Name and Surname : .....

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

Hudson Park High School

GRADE 10

MATHEMATICS

November Paper 1

Marks	:	100	Date	:	4 November 2022
Time	:	2 hours			
Examiner	:	PHL	Moderator(s)	:	SLT CYT MAK SMS RTS PKS

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. **NB** ∘ **A blank space of at least two lines should be left after each answer.**
   ∘ **Start each QUESTION at the top of a new side of a page.**

4. **NB** ∘ **Fill in the details requested on the front of this Question Paper and Answer Book first, before you start answering any questions.**

   ∘ Hand in your submission in the following manner :

   (on top) **Answers (on lined paper)**

   (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 (Start at the top of a new side of a page)

CALCULATORS MAY NOT BE USED IN THIS QUESTION.

1.1 Given $q = \sqrt{b^2 - 4ac}$

1.1.1 Determine the value of q if $a = 2,\ b = -1\ and\ c = -4.$ (2)

1.1.2 State whether q is rational or irrational. . (1)

1.1.3 Between which two consecutive integers does q lie. (2)

1.2 If: $9p^2 + q^2 = 12$ and $pq = -3$, determine the value of $(3p + q)^2$. (3)

1.3 Write $0,\dot{7}$ as a common fraction, clearly show all relevant working out. (3)

1.4 Factorise fully:

1.4.1 $4x - x^3$ (2)

1.4.2 $\frac{x^3+1}{x^2-x+1}$ (2)

1.5 Simplify fully: $\frac{2^x}{2^x - 3.2^{x-1}}$ (2)

[17]

QUESTION 2 (Start at the top of a new side of a page)

2.1 Solve for x:

2.1.1 $x(x-10)=x-10$ (3)

2.1.2 $3x^3-15x^2-8x+40=0$ (3)

2.1.3 $2x^{\frac{-3}{5}}+7=0$ (3)

2.1.4 $x(x^{\frac{1}{4}}+2)=0$ (2)

2.2 Given : $\frac{x}{5}-1 \leq 2-\frac{x}{10}$

2.2.1 Solve for x. (2)

2.2.2 Represent the answer from 2.2.1 in interval notation. (1)

2.3 Solve for x and y simultaneously

$3x-y-5=0$
$5x+3y=13$ (4)

[18]

QUESTION 3 (Start at the top of a new side of a page)

3.1 If the following number pattern is linear, calculate the value of x:
$x - 3;\ 7\ ;\ 3x - 1$ (2)

3.2 Given : $-97;\ -94{,}5;\ -92;\ \ldots\ \ldots\ ;\ 208.$

3.2.1 Determine an expression for the general term of the sequence, T_n. Simplify your answer. (2)

3.2.2 How many terms are there in the sequence? (2)

3.2.3 a) In which position will you find the first term that has a positive value? (3)

b) Hence, write down the value of that first positive term, in the sequence. (1)

[10]

