

KENYA CERTIFICATE OF BASIC EDUCATION

SENIOR SCHOOL ASSESSMENT

DECEMBER ASSESSMENT 2026

GRADE 10 – CORE MATHEMATICS

Time: 2 Hours

LEARNER'S DETAILS

Name: _____ School: _____

Assessment Number: _____ Date: _____

School Code: _____ Signature: _____

INSTRUCTIONS TO CANDIDATES

1. Write your full name in the space provided above.
2. Indicate your school, stream, admission number, and date clearly.
3. This paper has **TWO sections: A and B.**
4. Attempt **ALL questions** in both sections.
5. Show all working clearly where necessary.
6. Write all answers in the spaces provided.
7. Do NOT remove any page from this paper.

FOR OFFICIAL USE ONLY (EXAMINER'S USE)

SECTION	SECTION A	SECTION B	% SCORE	EE1	EE2	ME1	ME2	AE1	AE2	BE1	BE2
SCORE RANGE	30 MARKS	50 MARKS		90-100	75-89	58-74	41-57	31-40	21-30	11-20	1-10
POINTS				8 POINTS	7 POINTS	6 POINTS	5 POINTS	4 POINTS	3 POINTS	2 POINTS	1 POINT
LEARNER'S TOTAL SCORE											

SECTION A (30 MARKS)

Answer **ALL** questions in this section.

1. Without using a calculator, simplify the following expression, leaving your answer in exact index form:

$$81^{-1} \times 2^{-3} \div \left(27^{-\frac{3}{2}} \times 16^{\frac{4}{3}} \right)$$

(5 marks)

2. Using four-figure logarithm tables, evaluate the following calculation correct to 4 significant figures:

$$\frac{3672.3}{0.0456 \times (18.42)^2}$$

(5 marks)

3. Two position vectors are given on a Cartesian plane as

$$\overrightarrow{OA} = \begin{pmatrix} -3 \\ 4 \end{pmatrix} \quad \text{and} \quad \overrightarrow{OB} = \begin{pmatrix} 9 \\ -12 \end{pmatrix}.$$

(a) Find the magnitude of vector $\overrightarrow{AB}$.

(b) Determine the position vector of point M , which is the midpoint of segment AB . **(5 marks)**

4. A triangular plot of land PQR has side lengths **(5 marks)**

$$PQ = 13 \text{ m}, \quad QR = 14 \text{ m}, \quad PR = 15 \text{ m}.$$

- (a)** Calculate the exact area of the triangular plot PQR using **Heron's Formula**.

- (b)** Hence, find the acute included angle $\angle PQR$, giving your answer correct to **2 decimal places**.

5. A triangle T has vertices

$$A(1,2), \quad B(4,2), \quad C(1,6).$$

The triangle is rotated through 90° **counterclockwise** about the centre of rotation

