Name and Surname : ……...

Grade/Class : 10/……. **Mathematics Teacher** : …….

Hudson Park High School

GRADE 10

MATHEMATICS

November Paper 1

Marks : 100 Date : 01 November 2024

Time : 2 hours

Examiner(s) : SLT VNT PHL VPT SBL SMR Moderator(s) : SLT VNT PHL VPT SBL SMR

INSTRUCTIONS

1. Illegible work, in the opinion of the marker, will earn zero marks.

2. Number your answers clearly and accurately, exactly as they appear on the question paper.

3. **A blank space of at least two lines should be left after each answer. Start each Question at the top of new page.**

4. **Fill in the details requested on the front of this Question Paper, before you start answering any questions.**

   Hand in your submission in the following manner :

   (on top) **Answers (on lined paper, stapled together)**
   (below) **Question Paper**

   Please **DO NOT STAPLE** your Answers and Question Paper together.

5. Employ relevant formulae and show all working out.
   Answers alone *may* not be awarded full marks.

6. (Non-programmable and non-graphical) Calculators may be used, unless their usage is specifically prohibited.

7. Answers must be written in blue or black ink, as distinctly as possible, on both sides of the page. An HB pencil (but not lighter eg. 2H) may be used for diagrams.

8. Round off answers to 2 decimal places, where necessary, unless instructed otherwise.

9. If (Euclidean) GEOMETRIC statements are made, REASONS must be stated appropriately.

QUESTION 1

CALCULATORS MAY NOT BE USED IN THIS QUESTION

1.1.1. Given : $\sqrt{\frac{5}{3-4x}}$

Determine the value(s) of x for which the given expression will be :

(a) Undefined (1)

(b) Non – Real (1)

1.1.2. Between which two consecutive integers does $\sqrt{151}$ lie ?
Show all working out. (2)

1.1.3. Convert $1,\dot{6}\dot{7}\dot{8}$ into a simplified improper fraction.
Show all working out. (3)

[7]

QUESTION 2

2.1. Simplify the following as far as possible :

2.1.1. $\left(\frac{2}{y}+\frac{x}{2}\right)^2$ (2)

2.1.2. $\frac{2^{3n+2}.8^{n-3}}{4^{3n-2}}$ (3)

2.2. Factorise fully:

2.2.1. $2x^4-32$ (3)

2.2.2. $64x^3+27$ (2)

2.3. Simplify fully : $\frac{\frac{1}{x+y}}{\frac{3}{x-y}-\frac{2}{x+y}}$ (4)

[14]

QUESTION 3

3.1. Solve for x :

3.1.1. $3x^{\frac{3}{2}} - 192 = 0$ (2)

3.1.2. $x(x+5) = 24$ (3)

3.1.3. $3^x . 9^{3x-1} = \frac{1}{81}$ (3)

3.2 If $\frac{1}{a} + a = x$, determine $a^2 + \frac{1}{a^2}$ in terms of x (2)

3.3. Given : $-3 \leq \frac{2x+1}{2} < 7$ (where $x \in \mathbb{R}$)

3.3.1. Solve for x. (3)

3.3.2. Write your answer to QUESTION 3.3.1. in interval notation. (1)

[14]

QUESTION 4

4.1. Consider the following number sequence below and answer the questions that follow.

$$6 \; ; \; 10 \; ; \; 14 \; ; \; \ldots$$

4.1.1. Determine the 4^{th} term in the sequence. (1)

4.1.2. Determine an expression for the n^{th} term in the sequence, T_n.
Simplify your answer. (2)

4.1.3. Determine the position of the term whose value is 2 802. (2)

4.2. Given the following linear number pattern : $9x - 5 \; ; \; 7x + 6 \; ; \; 97 - 3x$

Calculate the value of x. (4)

