



NYANDO MIXED SECONDARY SCHOOL
GRADE 12 MATHEMATICS
End of Term Examination

Total Marks: 84

Name: Adm No: Date:

Section A (36 Marks)

Answer all the questions in this section.

1. Solve the equation $2x^2 - 5x - 3 = 0$. [3 marks]
2. Simplify $\sqrt{50} - \sqrt{18} + \sqrt{8}$, leaving your answer in surd form. [3 marks]
3. The 5th term of an arithmetic progression is 17 and the 8th term is 26. Find the first term and the common difference. [3 marks]
4. Given $A = \begin{bmatrix} 2 & 1 \\ 3 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 2 \\ 0 & -1 \end{bmatrix}$, find AB . [3 marks]
5. In triangle ABC, $AB = 6$ cm, $BC = 8$ cm and angle $ABC = 60^\circ$. Calculate the area of the triangle. [3 marks]
6. Find the volume of a cone of radius 3 cm and height 7 cm. (Take $\pi = 22/7$) [3 marks]

7. The marks of five students are 10, 12, 15, 18 and 20. Calculate the mean mark. [3 marks]

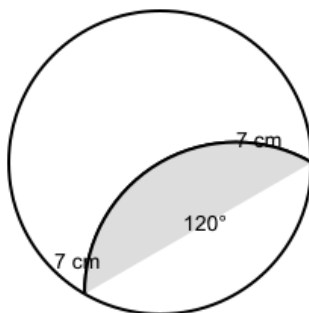
8. A fair coin is tossed twice. What is the probability of getting at least one head? [3 marks]

9. Differentiate $y = 3x^3 - 2x^2 + 4x - 5$ with respect to x . [3 marks]

10. Find the equation of the line passing through points A(2, 3) and B(4, 7). Leave your answer in the form $y = mx + c$. [3 marks]

11. The times taken by 20 students to complete a task are given in the table below. Determine the modal time. | Time (min) | 5 | 6 | 7 | 8 | | Frequency | 3 | 6 | 7 | 4 | [3 marks]

12. Study the sector shown in the diagram below and calculate its area, leaving your answer in terms of π . [3 marks]



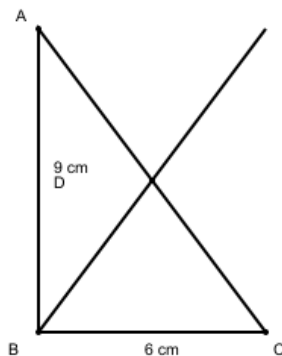
Section B (48 Marks)

Answer any four questions in this section.

1. The sum of the first five terms of an arithmetic progression is 40. The sum of the first ten terms is 130. (a) Form two equations in a and d , where a is the first term and d is the common difference. (b) Find the value of a and the value of d . (c) Determine the 15th term of the progression. [8 marks]

2. A matrix $M = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$. (a) Find the determinant of M . (b) Find the inverse of M . (c) Hence solve the simultaneous equations: $x + 2y = 5$, $3x + 4y = 11$. [8 marks]

3. The diagram below shows a right-angled triangle ABC. A perpendicular is drawn from B to meet AC at D. (a) Calculate the length of AC. (b) Calculate the area of triangle ABC. (c) Hence determine the length of BD. [8 marks]



4. The heights (to the nearest cm) of 40 plants are given in the distribution table below. | Height (cm) | 10-14 | 15-19 | 20-24 | 25-29 | 30-34 | | Frequency | 4 | 8 | 12 | 10 | 6 | (a) Determine the midpoint of each class. (b) Calculate the mean height. (c) Calculate the standard deviation of the heights, correct to two decimal places. [8 marks]

5. A bag contains 5 red balls and 3 blue balls. Two balls are drawn at random, one after the other, without replacement. (a) Draw a tree diagram for the outcomes. (b) Find the probability that both balls are red. (c) Find the probability that at least one ball is red. [8 marks]

6. Describe the steps you would follow to find the area under a curve using integration. Hence find the area enclosed by the curve $y = x^2 + 1$, the x-axis and the lines $x = 0$ and $x = 2$. [8 marks]

MARKING GUIDE

Question	Expected answer / marking points	Marks
q1_01	$x = 3$ or $x = -1/2$	3
q1_02	$4\sqrt{2}$	3
q1_03	First term = 5, common difference = 3	3
q1_04	$AB = [[2, 3], [3, 2]]$	3
q1_05	$12\sqrt{3} \text{ cm}^2$	3
q1_06	66 cm^3	3
q1_07	15	3
q1_08	$3/4$	3
q1_09	$dy/dx = 9x^2 - 4x + 4$	3
q1_10	Gradient $m = (7-3)/(4-2) = 2$; using A: $y - 3 = 2(x - 2) \Rightarrow y = 2x - 1$	3
q1_11	7 minutes	3
q1_12	$49\pi/3 \text{ cm}^2$	3
q2_01	(a) $S_5 = 5/2(2a+4d)=40 \Rightarrow a+2d=8$; $S_{10} = 10/2(2a+9d)=130 \Rightarrow 2a+9d=26$. (b) Solving: $a=4$, $d=2$. (c) 15th term = $a+14d = 4+28 = 32$.	8
q2_02	(a) $\det M = (1)(4) - (2)(3) = -2$. (b) $M^{-1} = (1/-2) [[4, -2], [-3, 1]] = [[-2, 1], [3/2, -1/2]]$. (c) $[x; y] = M^{-1} [5; 11] = [[-2(5)+1(11)], [3/2(5) - 1/2(11)]] = [[1], [2]] \Rightarrow x=1, y=2$.	8
q2_03	(a) $AC = \sqrt{(9^2 + 6^2)} = \sqrt{117} = 3\sqrt{13} \text{ cm}$. (b) Area = $\frac{1}{2} \times 9 \times 6 = 27 \text{ cm}^2$. (c) Area = $\frac{1}{2} \times AC \times BD \Rightarrow BD = 54/(3\sqrt{13}) = 18/\sqrt{13} = 18\sqrt{13}/13 \text{ cm}$.	8
q2_04	(a) Midpoints: 12, 17, 22, 27, 32. (b) Mean = $(12 \times 4 + 17 \times 8 + 22 \times 12 + 27 \times 10 + 32 \times 6) / 40 = 910/40 = 22.75 \text{ cm}$. (c) Standard deviation = $\sqrt{[(4(12-22.75)^2 + 8(17-22.75)^2 + 12(22-22.75)^2 + 10(27-22.75)^2 + 6(32-22.75)^2)/40]} = \sqrt{(1427.5/40)} \approx 5.97 \text{ cm}$.	8
q2_05	(a) Tree: first draw Red ($5/8$) or Blue ($3/8$); after Red, second Red ($4/7$) or Blue ($3/7$); after Blue, second Red ($5/7$) or Blue ($2/7$). (b) $P(RR) = 5/8 \times 4/7 = 20/56 = 5/14$. (c) $P(\text{at least one red}) = 1 - P(BB) = 1 - (3/8 \times 2/7) = 1 - 6/56 = 25/28$.	8
q2_06	Steps: (1) Integrate the function $y = f(x)$ with respect to x . (2) Evaluate the definite integral between the given limits. Area = $\int_{-2}^2 (x^2 + 1) dx = [x^3/3 + x]_{-2}^2 = (8/3 + 2) - 0 = 14/3$ square units.	8