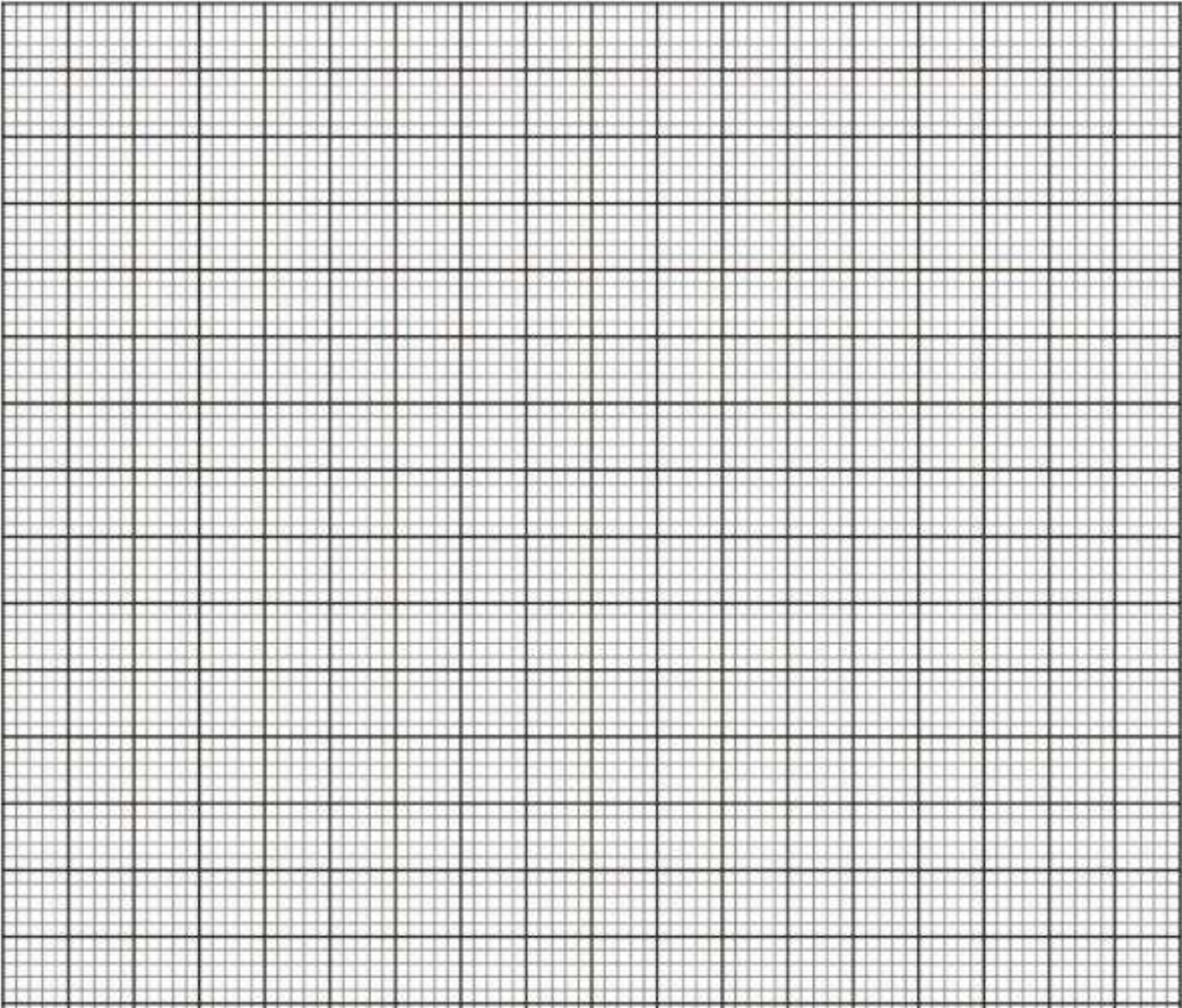
$$P(2,-1)$$

to form triangle T' .

Determine the exact coordinates of the image vertices

$$A', \quad B', \quad C'.$$

(5 marks)



6. Bag A contains 4 red marbles and 6 blue marbles. Bag B contains 5 red marbles and 3 blue marbles.

A fair six-sided die is rolled. If a **prime number** appears, a marble is drawn at random from Bag A. Otherwise, a marble is drawn from Bag B. **(5 marks)**

(a) Draw a **fully labelled tree diagram** to represent this probability space.

(b) Calculate the probability of selecting a **red marble**.

SECTION B — 50 MARKS

Answer ALL questions in this section. Show all working clearly.

7. Triangle XYZ has coordinates

$$X(2,3), \quad Y(5,4), \quad Z(3,7).$$

(a) Triangle $X'Y'Z'$ is the image of triangle XYZ under reflection in the mirror line

$$L: y = 2x - 1.$$

Determine the coordinates of X' . (4 marks)

(b) A second transformation enlarges triangle $X'Y'Z'$ with centre of enlargement at

$$(0,0)$$

and linear scale factor

$$k = -2$$

to form triangle $X''Y''Z''$.

