

1. Solve the following inequalities and represent the solution on a number line hence state the integral values. (3 Marks)

$$7x - 4 \leq 9x + 2 \quad 9x + 2 < 3x + 14$$

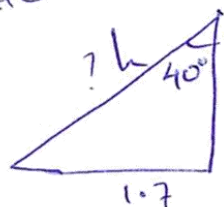
$$-2x \leq 6 \quad 6x < 12$$

$$x \geq -3 \quad x < 2$$

$$-3 \leq x < 2$$

2. The diagram below shows a circle with a chord PQ = 3.4cm and angle PRQ = 40°. Calculate the area of the shaded segment. (4 Marks)

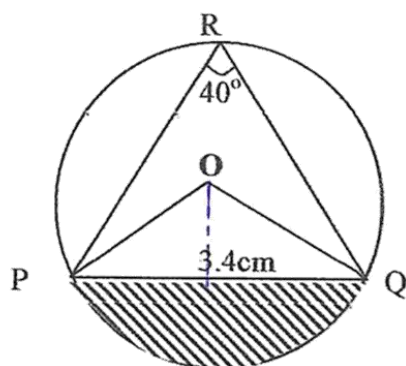
SOHCAHTOA



$$\sin 40^\circ = \frac{1.7}{2.6}$$

$$h = \frac{1.7}{\sin 40^\circ} = \frac{1.7}{0.6428}$$

$$h = 2.645 \text{ cm}$$



$$\angle POQ = 2 \times 40^\circ = 80^\circ$$

$$\frac{\theta}{360} \pi r^2 - \frac{1}{2} ab \sin \theta$$

$$\frac{80}{360} \times 2.6^2 \times \pi - \frac{1}{2} \times 2.6 \times 2.6 \times \sin 80^\circ$$

$$4.856 - 3.445$$

$$= 1.411 \text{ cm}^2$$

3. Given that $a = \begin{pmatrix} 2 \\ 1 \end{pmatrix}$ and $b = \begin{pmatrix} -3 \\ 4 \end{pmatrix}$ find: $|a+b|$.

(3 Marks)

$$\begin{pmatrix} 2 \\ 1 \end{pmatrix} + \begin{pmatrix} -3 \\ 4 \end{pmatrix} = \begin{pmatrix} -1 \\ 5 \end{pmatrix} \checkmark$$

$$= \sqrt{26} \text{ units} \checkmark$$

$$|a+b| = \sqrt{(-1)^2 + 5^2} \checkmark$$

4. Use completing square method to solve $2x^2 - 4x - 5 = 0$

(3 marks)

$$\frac{2x^2}{2} - \frac{4x}{2} - \frac{5}{2} = \frac{0}{2} \quad x^2 - 2x + \left(\frac{-2}{2}\right)^2 = \frac{5}{2} + \left(\frac{-2}{2}\right)^2 \quad x = 1 \pm 1.8708$$

$$x^2 - 2x - \frac{5}{2} = 0 \quad (x-1)^2 = \frac{7}{2} \quad x = 2.187 \checkmark$$

$$x^2 - 2x = \frac{5}{2} \quad \text{Square root on both side.} \quad \text{or}$$

$$x^2 - 2x = \frac{5}{2} \quad x - 1 = \pm 1.8708 \quad x = -0.8708$$

5. A rectangular room has length 12.4 metres and width 8.8 metres. Find the percentage error in estimating the perimeter of the room.

(3 marks)

$$12.35 < 12.4 < 12.45$$

$$8.75 < 8.8 < 8.85$$

$$\text{Min } P = 2(12.35 + 8.75) = 42.2$$

$$\text{actual } P = 2(12.4 + 8.8) = 42.4$$

$$\text{absolute} = \frac{42.6 - 42.2}{2} = 0.2$$

$$\text{Max Perimeter} = 2(12.45 + 8.85) = 42.6 \checkmark$$

$$P.E = \frac{0.2}{42.4} \times 100 = 0.472\% \checkmark$$

* 6. The expression $ax - 30x + 9$ is a perfect square, where a is a constant. Find the value of a .
Type equation here. (3 Marks)

$$a \times 9 = \left(\frac{-30}{2}\right)^2 \checkmark \quad \frac{9a}{9} = \frac{225}{9} \checkmark$$

$$a = 25 \checkmark$$

7. Rationalize $\frac{\sqrt{3}+\sqrt{2}}{\sqrt{3}-\sqrt{2}}$ and leave your in the form of $a+b\sqrt{c}$. Where a, b and care contant. (3 Marks)

