

**HOLY CROSS HIGH SCHOOL
MAITLAND**



MATHEMATICS

**GRADE 10
CONTROLLED TEST
TERM 3**

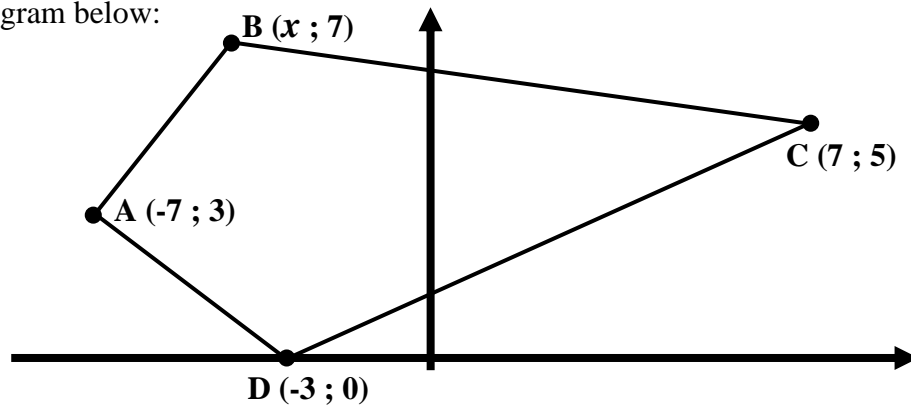
GENERAL INSTRUCTIONS

1. Attempt all questions.
2. An approved, non-programmable calculator may be used. Where necessary, give your final answers rounded off to two decimal places, unless otherwise stated.
3. **All reasons must be given for any geometric statements made.**
4. This question-paper must be stapled to the **back** of your answer-sheets.

Examiner: Mr M Mutandwa
Moderator: Mrs M Smith

QUESTION 1

Refer to the diagram below:



- 1.1 Find the gradient of line AD . (3)
- 1.2 If it is given that $AB \perp AD$, show by calculation that $x = -4$ in the point B (5)
- 1.3 Join BD . Given that $x = -4$, find the length of the sides of $\triangle ABD$. (6)
- 1.4 Apart from being right-angled, what type of triangle is $\triangle ABD$? Why? (2)

[16]

QUESTION 2

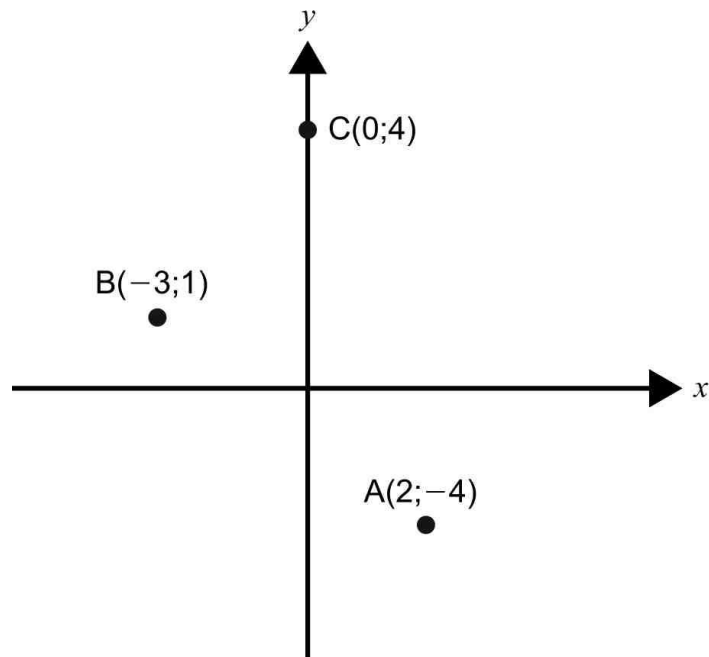
The vertices of a quadrilateral are $R(-4; 2)$, $H(-4; -3)$, $O(0; 0)$, $M(0; 5)$:.

- 2.1 Prove that the diagonals RO and HM bisect each other. (4)
- 2.2 Prove that RM parallel to HO (4)

[8]

QUESTION 3

Refer to the diagram below to answer the questions that follow.