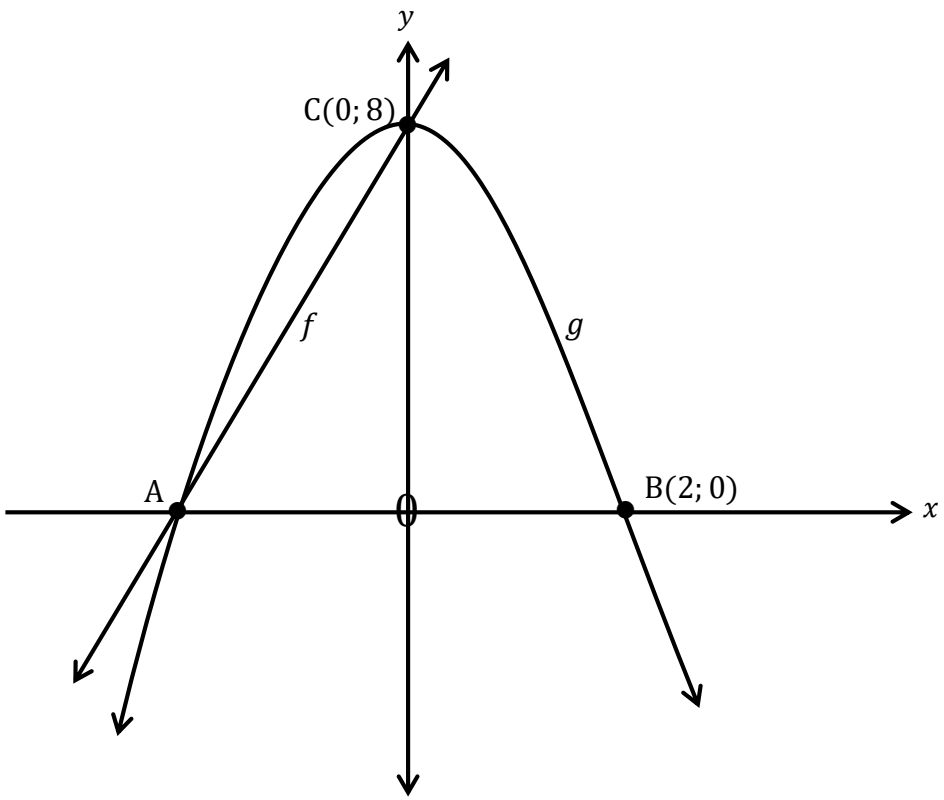
4.3. Given : $2 \; ; \; 4 \; ; \; 8 \; ; \; x \; ; \; 32 \; ; \; 64 \; ; \; 128$

Determine the value of x. (1)

[10]

QUESTION 5

5. The diagram below shows the graphs of $f(x) = mx + c$ and $g(x) = ax^2 + q$.
Points A and B$(2; 0)$ are the x-intercepts of g and C$(0; 8)$ is the y-intercept of g.
The graphs of f and g pass through A and C.



5.1. Write down the range of g. (1)

5.2. Write down the coordinates of A. (1)

5.3. Calculate the values of a and q. (3)

5.4. For which values of x is :

5.4.1. $f(x) = g(x)$ (1)

5.4.2. $ax^2 + q - mx - c > 0$ (2)

5.4.3. $(ax^2 + q)(mx + c) \leq 0$ (2)

5.4.4. $x.f(x) \geq 0$ (2)

5.5. The graph of h is obtained by reflecting g in the line $y = 0$.
Write down the equation of h in the y-form. (2)

[14]

QUESTION 6

6. On separate sets of axes, sketch the graphs of :

6.1. $y = x$ (2)

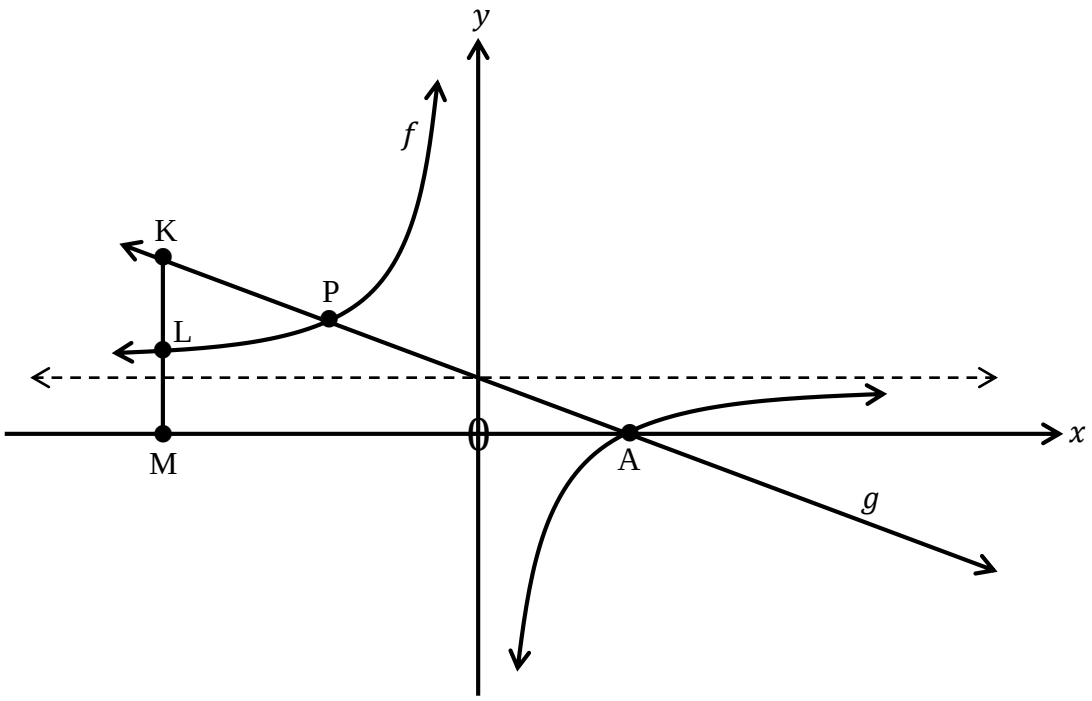
6.2. $y = -2^x - 1$ (3)

ALL relevant details must be shown on your sketches.