$$\frac{\sqrt{3}+\sqrt{2}}{\sqrt{3}-\sqrt{2}} \times \frac{\sqrt{3}+\sqrt{2}}{\sqrt{3}+\sqrt{2}}$$

$$N: (a+b)^2 = 3 + 2\sqrt{2}\sqrt{3} + 4$$

$$= 7 + 2\sqrt{6}$$

$$D: (a+b)(a-b) = a^2 - b^2$$

$$3 - 2 = 1$$

$$\frac{7+2\sqrt{6}}{1} = 7+2\sqrt{6}$$

$$a=7 \quad b=2 \quad c=6$$

8. Find the value of θ , given that $\frac{1}{2} \sin \theta = 0.35$ for $0^\circ \leq \theta \leq 360^\circ$ (2 Marks)

$$\frac{1}{2} \sin \theta = 0.35$$

$$\sin \theta = 0.7$$

$$\theta = \sin^{-1} 0.7$$

$$\theta = 44.43^\circ$$

$$180 - 44.43 = 135.57^\circ$$

$$44.43^\circ, 135.57^\circ$$

9. The marks obtained by 10 students in a maths test were:- 25, 24, 22, 23, 26, 26, 21, 23, 22 and 27. Calculate the value of mean and the modal mark. (3 Marks)

$$\text{Mean} = \frac{\sum fx}{N}$$

$$= \frac{25+24+22+23+26+26+21+23+22+27}{10}$$

$$= \frac{220}{10} = 22$$

$$\text{Modal mark} = 26 \text{ mark.}$$

10. Two trucks A and B travelling at 28km/hr and 26km/hr respectively approach one another on a straight road. Truck A is 10m long, while truck B is 15m long. Determine the time in seconds that elapses before the trucks completely pass each other. (3 Marks)