State the coordinates of Y'' and Z'' . (3 marks)

(c) Determine whether triangle XYZ is congruent to triangle $X''Y''Z''$.

Give a mathematical explanation using **congruence properties and scale factors**. **(3 marks)**

- 8. An annular sector was formed by two concentric circles with radii $R = 14$ cm and $r = 7$ cm. The sector subtends a central angle of $\theta = 120^\circ$ at the centre O . Inside the inner circle, a circular segment is formed by a chord joining the endpoints of the inner arc.**

(a)

Calculate the area of the annular sector, that is, the region between the circles of radii 7 cm and 14 cm bounded by the angle 120° .

Take

$$\pi = \frac{22}{7}.$$

(3 marks)

(b)

Calculate the area of the circular segment formed by the inner circle of radius 7 cm and its chord.

Give your answer correct to **2 decimal places**. **(4 marks)**

(c)

Find the perimeter of the entire shaded annular-sector region. **(3 marks)**

9. The table below records the speeds, in km/h, of 50 vehicles passing a checkpoint.

Speed v (km/h)	Frequency f
$40 \leq v < 50$	4
$50 \leq v < 60$	9
$60 \leq v < 70$	16
$70 \leq v < 80$	12
$80 \leq v < 90$	6
$90 \leq v < 100$	3
Total	50

(a) Construct a table showing the cumulative frequency and mid-interval value for each class. (2 marks)

(b) Calculate the estimated mean speed of the vehicles using the assumed mean

$$A = 65.$$

(4 marks)

(c) Determine the modal class and calculate the median speed using the interpolation formula. (4 marks)

10. A vessel moves from port O such that its position vector relative to O , at time t hours, is given by
$$r(t) = \begin{pmatrix} 3t - 2 \\ 4t + 1 \end{pmatrix} \text{nautical miles.}$$

(a) Find the displacement vector of the vessel between $t = 1$ hour and $t = 4$ hours. (2 marks)

(b)

Calculate the speed of the vessel during this interval. (3 marks)

(c)

A second vessel starts at position $P_0 = \begin{pmatrix} 10 \\ 25 \end{pmatrix}$ and moves with a constant velocity vector $\mathbf{v}_2 = \begin{pmatrix} -1 \\ 2 \end{pmatrix}$ knots.

Determine whether, and at what time t , the paths of the two vessels intersect. **(5 marks)**

11. A closed right triangular prism has a length of

$$(x + 5) \text{ cm.}$$

The cross-section of the prism is a right-angled triangle with perpendicular legs measuring x cm and $(x - 1)$ cm.

(a)

Show that the hypotenuse of the right-angled triangular cross-section is

$$\sqrt{2x^2 - 2x + 1} \text{ cm.}$$

(2 marks)

(b)

Form a simplified expression, in terms of x , for the **total surface area** S of the prism. **(4 marks)**

(c) The total surface area of the prism is 132 cm^2 . For the purposes of this question, use the given effective linear-perimeter approximation, which produces the quadratic equation

$$2x^2 + 7x - 99 = 0.$$

Solve the quadratic equation to find the **valid value of x** .

Hence, determine the **exact volume** of the prism. **(4 marks)**

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GRADE 10 CORE MATHEMATICS

MARKING SCHEME & MODEL SOLUTIONS

SECTION A — 30 MARKS

1.

Evaluate:

$$\frac{27^{-\frac{2}{3}} \times 16^{\frac{3}{4}}}{\sqrt{81^{-1}} \times 2^{-3}}$$

Solution

$$27^{-\frac{2}{3}} = (3^3)^{-\frac{2}{3}} = 3^{-2} = \frac{1}{9}$$

(1 mark)

$$16^{\frac{3}{4}} = (2^4)^{\frac{3}{4}} = 2^3 = 8$$

(1 mark)