[5]

QUESTION 7

7. The graphs of $f(x) = \frac{k}{x} + 1$ and $g(x) = -\frac{x}{4} + 1$ are sketched below. KLM is a vertical line.



7.1. Determine the coordinates of A. (1)

7.2. Write down the equation of asymptotes of f. (2)

7.3. Calculate the value of k, showing that it will be equal to -4. (1)

7.4. If OM = 10 units, determine the length of KL. (3)

7.5. Calculate the x-coordinate of P, x_P. (4)

7.6. Write down the equation of the axis of symmetry of h, if :

$h(x) = \frac{k}{x} + 1 \quad (x > 0)$ (2)

[13]

QUESTION 8

8.1. Martin wishes to buy a new iphone which costs R18 575 from Incredible Connection. The deal, as seen on television, is a hire purchase agreement that has the following terms and conditions :

- 7,5 % cash deposit
- Interest of 21,1 % p.a.
- A monthly insurance fee of R 300,00
- Monthly repayments over 3 years

8.1.1. Calculate the value of Martin's cash deposit. (1)

8.1.2. Hence, determine Martin's monthly repayments for his new cellphone. (4)

8.2. Mrs Vaupotic invests R 8 000 into a new savings account that earns interest of 5 % per annum compounded quarterly. How many years will it take for her investment to grow into R 13 818,83 ? (4)

[9]

QUESTION 9

9.1. Evaluate the following statements :

9.1.1. For mutually exclusive events : P(A and B) = … (1)

9.1.2. For complementary events : P(A or B) = … (1)

9.2 Given :

- P(A) = 0,5
- P(not B) = 0,6
- P (A or B) = 0,7

Determine :

9.2.1. P(B) (1)

9.2.2. P(A and B) (2)

9.3 For two events that are not mutually exclusive, the following information is given :

- P(M) = 0,35
- P(N) = 0,55
- P(M ∪ N) = 0,8
- P(M ∩ N) = x

9.3.1. Represent the above information on a Venn diagram, in terms of x (where necessary). (3)

9.3.2. Now, determine the value of :

(a) x, showing that it will be equal to 0,1 (1)

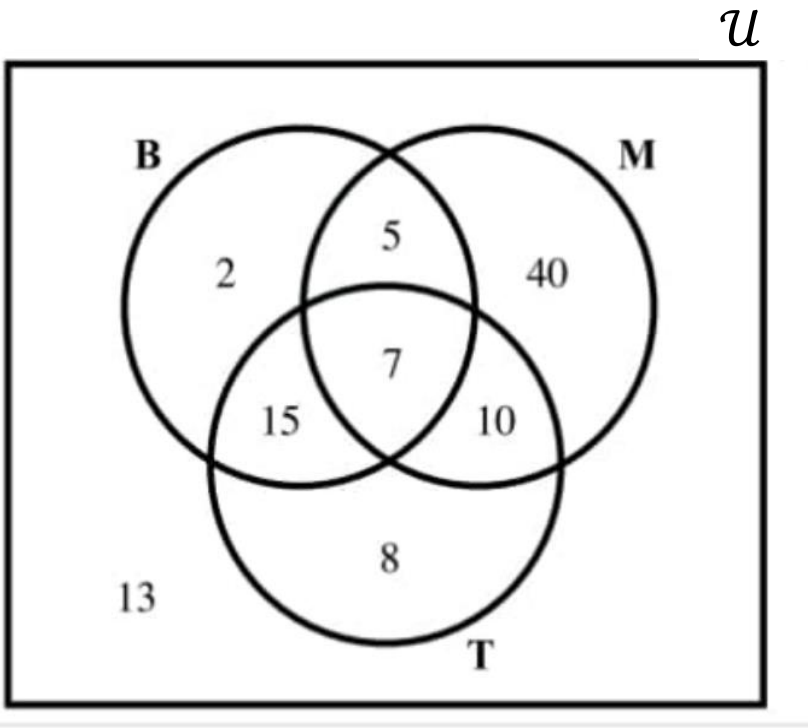
(b) P (M' ∪ N) (1)

(c) P (M ∩ N') (1)

9.4. A survey was conducted on the mode of transport used by Joburg Park High School Grade 10 learners.

The three available modes of transport are : buses (B), minibus taxis (M) and trains (T).

The results were represented in the Venn diagram below.



How many grade 10 learners :

9.4.1. are at Joburg Park High school ? (1)

9.4.2. use buses and minibus taxis, but not trains ? (1)

9.4.3. use at least two modes of transport ? (1)

[14]

TOTAL 100