$$R.S = 28 + 26 = 54 \text{ km/h} = 9 \text{ m/s}$$

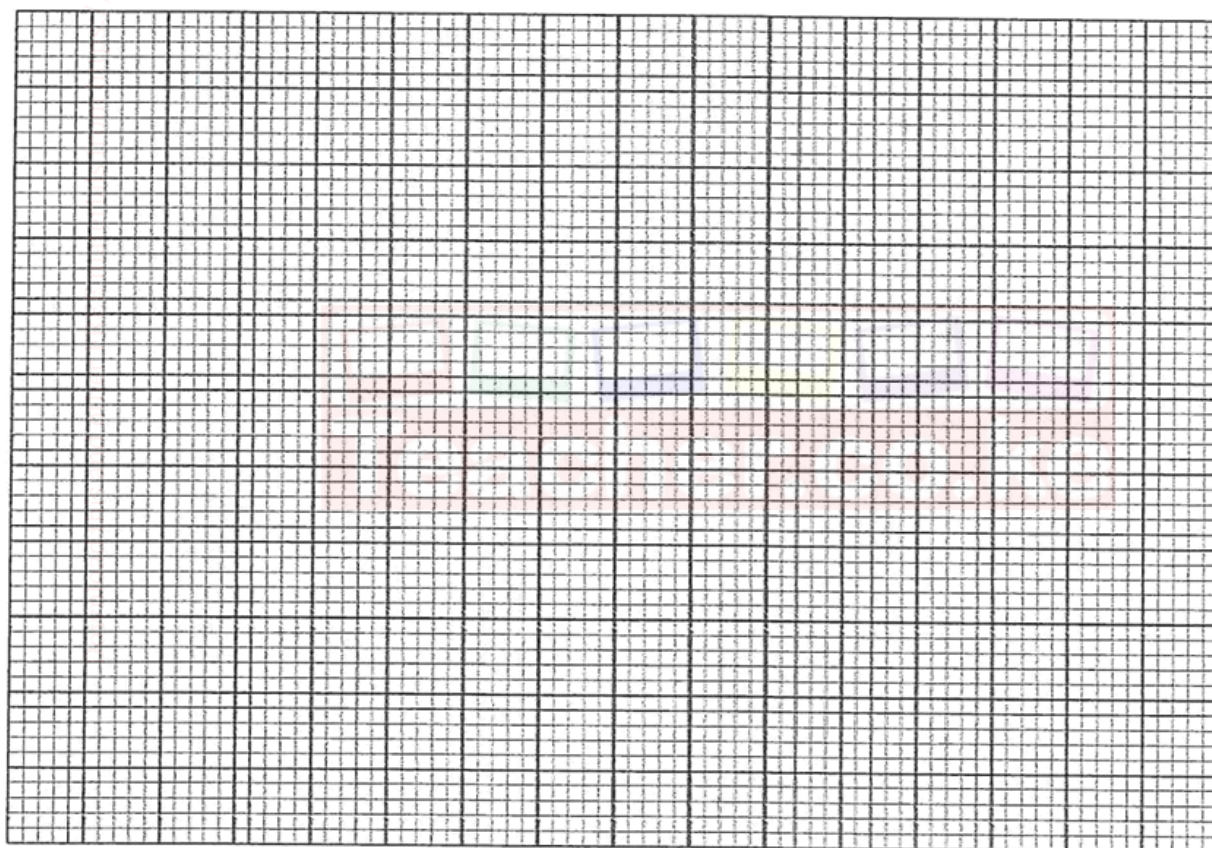
$$R.D = 15 + 10 = 25 \text{ m}$$

$$T = \frac{R.D}{R.S} = \frac{25}{9} = 2\frac{7}{9} \text{ seconds}$$

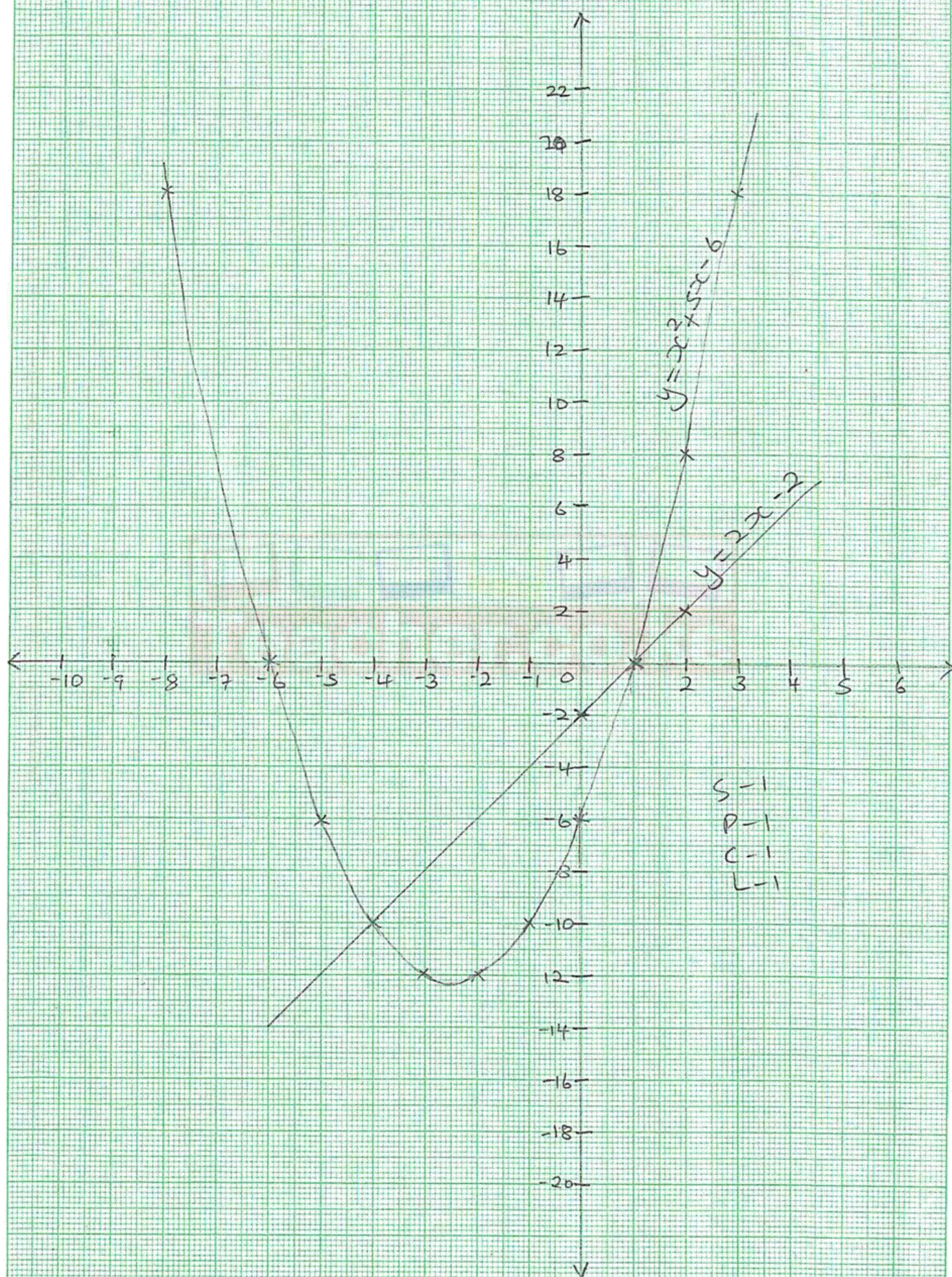
* 11(a) Complete the table below for the equation :- $y = x^2 + 5x - 6$ for $-8 \leq x \leq 3$