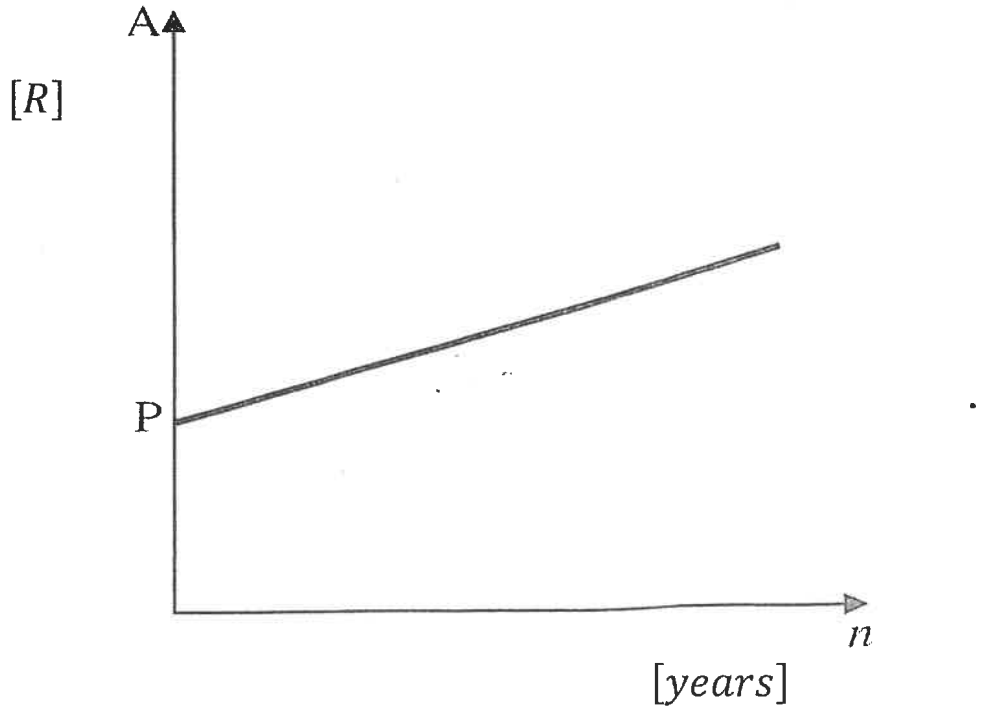
QUESTION 4 (Start at the top of a new side of a page)

4.1 How many months will it take an amount in a savings account , that earns interest of 4,3% per annum compounded monthly, to triple in value? (5)

4.2 Given: 1£ = R 19
1 US$ = R15

An item costs £ 1000 in UK. How much will it cost in US$ in the US? (2)

4.3 Mrs PHL invests R20 000 into a savings account that earns interest of 3% per annum. She sketches the graph of her investment as time goes by and finds that it is a straight line.



4.3.1 Does the savings account earn compound or simple interest? (1)

4.3.2 What will the gradient of the line have a value of? (1)

[09]

QUESTION 5 (Start at the top of a new side of a page)

5.1. Given : $f(x) = 6.3^x - 2$

5.1.1. Write down the equation of the horizontal asymptote of f. (1)

5.1.2. For f, calculate the

(a) y-intercept (1)

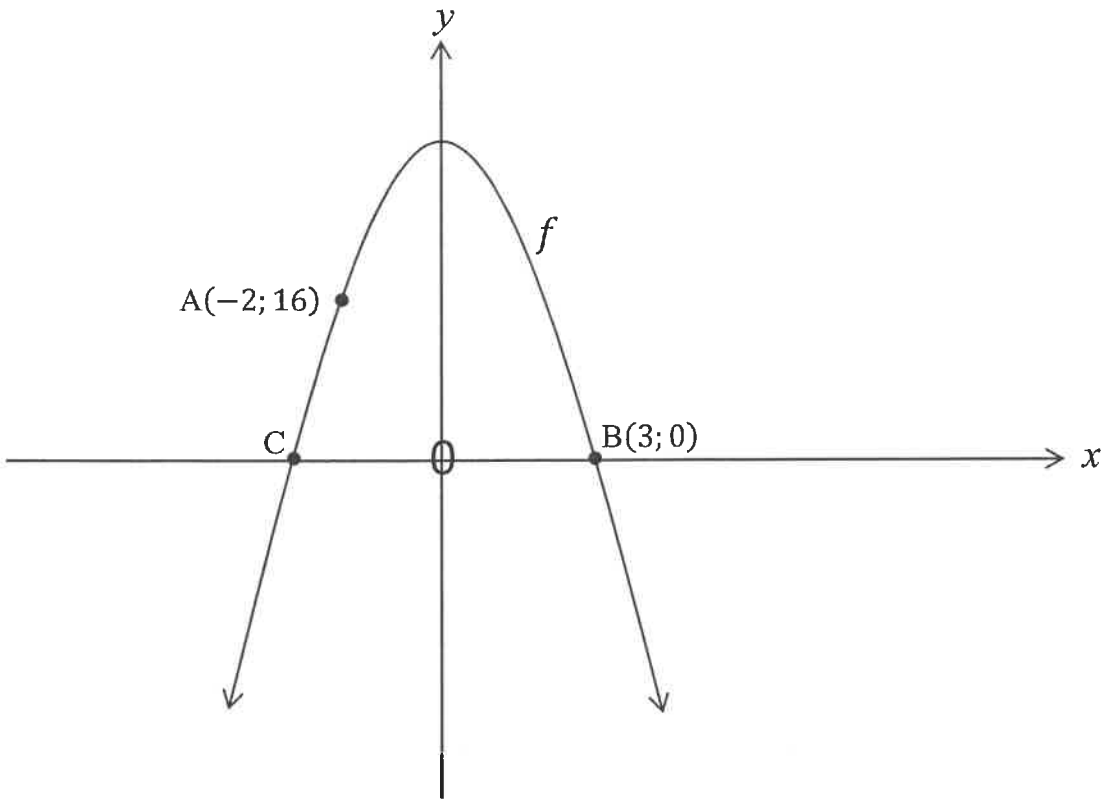
(b) x-intercept (2)