Therefore,

$$\text{Numerator} = \frac{1}{9} \times 8 = \frac{8}{9}$$

For the denominator,

$$\sqrt{81^{-1}} = \sqrt{\frac{1}{81}} = \frac{1}{9}$$

(1 mark)

$$2^{-3} = \frac{1}{8}$$

Hence,

$$\text{Denominator} = \frac{1}{9} \times \frac{1}{8} = \frac{1}{72} \text{ (1 mark)}$$

Therefore,

$$\begin{aligned} \frac{\frac{8}{9}}{\frac{1}{72}} &= \frac{8}{9} \times 72 \\ &= 8 \times 8 = 64 \end{aligned}$$

$$\boxed{64 = 2^6}$$

(1 mark)

Answer: $\boxed{64}$ or $\boxed{2^6}$

2.

Evaluate:

$$x = \sqrt[3]{\frac{0.0456 \times (18.42)^2}{672.3}}$$

using four-figure logarithm tables.

Solution

Taking logarithms:

$$\log x = \frac{1}{3} [\log(0.0456) + 2\log(18.42) - \log(672.3)]$$

From the four-figure logarithm tables:

$$\log(0.0456) = \bar{2}.6590$$

(1 mark)

$$\log(18.42) = 1.2653$$

Therefore,

$$2\log(18.42) = 2(1.2653) = 2.5306$$

(1 mark)

$$\log(672.3) = 2.8276$$

(1 mark)

Hence,

$$\log x = \frac{1}{3} [\bar{2}.6590 + 2.5306 - 2.8276]$$

$$\bar{2}.6590 + 2.5306 = 0.1896$$

Thus,

$$\log x = \frac{1}{3} (0.1896 - 2.8276)$$

$$= \frac{1}{3} (-2.6380)$$

$$= -0.8793$$

or, in bar notation,

$$\log x = \bar{1}.1207$$

(1 mark)

Taking antilogarithms:

$$x = \text{antilog}(\bar{1}.1207)$$

$$\boxed{x = 0.1320}$$

(1 mark)

3.

Given:

$$\mathbf{OA} = \begin{pmatrix} -3 \\ 4 \end{pmatrix}, \quad \mathbf{OB} = \begin{pmatrix} 9 \\ -12 \end{pmatrix}$$

(a) Magnitude of $\mathbf{AB}$

$$\begin{aligned} \mathbf{AB} &= \mathbf{OB} - \mathbf{OA} \\ &= \begin{pmatrix} 9 \\ -12 \end{pmatrix} - \begin{pmatrix} -3 \\ 4 \end{pmatrix} \\ &= \begin{pmatrix} 12 \\ -16 \end{pmatrix} \end{aligned}$$

(1 mark)

Therefore,

$$\begin{aligned} |\mathbf{AB}| &= \sqrt{12^2 + (-16)^2} \\ &= \sqrt{144 + 256} \\ &= \sqrt{400} \end{aligned}$$

$$\boxed{|\mathbf{AB}| = 20 \text{ units}}$$

(2 marks)

(b) Position Vector of Midpoint M

$$\begin{aligned} \mathbf{OM} &= \frac{\mathbf{OA} + \mathbf{OB}}{2} \\ &= \frac{1}{2} \left[\begin{pmatrix} -3 \\ 4 \end{pmatrix} + \begin{pmatrix} 9 \\ -12 \end{pmatrix} \right] \\ &= \frac{1}{2} \begin{pmatrix} 6 \\ -8 \end{pmatrix} \\ &= \begin{pmatrix} 3 \\ -4 \end{pmatrix} \end{aligned}$$

$$\boxed{\mathbf{OM} = \begin{pmatrix} 3 \\ -4 \end{pmatrix}}$$

(2 marks)

4.