2 marks

x	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3
y	18	8	0	-6	-10	-12	-12	-10	-6	0	8	18



(b) Using a scale 1cm to represent 1 unit in x axes and 1 cm to represent 2 units on y axis, draw the graph of $y = x^2 + 5x - 6$ 3 marks



(c) Use your graph to solve:-

(i) $X^2 + 5X - 6 = 0$

(2 marks)

$$y = x^2 + 5x - 6$$

$$0 = x^2 + 5x - 6$$

$$x = -6 \text{ or } x = 1$$

(ii) $X^2 + 3X - 4 = 0$ (2 marks)

$$y = x^2 + 3x - 4$$

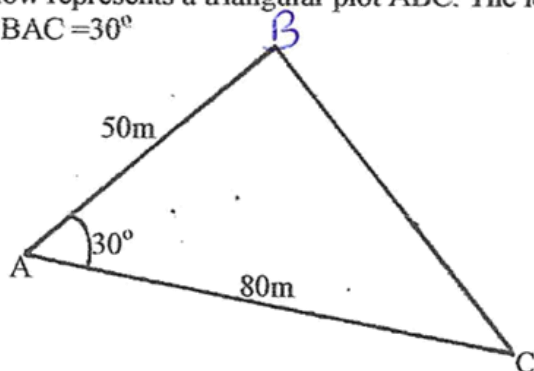
$$0 = x^2 + 3x - 4$$

$$x = -4 \text{ or } x = 1$$

$$y = 2x - 2$$

x	0	1	2
y	-2	0	2

12. The figure below represents a triangular plot ABC. The lengths of AB = 50m, AC = 80m and angle BAC = 30°



(a) Find the length of BC to 2 significant figures.

$$BC^2 = AB^2 + AC^2 - 2AB \cdot AC \cos A$$

$$BC^2 = 50^2 + 80^2 - (2 \times 50 \times 80) \cos 30^\circ$$

$$BC^2 = 8900 - 6928.20$$

$$\sqrt{BC^2} = \sqrt{1971.796}$$

$$BC = 44.4049$$

$$= 44m$$

(b) Find the area of the plot in hectares.

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

$$\sqrt{87(87-50)(87-80)(87-44)}$$

$$s = \frac{50+80+44}{2}$$

$$= 87$$

$$\sqrt{87 \times 37 \times 7 \times 43}$$

$$= \frac{984.3368}{10,000}$$

$$0.09843 \text{ ha}$$

(c) The plot is fenced using 4 strands of barbed wire. The length of one roll of barbed wire is 600m and it costs shs.4000. Calculate;

(i) The length of fencing wire required.

(2 Marks)

$$P = 50 + 80 + 44$$

$$= 174m$$

$$\text{length of wire} = 174 \times 4$$

$$= 696m$$

(ii) The number of complete rolls to be bought.

(1 Mark)

$$\frac{696}{600}$$

$$1.16$$

$$2 \text{ rolls}$$

(iii) The cost of the rolls.

(1 Mark)

$$2 \times 4000$$

$$= 8,000$$

$$\text{Ksh } 8,000$$

13. The table below shows marks obtained by 60 students in a test.

Marks	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90-99
No. of pupils	2	2	3	8	23	13	6	2	1

(a) State the modal class.

(1 Mark)

50-59 ✓

(b) Calculate the mean height.

(5mks)

Class	f	x	fx	cf
10-19	2	14.5	29	2
20-29	2	24.5	49	4
30-39	3	34.5	103.5	7
40-49	8	44.5	356	15
50-59	23	54.5	1253.5	38
60-69	13	64.5	838.5	51
70-79	6	74.5	447	57
80-89	2	84.5	169	59
90-99	1	94.5	94.5	60
			3340	

$$\text{Mean}(\bar{x}) = \frac{\sum fx}{\sum f}$$

$$= \frac{3340}{60}$$

$$= 55.67$$

(c) State the median class.

(1 Mark)

$$\frac{60}{2} = 30^{\text{th}} \text{ student } 50-59 \checkmark$$

(d) Calculate the median mark.

(3 Marks)

$$M = L + \frac{\left(\frac{N}{2} - cf\right)}{f} \cdot i$$

$$= 49.5 + \frac{\left(\frac{60}{2} - 15\right)}{23} \cdot 10$$

$$49.5 + 6.522$$

$$= 56.02$$