- 3.1 Prove that $BC \perp AB$. (5)
- 3.2 Determine the equation of the line AB. (3)

[8]

QUESTION 4

4.1 Determine through calculation which of the following investments will be more profitable:

- a) R7 000 at 10% p.a compound interest for 5 years. (4)
- b) R7 000 at 12% p.a simple interest for 5 years. (3)

4.2 Inflation is set at 5,5% for the next three years. A small scooter currently costs R7999,00. I want to buy this scooter on my birthday in 3 years' time.

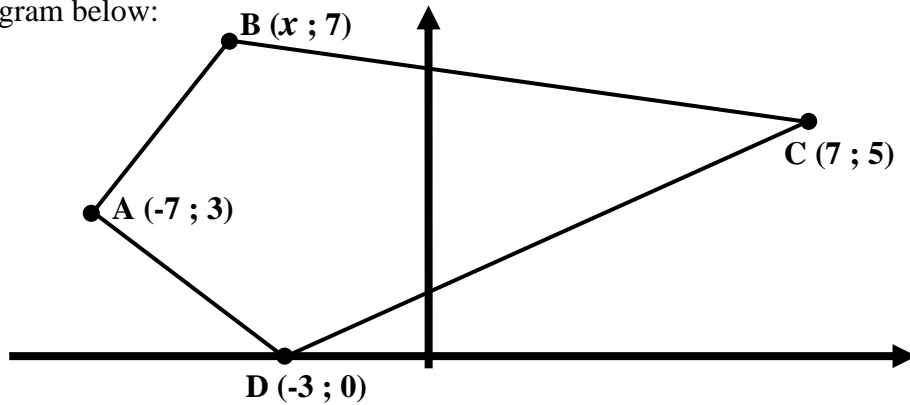
- 4.2.1 What will it cost in three years' time? (3)
- 4.2.2 The dealer offers me a hire purchase on the scooter on the following terms: 15% deposit and the balance payable over 36 months. The current interest rate on a hire purchase deal is 23% per annum. Calculate my monthly payments. (6)
- 4.2.3 What is the total amount that I pay to the dealer? (2)

TOTAL MARKS [50]

MEMORANDUM

QUESTION 1

Refer to the diagram below:



- 1.1 Find the gradient of line AD .

$$\begin{aligned} \text{gradient of line } AD &= \frac{3-0}{-7-(-3)} \quad \text{or} \quad \frac{0-3}{7-3} && \text{m}\checkmark \\ &= \frac{3}{-4} \quad \text{or} \quad \frac{-3}{4} = -\frac{3}{4} && \text{m}\checkmark \text{ a}\checkmark(3) \end{aligned}$$

- 1.2 If it is given that $AB \perp AD$, show by calculation that $x = -4$ in the point B

$$\begin{aligned} \text{gradient of line } AD &= \frac{7-3}{x-(-7)} \quad \text{or} \quad \frac{3-7}{-7-x} && \text{m}\checkmark \\ &= \frac{4}{x+7} \quad \text{or} \quad \frac{-4}{-7-x} = \frac{4}{x+7} && \text{a}\checkmark \end{aligned}$$

$$AB \perp AD: \quad \therefore m_{AB} \times m_{AD} = -1$$

$$\therefore \frac{4}{x+7} \times -\frac{3}{4} = -1 \quad \text{m}\checkmark$$

$$\therefore \cancel{(x+7)} \times \frac{4}{\cancel{(x+7)}} \times \cancel{-\frac{3}{4}} = \cancel{-1} \times (x+7) \quad \text{m}\checkmark$$

$$\therefore 3 = x+7$$

$$\therefore x = -4 \quad \text{a}\checkmark$$

(5)

1.3 Join **BD**. Given that $x = -4$, find the length of the sides of ΔABD .

$$AD = \sqrt{(-7 - (-3))^2 + (3 - 0)^2} \quad \text{m}\checkmark$$

$$= \sqrt{(-7 + 3)^2 + (3)^2} \quad \text{m}\checkmark$$

$$= \sqrt{16 + 9} \quad \text{a}\checkmark$$

$$= \sqrt{25} = 5 \quad \text{a}\checkmark$$

$$AB = \sqrt{(-7 - (-4))^2 + (3 - 7)^2}$$

$$= \sqrt{(-7 + 4)^2 + (-4)^2}$$

$$= \sqrt{9 + 16}$$

$$= \sqrt{25} = 5 \quad \text{a}\checkmark$$

$$BD = \sqrt{(-4 - (-3))^2 + (7 - 0)^2}$$

$$= \sqrt{(-1)^2 + (7)^2}$$

$$= \sqrt{1 + 49}$$

$$= \sqrt{50} = 5\sqrt{2} \quad \text{a}\checkmark$$

(6)