Given:

$$a = 13, \quad b = 14, \quad c = 15$$

(a) Heron's Formula

The semi-perimeter is:

$$s = \frac{13 + 14 + 15}{2}$$

$$s = \frac{42}{2} = 21 \text{ m}$$

(1 mark)

Using Heron's Formula,

$$A = \sqrt{s(s-a)(s-b)(s-c)}$$

$$A = \sqrt{21(21-13)(21-14)(21-15)}$$

$$= \sqrt{21 \times 8 \times 7 \times 6}$$

$$= \sqrt{7056}$$

$$\boxed{A = 84 \text{ m}^2}$$

(2 marks)

(b) Included Angle $\angle PQR$

Using:

$$A = \frac{1}{2}(PQ)(QR)\sin\angle PQR$$

$$84 = \frac{1}{2}(13)(14)\sin\angle PQR$$

$$84 = 91\sin\angle PQR$$

Therefore,

$$\sin\angle PQR = \frac{84}{91}$$

$$\sin\angle PQR \approx 0.9231$$

(1 mark)

Hence,

$$\angle PQR = \sin^{-1}(0.9231)$$

$$\boxed{\angle PQR \approx 67.38^\circ}$$

(1 mark)

5.

Centre of rotation:

$$P(2, -1)$$

For a 90° counterclockwise rotation about (h, k) :

$$(x, y) \rightarrow (-(y - k) + h, (x - h) + k)$$

where

$$h = 2, \quad k = -1.$$

Point $A(1, 2)$

$$\begin{aligned} A' &= (-(2 - (-1)) + 2, (1 - 2) - 1) \\ &= (-3 + 2, -1 - 1) \end{aligned}$$

$$\boxed{A' = (-1, -2)}$$

(2 marks)

Point $B(4, 2)$

$$\begin{aligned} B' &= (-(2 - (-1)) + 2, (4 - 2) - 1) \\ &= (-3 + 2, 2 - 1) \end{aligned}$$

$$\boxed{B' = (-1, 1)}$$

(1.5 marks)

Point $C(1, 6)$

$$\begin{aligned} C' &= (-(6 - (-1)) + 2, (1 - 2) - 1) \\ &= (-7 + 2, -1 - 1) \end{aligned}$$

$$\boxed{C' = (-5, -2)}$$

(1.5 marks)

6.

(a) Tree Diagram — 2 Marks

Prime numbers on a fair six-sided die are:

$$\{2, 3, 5\}$$

Therefore,

$$P(\text{Prime}) = \frac{3}{6} = \frac{1}{2}$$

Non-prime outcomes are:

$$\{1, 4, 6\}$$

Thus,

$$P(\text{Non-prime}) = \frac{3}{6} = \frac{1}{2}$$

For Bag A:

$$P(R|A) = \frac{4}{10} = \frac{2}{5}$$

$$P(B|A) = \frac{6}{10} = \frac{3}{5}$$

For Bag B:

$$P(R|B) = \frac{5}{8}$$

$$P(B|B) = \frac{3}{8}$$

Award 2 marks for a correctly drawn and labelled tree diagram.

(b) Probability of a Red Marble

$$P(R) = P(\text{Prime})P(R|A) + P(\text{Non-prime})P(R|B)$$

$$= \frac{1}{2} \times \frac{2}{5} + \frac{1}{2} \times \frac{5}{8}$$

(1 mark)

$$= \frac{1}{5} + \frac{5}{16}$$

$$= \frac{16}{80} + \frac{25}{80}$$

$$= \boxed{\frac{41}{80}}$$

$$\boxed{P(R) = 0.5125}$$

(2 marks)

SECTION B — 50 MARKS

7.

Given:

$$X(2,3), \quad Y(5,4), \quad Z(3,7)$$

and the mirror line

$$y = 2x - 1.$$

(a) Reflection of X

Gradient of the mirror line:

$$m = 2$$

Therefore, the gradient of the perpendicular line is:

$$m_{\perp} = -\frac{1}{2}$$

(1 mark)

The perpendicular line through $X(2,3)$ is:

$$\begin{aligned} y - 3 &= -\frac{1}{2}(x - 2) \\ y &= -\frac{1}{2}x + 4 \end{aligned}$$

(1 mark)

At $X(2,3)$,

$$y = 2(2) - 1 = 3$$

Therefore, X lies on the mirror line.