5.1.3. Sketch a rough graph of f, showing all relevant details on the diagram. (1)

5.1.4. State the range of f. (1)

5.1.5. If f is reflected in the x-axis to become g, determine the equation of g in the form $y = \cdots$. (2)

5.2. Given below is a sketch of the graph of $f(x) = ax^2 + c$. A$(-2; 16)$ and B$(3; 0)$.



5.2.1. State the equation of the axis of symmetry of f. (1)

5.2.2. Hence, write down the x-value of C, x_C. (1)

5.2.3. Determine the values of a and c. (4)

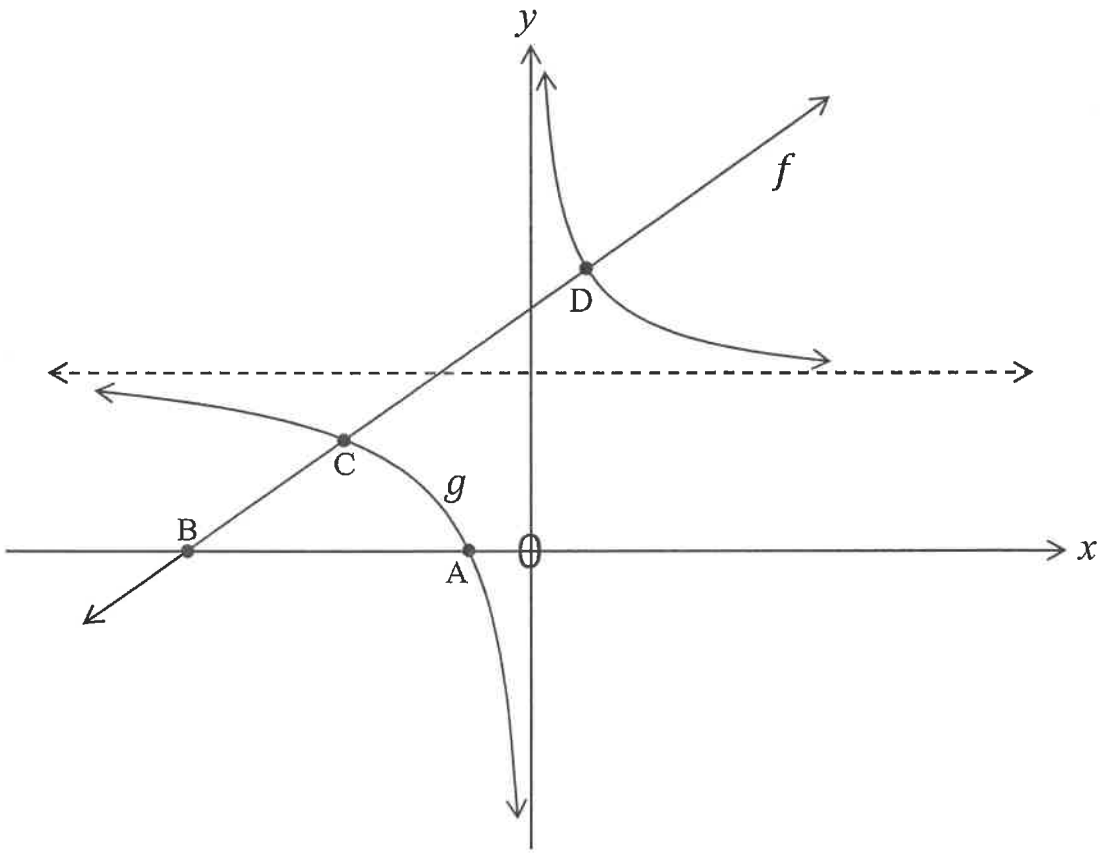
5.2.4. Write down the values of x for which f is decreasing. (1)