1.4 Apart from being right-angled, what type of triangle is ΔABD ? Why?

Isosceles: $AB = AD$ a}\checkmark a}\checkmark (2)

QUESTION 2

The vertices of a quadrilateral are **R**(-4 ; 2) , **H**(-4 ; -3) , **O**(0 ; 0) , **M**(0 ; 5) :.

2.1 Prove that the diagonals **RO** and **HM** bisect each other.

$$M_{RO} = \left(\frac{-4+0}{2}; \frac{2+0}{2} \right) \quad m\checkmark$$

$$M_{RO} = (-2;1) \quad a\checkmark$$

$$M_{HM} = \left(\frac{-4+0}{2}; \frac{-3+5}{2} \right)$$

$$M_{HM} = (-2;1) \quad a\checkmark$$

Since mid-points are same, the diagonals bisect each other. a\checkmark
(4)

2.2 Prove that **RM** parallel to **HO**

$$m_{RM} = \frac{2-5}{-4-0} \quad \text{or} \quad \frac{5-2}{0-(-4)} \quad m\checkmark$$

$$m_{RM} = \frac{3}{4} \quad a\checkmark$$

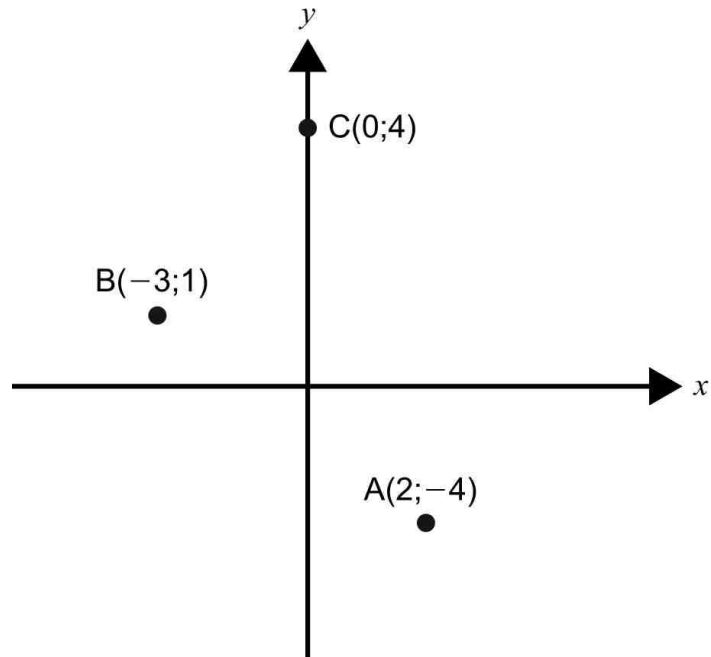
$$m_{HO} = \frac{-3-0}{-4-0} \quad \text{or} \quad \frac{0-(-3)}{0-(-4)}$$

$$m_{RM} = \frac{3}{4} \quad a\checkmark$$

$$m_{RM} = m_{HO} \quad \therefore \text{RM is parallel to HO} \quad a\checkmark \quad (4)$$

QUESTION 3

Refer to the diagram below to answer the questions that follow.



3.1 Prove that $BC \perp AB$.

$$m_{BC} = \frac{4-1}{0-(-3)} = 1$$

$$m_{BA} = \frac{-4-1}{2-(-3)} = -1$$

Since $m_{BC} \times m_{BA} = -1$, $BC \perp AB$ (Pythagoras' Th can also be used)
(5)

3.2 Determine the equation of the line AB.

From above, $m_{BA} = -1$

$$\therefore y = -1x + c \text{ passes thru' } (2; -4)$$

$$\therefore -4 = -1(2) + c$$

$$\therefore c = 2$$

$$\therefore \text{eqn AB: } y = -x + 2 \quad (3)$$

4.1 a) R11 273,57

- b) R11 200
- 4.2.1 R9 392,76
- 4.2.2 R319,18
- 4.2.3 R12 690,41