


Name and Surname :

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

Hudson Park High School



GRADE 10
MATHEMATICS
November Paper 1

Marks :

100

Time : 2 hours

Date : November 2020

Examiner : SLT

Moderator(s) : FRD PHL CYT GWS

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**
 - Leave **2 lines** open between each of your answers.
 - Start each new **QUESTION** at the **TOP** of a page.
4. **NB**
 - Fill in the details requested on the front of this Question Paper.
 - Hand in your submission in the following manner :
 - Question Paper (on top)
 - Answers on lined paper, stapled together (below)
 - ***Please DO NOT staple your Question Paper and Answers 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. Round off answers to 2 decimal places, where necessary, unless instructed otherwise.
8. If (Euclidean) Geometric statements are made, reasons must be stated appropriately.

QUESTION 1

CALCULATORS MAY NOT BE USED IN THIS QUESTION

1.1. Write $2,7\bar{8}$ as an improper fraction. Show all relevant steps and working out. (3)

1.2. For which values of x will $\sqrt{2x-5}$ be non-real? (2)

[5]

QUESTION 2

2.1. Multiply out and simplify fully:

$$3x^{\frac{1}{2}} \left(2x^{-\frac{1}{2}} - x^{\frac{1}{2}} \right) \quad (2)$$

2.2. Simplify fully:

2.2.1. $\frac{x+2}{5} - \frac{x-4}{10}$ (2)

2.2.2. $\frac{2^{3x} - 5 \cdot 8^{x+1}}{2^{3x}}$ (3)

2.3. Factorise fully:

2.3.1. $3x^4 - 48$ (3)

2.3.2. $8x^3 + \frac{27}{x^3}$ (2)

2.3.3. $5(a-2b)x^2 + 13(2b-a)xy + 6(a-2b)y^2$ (3)

[15]

QUESTION 3

3.1. Solve for x :

3.1.1. $2x^2 = 3x$ (2)

3.1.2. $2^{x(x-5)} - \frac{1}{16} = 0$ (without the use of a calculator) (4)

3.1.3. $3x^{-\frac{2}{5}} - 15 = 0$ (4)

3.2. Given : $f(x) = -8x^2 + 4x$

3.2.1. Determine $f(-12)$ (1)

3.2.2. Solve for x , if: $f(x) = -12$ (3)

3.3. Given : $-5 \leq 3 - 2x < 10$

3.3.1. Solve the given inequality for x . (2)

3.3.2. Represent your answer to (3.3.1.)

(a) on a number line (1)

(b) in interval notation (1)

3.4. Solve for x and y :

$3x + 4y + 33 = 0$ and $7x - y - 47 = 0$ (4)

[22]

QUESTION 4

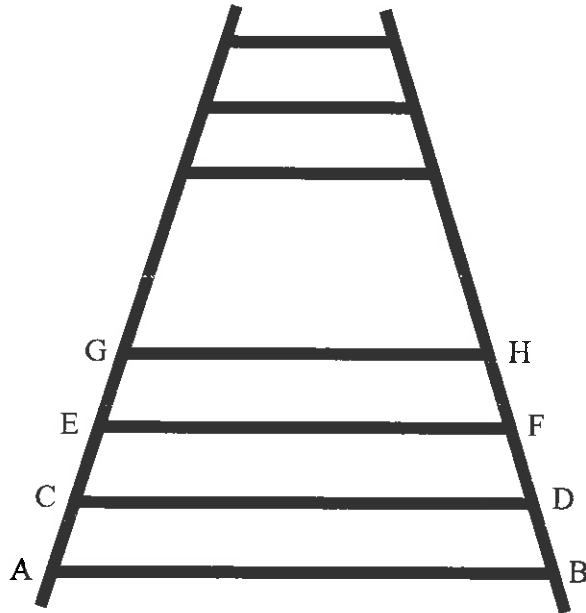
4.1. The bottom four rungs and the top three rungs of a ladder are shown.

The lengths of the rungs of the ladder form a linear number pattern:

$$AB = 2,00 \text{ metres}$$

$$CD = 1,97 \text{ metres}$$

$$EF = 1,94 \text{ metres}$$



4.1.1. How long will rung GH be? (1)

4.1.2. Determine a formula for the length of rung n , R_n , in terms of n . (2)

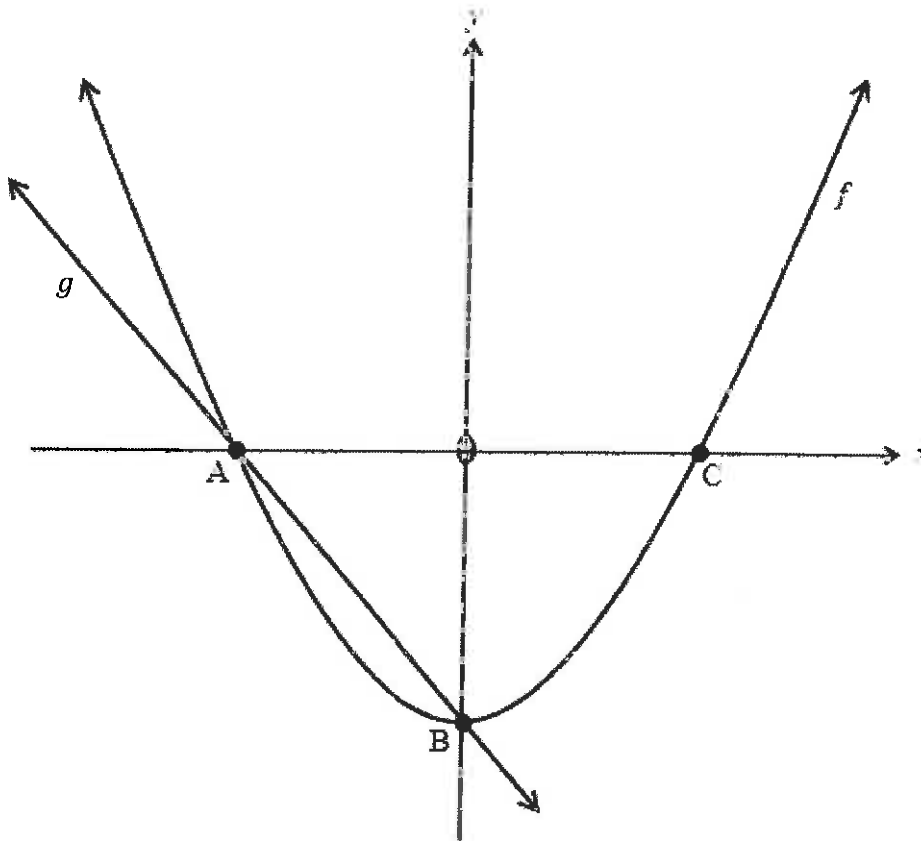
4.1.3. If the length of the top-most rung is 0,38 m, how many rungs will the ladder have? (2)

4.2. If: $2x - 7$; $10x + 1$; $-7x - 5$ are three consecutive terms in an arithmetic sequence, calculate the value of x . (2)

[7]

QUESTION 5

5. The graphs of $f(x) = ax^2 + c$ and $g(x) = mx + c$ are shown below. $A(-2; 0)$ and $B(0; -4)$.



- 5.1. Write down the coordinates of C. (1)
- 5.2. Calculate the values of c , a and m . (4)
- 5.3. Write down the range of f . (1)
- 5.4. State the value(s) of x for which f is increasing. (1)
- 5.5. Use the graphs to solve for x :
 $f(x) > g(x)$ (2)

[9]

QUESTION 6

6.1. Given: $f(x) = -2 \cdot 3^x + 5$

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

6.1.2. Draw a neat sketch graph of f , showing all relevant details. (4)

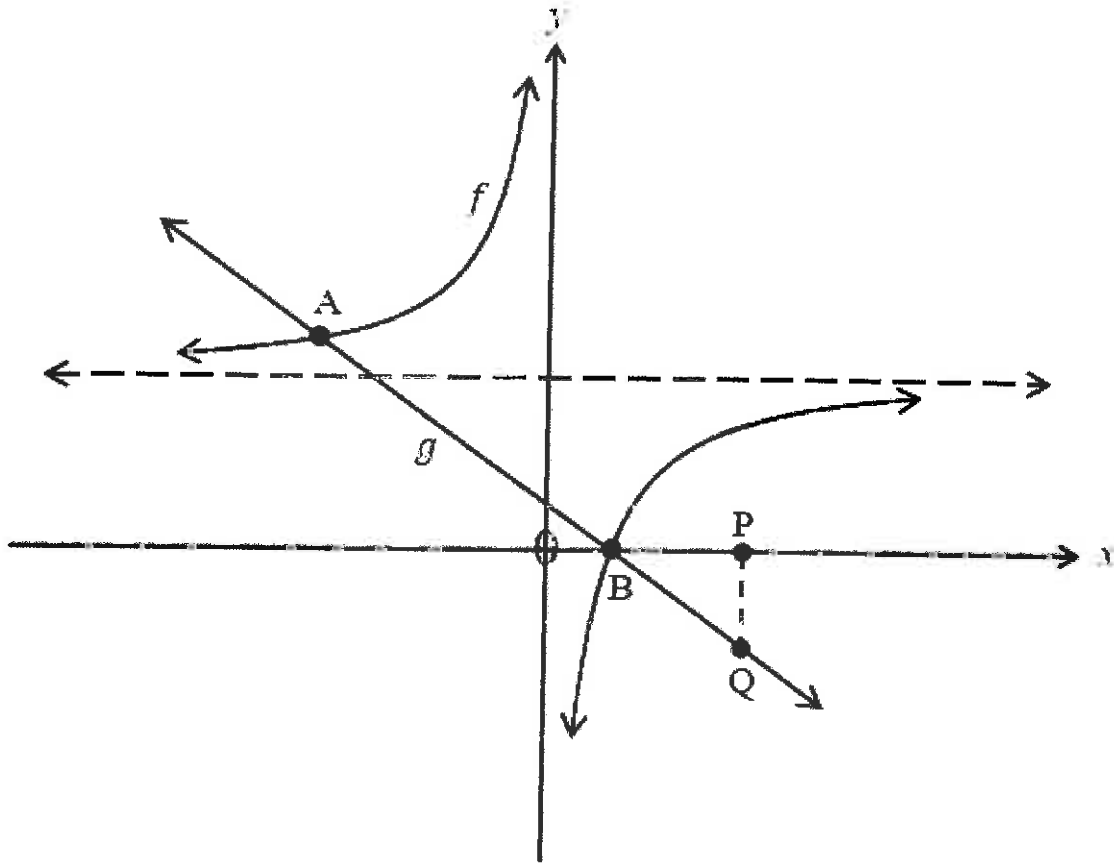
6.1.3. Determine the equation of the reflection of f in the x -axis, leaving your answer in y -form. (2)