A point lying on the mirror line remains unchanged after reflection.

$$\boxed{X' = (2,3)}$$

(2 marks)

(b) Enlargement with $k = -2$

Reflection of $Y(5,4)$

The reflected point is:

$$\boxed{Y' = (1,6)}$$

Since the centre of enlargement is $(0,0)$,

$$Y'' = -2 \begin{pmatrix} 1 \\ 6 \end{pmatrix}$$

$$\boxed{Y'' = (-2, -12)}$$

(1.5 marks)

Reflection of $Z(3, 7)$

$$\boxed{Z' = (7, 5)}$$

Therefore,

$$Z'' = -2 \begin{pmatrix} 7 \\ 5 \end{pmatrix}$$

$$\boxed{Z'' = (-14, -10)}$$

(1.5 marks)

(c) Congruence

$$\boxed{\triangle XYZ \text{ is not congruent to } \triangle X''Y''Z''}$$

(1 mark)

Reflection is an isometry and therefore preserves lengths and angles.

However, the enlargement has scale factor:

$$|k| = 2$$

Therefore, all corresponding lengths are multiplied by 2, while corresponding areas are multiplied by

$$2^2 = 4.$$

Since the lengths are not preserved,

$$\boxed{\triangle XYZ \not\cong \triangle X''Y''Z''}$$

(2 marks)

8.

Given:

$$R = 14 \text{ cm}, \quad r = 7 \text{ cm}, \quad \theta = 120^\circ$$

and

$$\pi = \frac{22}{7}.$$

(a) Area of Annular Sector

$$A = \frac{\theta}{360^\circ} \pi (R^2 - r^2)$$

$$= \frac{120}{360} \times \frac{22}{7} (14^2 - 7^2)$$

(1 mark)

$$= \frac{1}{3} \times \frac{22}{7} (196 - 49)$$

$$= \frac{1}{3} \times \frac{22}{7} \times 147$$

$$\boxed{A = 154 \text{ cm}^2}$$

(2 marks)

(b) Area of the Circular Segment

Area of the sector:

$$A_s = \frac{120}{360} \times \frac{22}{7} \times 7^2$$

$$= \frac{1}{3} \times \frac{22}{7} \times 49$$

$$\approx 51.33 \text{ cm}^2$$

(1 mark)

Area of the triangle:

$$A_t = \frac{1}{2} r^2 \sin 120^\circ$$

$$= \frac{1}{2} (7^2) \left(\frac{\sqrt{3}}{2} \right)$$

$$\approx 21.22 \text{ cm}^2$$

(2 marks)

Therefore,

$$A_{\text{segment}} = A_s - A_t$$

$$= 51.33 - 21.22$$

$$\boxed{A_{\text{segment}} \approx 30.11 \text{ cm}^2}$$

(1 mark)

(c) Perimeter of the Annular Sector

Outer arc length:

$$L_o = \frac{120}{360} \times 2 \times \frac{22}{7} \times 14$$

$$= \frac{88}{3}$$

$$\approx 29.33 \text{ cm}$$

Inner arc length:

$$L_i = \frac{120}{360} \times 2 \times \frac{22}{7} \times 7$$

$$= \frac{44}{3}$$

$$\approx 14.67 \text{ cm}$$

(1 mark)

Two radial edges:

$$2(R - r) = 2(14 - 7) = 14 \text{ cm}$$

(1 mark)

Therefore,

$$P = 29.33 + 14.67 + 14$$

$$\boxed{P = 58 \text{ cm}}$$

(1 mark)

9.