5.2.5. What is the maximum value of f ? (1)

[16]

QUESTION 6 (Start at the top of a new side of a page)

6. Sketched below are the graphs of $f(x) = \frac{5}{6}x + \frac{17}{6}$ and $g(x) = \frac{5}{x} + 2$:



6.1. Write down the

6.1.1. range of f (1)

6.1.2. domain of g (1)

6.2. Calculate the x-intercepts of

6.2.1. f (1)

6.2.2. g (1)

6.3. Write down the equation of the axis of symmetry of g that has a negative gradient. (1)

6.4. Calculate the x-values of the points of intersection of f and g, C and D, showing that they will be : $x_C = -3$ and $x_D = 2$. (4)

6.5. Use the graphs to solve for x, if :

6.5.1. $f(x) \geq g(x)$ (2)

6.5.2. $f(x).g(x) \geq 0$ (2)

6.5.3. $x.f(x) < 0$ (1)

[14]

QUESTION 7 (Start at the top of a new side of a page)

7.1 In a random Physical Sciences experiment, A and B are two different events. It is found that:

$$P(A) = \frac{2}{5};\ P(\text{not } B) = \frac{3}{8} \text{ and } P(A \text{ or } B) = \frac{5}{7}$$

7.1.1 a) Calculate P (B) (1)

b) P(A and B) (3)

7.1.2 Hence, determine whether events A and B are mutually exclusive. Motivate your answer. (2)

7.2 For two events A and B, it is given that:

P(A) = 0,30; P(B) = 0,65 and P(A or B) = 0,74

7.2.1 Represent the given information as a probability venn diagram (4)

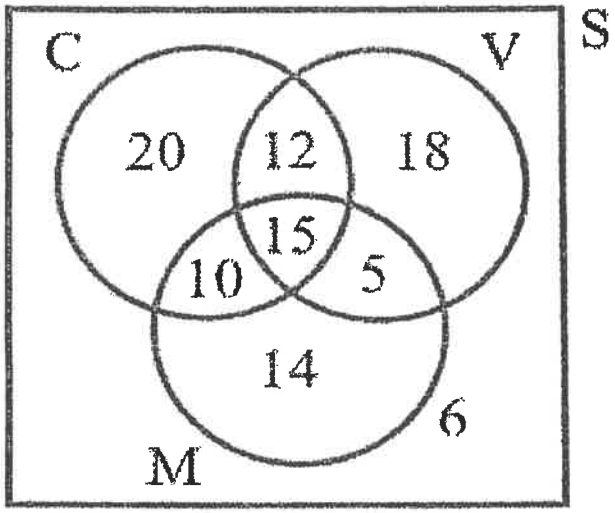
7.2.2 Determine:

a) P(A only) (1)

b) $P(A' \cap B)$ (1)

c) $P(A' \cup B)$ (1)

7.3 The venn diagram below shows three types of ice cream flavours available at a school tuckshop, chocolate (C), vanilla (V) and mint choc chip (M).
100 Grade 10 learners were surveyed to find out which flavour(s) they would choose to buy.



How many learners chose :

7.3.1 all 3 types. (1)

7.3.2 at least one flavour. (1)

7.3.3 vanilla and mint chop chip , but not chocolate. (1)

[16]

TOTAL 100