 1 Hour

Total Marks: 55

13 October 2024

Calculator Allowed

Full Name of Student: ……

1.

The air resistance, R, acting on an object falling through air is directly proportional to the speed, v, of the object.

When the speed of the object is 12 m/s, the air resistance experienced by the object is 720 N.

(a) Find a formula for R in terms of v.

$R =$ ……

(3)

(b) Calculate the air resistance when the speed of the object is 8 m/s.

……

(1)

(c) At what speed will the object experience an air resistance of 1125 N?

……

(1)

[Total for Question 1 = 5 marks]

2.

It is given that y is inversely proportional to the **square root** of x.

When $x = 6.25$, $y = 3.2$.

(a) Express y in terms of x.

y = ……..

(3)

(b) Find x when $y = 16$.

……

(1)

(c) Find y when $x = 100$.

……

(1)

[Total for Question 2 = 5 marks]

3.

Factorise,

(a) (i) $3x^2 + 2x - 8$

……

(2)

(ii) $5y^2 - 7y$

……..

(1)

(b) Simplify,

$$\frac{x^2-5x-14}{x^2+10x+16}$$

……..

(3)

[Total for Question 3 = 6 marks]

4.

The table gives some information about the delays, in minutes, of 80 flights.

Delay (n minutes)	**Frequency**
$0 < n \leqslant 20$	16
$20 < n \leqslant 30$	26
$30 < n \leqslant 40$	23
$40 < n \leqslant 50$	10
$50 < n \leqslant 60$	5

(a) What percentage of the flights were delayed by more than 30 minutes?

.....
(2)

(b) Find the median class interval.

.....
(2)

(c) Write down the modal class interval.

.....
(1)

(d) Find an estimate for the mean delay time of a flight.

…… minutes
(9)

[Total for Question 4 = 9 marks]

5.

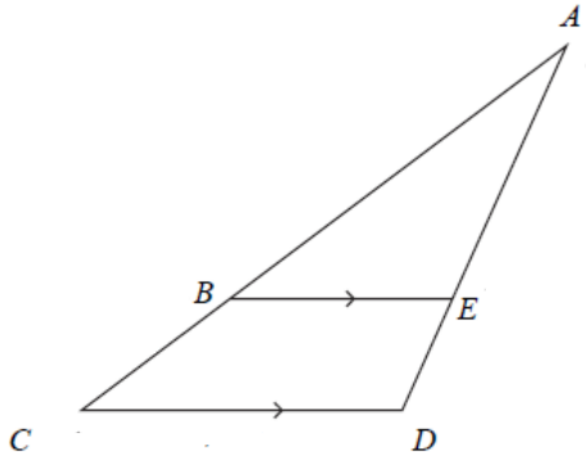

Diagram **NOT** accurately drawn

BE is parallel to CD.

AE = 10 cm, ED = 4 cm, AB = 12 cm, CD = 9.8 cm

(a) Calculate the length of BC.

…… cm
(3)

(b) Calculate the perimeter of the quadrilateral CDEB.

…….. cm
(3)

[Total for Question 5 = 6 marks]

6.

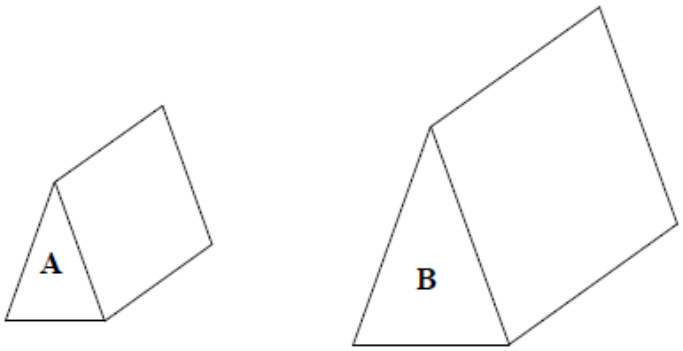

Diagram **NOT** accurately drawn

The two prisms, A and B, are mathematically similar.

The total surface area of prism A is 4250 cm^2.

The total surface area of prism B is 38250 cm^2.

The volume of prism B is 310500 cm^3.

Calculate the volume of prism A.

[Total for Question 6 = 4 marks]

7.

(a) $A = \{p, r, a, g, u, e\}$

$B = \{p, a, r, i, s\}$

$C = \{b, u, d, a, p, e, s, t\}$

List the members of the set

(i) $A \cap B$

.....

(ii) $B \cup C$

.....

(2)

(b) $D = \{r, o, m, e\}$

$E = \{l, i, s, b, o, n\}$

$F = \{b, e, r, l, i, n\}$

Put one of the letters D, E or F in the box below to make the statement correct.

$$A \cap \square = \varnothing$$

Explain your answer.

.....

(1)

[Total for Question 7 = 3 marks]

8.

$\mathscr{E} = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$
$A = \{1, 3, 5, 7\}$
$B = \{2, 4, 6, 8\}$

(a) Explain why $A \cap B = \varnothing$

.....

.....

(1)

$x \in \mathscr{E}$ and $x \notin A \cup B$

(b) Write down the value of x.

$x =$ .....

(1)

$A \cap C = \{3, 7\}$, $B \cap C = \{8\}$ and $A \cup B \cup C = \mathscr{E}$

(c) List all the members of C.

.....

(2)

[Total for Question 8 = 4 marks]

9.

It is given that $f(x) = x^2 - 3x + 1$ and $g(x) = 5x + 2$.

(a) Find $g(3)$.

……..

(2)

(b) Find $f(2)$.

……..

(3)

(c) Find and expression for $f(2x)$

……

(3)

(d) Solve,

$$f(x) = 2g(x)$$

……..

(5)

[Total for Question 9 = 13 marks]

- End of Test -