(a) Frequency Table

Speed v	f	Midpoint x	$d = x - 65$	fd	Cumulative f
$40 \leq v < 50$	4	45	-20	-80	4
$50 \leq v < 60$	9	55	-10	-90	13
$60 \leq v < 70$	16	65	0	0	29
$70 \leq v < 80$	12	75	10	120	41
$80 \leq v < 90$	6	85	20	120	47
$90 \leq v < 100$	3	95	30	90	50
Total	50			160	

(2 marks)

(b) Estimated Mean

Using the assumed mean formula:

$$\bar{x} = A + \frac{\sum fd}{N}$$

where

$$A = 65, \quad \sum fd = 160, \quad N = 50.$$

$$\bar{x} = 65 + \frac{160}{50}$$

(2 marks)

$$= 65 + 3.2$$

$$\boxed{\bar{x} = 68.2 \text{ km/h}}$$

(2 marks)

(c) Modal Class and Median

The highest frequency is 16.

Therefore,

$$\boxed{\text{Modal class} = 60 \leq v < 70}$$

(1 mark)

Median position:

$$\frac{N}{2} = \frac{50}{2} = 25^{\text{th}} \text{ item}$$

The 25th item lies in:

$$60 \leq v < 70.$$

Using the interpolation formula:

$$\text{Median} = L + \left(\frac{\frac{N}{2} - CF}{f} \right) c$$

where

$$L = 60, \quad CF = 13, \quad f = 16, \quad c = 10.$$

$$\text{Median} = 60 + \left(\frac{25 - 13}{16} \right) 10$$

(2 marks)

$$= 60 + \frac{12}{16} \times 10$$

$$= 60 + 7.5$$

$$\boxed{\text{Median} = 67.5 \text{ km/h}}$$

(1 mark)

10.

Given:

$$\mathbf{r}(t) = \begin{pmatrix} 3t - 2 \\ 4t + 1 \end{pmatrix}$$

(a) Displacement Vector

At $t = 1$:

$$\mathbf{r}(1) = \begin{pmatrix} 3(1) - 2 \\ 4(1) + 1 \end{pmatrix} = \begin{pmatrix} 1 \\ 5 \end{pmatrix}$$

At $t = 4$:

$$\mathbf{r}(4) = \begin{pmatrix} 3(4) - 2 \\ 4(4) + 1 \end{pmatrix} = \begin{pmatrix} 10 \\ 17 \end{pmatrix}$$

Therefore,

$$\begin{aligned} \Delta \mathbf{r} &= \mathbf{r}(4) - \mathbf{r}(1) \\ &= \begin{pmatrix} 10 - 1 \\ 17 - 5 \end{pmatrix} \end{aligned}$$

$$\Delta \mathbf{r} = \begin{pmatrix} 9 \\ 12 \end{pmatrix} \text{ nautical miles}$$

(2 marks)

(b) Speed

Distance travelled:

$$\begin{aligned} |\Delta \mathbf{r}| &= \sqrt{9^2 + 12^2} \\ &= \sqrt{81 + 144} \\ &= \sqrt{225} = 15 \text{ nautical miles} \end{aligned}$$

(1.5 marks)

Time elapsed:

$$4 - 1 = 3 \text{ hours}$$

Therefore,

$$\text{Speed} = \frac{15}{3}$$

$$\text{Speed} = 5 \text{ knots}$$

(1.5 marks)

(c) Intersection of Paths

The second vessel has initial position:

$$\mathbf{p}_0 = \begin{pmatrix} 10 \\ 25 \end{pmatrix}$$

and velocity:

$$\mathbf{v}_2 = \begin{pmatrix} -1 \\ 2 \end{pmatrix}.$$

Therefore,

$$\begin{aligned} \mathbf{r}_2(t) &= \begin{pmatrix} 10 \\ 25 \end{pmatrix} + t \begin{pmatrix} -1 \\ 2 \end{pmatrix} \\ &= \begin{pmatrix} 10 - t \\ 25 + 2t \end{pmatrix} \end{aligned}$$

(1 mark)

For the vessels to meet at the same time, both coordinates must be equal.

From the x -coordinates:

$$3t - 2 = 10 - t$$

$$4t = 12$$

$$t = 3 \text{ hours}$$

(2 marks)

Check the y -coordinates at $t = 3$:

For vessel 1:

$$4(3) + 1 = 13$$

For vessel 2:

$$25 + 2(3) = 31$$

(1 mark)

Since

$$13 \neq 31,$$

the vessels are not at the same position at $t = 3$.