6.2. Write down the gradient of any line parallel to: $5x - 3y - 9 = 0$ (1)

[8]

QUESTION 7

7. Given below are the graphs of $f(x) = -\frac{10}{x} + 2$ and $g(x) = -\frac{1}{5}x + 1$.
PQ is a vertical line that is 3 units long.



- 7.1. Write down the domain of f . (1)
- 7.2. Calculate the coordinates of Q. (2)
- 7.3. Determine the coordinates of A. (5)
- 7.4. Write down the equation of the axis of symmetry of h , if:
 $h(x) = f(x) \quad (x > 0)$ (2)

[10]

QUESTION 8

8.1. A deep freeze is on sale for R 3 750.

You have saved up some money and pay a 20 % deposit.

Then, the balance you pay off using a hire purchase agreement with the following details :

- 13 % per annum simple interest will be charged.
- There is a monthly insurance premium of R 35 that will need to be paid.
- You will pay off your loan over 3 years by means of equal monthly instalments.

8.1.1. Calculate the balance due for the deep freeze after you pay your deposit. (2)

8.1.2. Calculate the total monthly instalment that you will need to pay. (3)

8.2. The following were exchange rates on a certain day earlier this year :

$$1 \$ = R 16,89$$

$$1 £ = R 21,87$$

On that day, if a car was worth \$ 25 000, what would it be worth in £ ? (2)

8.3. R 50 000 is deposited into a new saving account, where it earns interest of 7 % per annum compounded monthly.

After $5\frac{1}{2}$ years, what will be the balance in the savings account ? (4)

[11]

QUESTION 9

9.1. For two events, A and B, it is known that

- $P(A) = 0,3$
- $P(B) = 0,6$
- $P(A \cup B) = 0,7$

9.1.1. Calculate $P(B')$. (1)

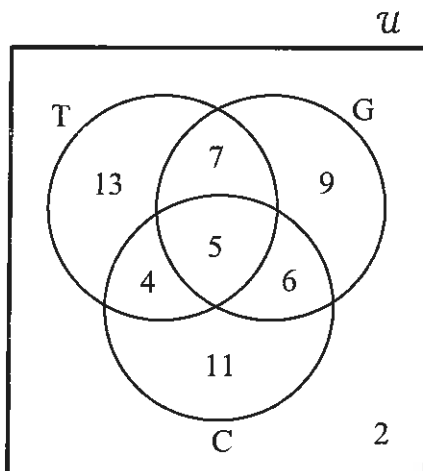
9.1.2. Calculate $P(A \cap B)$. (2)

9.1.3. Draw a Venn Diagram to represent the given information. (4)

9.1.4. Why will events A and B **not** be mutually exclusive? (1)

9.2. A group of Grade 10 learners was interviewed about their participation in tennis (T), golf (G) and cricket (C).

The following Venn Diagram represents their responses :



How many of these Grade 10's :

9.2.1. Play all three sports? (1)

9.2.2. Do not play any of the three sports? (1)

9.2.3. Play only one of the three sports? (1)

9.2.4. Play tennis and golf, but not cricket? (1)

9.2.5. Play at least two sports? (1)

[13]

TOTAL 100