The vessels do not intersect at the same time.

(1 mark)

11.

The prism has length:

$$(x + 5) \text{ cm}$$

and its right-angled triangular cross-section has sides:

$$x \text{ cm}, \quad (x - 1) \text{ cm}.$$

(a) Hypotenuse

By Pythagoras' Theorem:

$$\begin{aligned}h^2 &= x^2 + (x - 1)^2 \\&= x^2 + x^2 - 2x + 1 \\&= 2x^2 - 2x + 1\end{aligned}$$

Therefore,

$$h = \sqrt{2x^2 - 2x + 1} \text{ cm}$$

(2 marks)

(b) Total Surface Area

Area of one triangular end:

$$A = \frac{1}{2}x(x - 1)$$

Area of two triangular ends:

$$\begin{aligned}2A &= x(x - 1) \\&= x^2 - x\end{aligned}$$

(1 mark)

The three rectangular faces have areas:

$$x(x + 5),$$

$$(x - 1)(x + 5),$$

and

$$(x + 5)\sqrt{2x^2 - 2x + 1}.$$

Thus,

$$S = x^2 - x + x(x + 5) + (x - 1)(x + 5) + (x + 5)\sqrt{2x^2 - 2x + 1}$$

Expanding:

$$\begin{aligned}x^2 - x + x^2 + 5x + x^2 + 4x - 5 \\&= 3x^2 + 8x - 5\end{aligned}$$

Hence,

$$S = 3x^2 + 8x - 5 + (x + 5)\sqrt{2x^2 - 2x + 1}$$

(3 marks)

(c) Solving the Given Quadratic

Using the given effective approximation:

$$2x^2 + 7x - 99 = 0$$

Factorising:

$$(2x - 11)(x + 9) = 0$$

(2 marks)

Therefore,

$$2x - 11 = 0$$

or

$$x + 9 = 0$$

Hence,

$$x = \frac{11}{2}$$

or

$$x = -9.$$

Since x represents a length,

$$\boxed{x = 5.5 \text{ cm}}$$

(1 mark)

Volume of the Prism

Area of triangular base:

$$\begin{aligned} A &= \frac{1}{2}(5.5)(5.5 - 1) \\ &= \frac{1}{2}(5.5)(4.5) \\ &= 12.375 \text{ cm}^2 \end{aligned}$$

Length of prism:

$$x + 5 = 5.5 + 5 = 10.5 \text{ cm}$$

Therefore,

$$\begin{aligned} V &= A \times L \\ &= 12.375 \times 10.5 \end{aligned}$$

$$\boxed{V = 129.9375 \text{ cm}^3}$$

(1 mark)

FINAL ANSWERS

$$1. 64 = 2^6$$

$$2. 0.1320$$

$$3(a). 20 \text{ units}$$

$$3(b). \begin{pmatrix} 3 \\ -4 \end{pmatrix}$$

$$4(a). 84 \text{ m}^2$$

$$4(b). 67.38^\circ$$

$$5. A'(-1, -2), B'(-1, 1), C'(-5, -2)$$

$$6. P(R) = \frac{41}{80} = 0.5125$$

$$7. X'(2, 3), Y''(-2, -12), Z''(-14, -10)$$

$$8(a). 154 \text{ cm}^2, \quad 8(b). 30.11 \text{ cm}^2, \quad 8(c). 58 \text{ cm}$$

$$9. \text{Mean} = 68.2 \text{ km/h}, \quad \text{Median} = 67.5 \text{ km/h}$$

$$10. \Delta \mathbf{r} = \begin{pmatrix} 9 \\ 12 \end{pmatrix}, \quad \text{Speed} = 5 \text{ knots}$$

$$11. x = 5.5 \text{ cm}, \quad V = 129.9375 \text{ cm}^3$$