BERGVLIET HIGH SCHOOL

MATHEMATICS DEPARTMENT

NOVEMBER EXAMINATION

GRADE 10

MATHEMATICS P1

30 November 2023

MARKS: 100
TIME: 2 HOURS

EXAMINER: L STOREY
MODERATOR: D VILJOEN

This question paper consists of 6 pages

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. This question paper consists of 9 questions.
2. Answer ALL the questions and attach the diagram sheet to the front of your solutions.
3. Clearly show ALL calculations, diagrams, graphs, et cetera that you have used in determining your answers.
4. Answers only will not necessarily be awarded full marks.
5. You may use an approved scientific calculator (non-programmable and non-graphical), unless stated otherwise.
6. If necessary, round off answers to TWO decimal places, unless stated otherwise.
7. Number the questions correctly according to the numbering system used in this question paper.
8. Write neatly and legibly.
9. The following formulae have been provided:

$$A = P(1+in) \qquad A = P(1+i)^n$$

QUESTION 1

1.1. Consider the list of numbers below:

$$\sqrt{18} \;;\; \pi \;;\; \frac{-\sqrt{16}}{9} \;;\; 0,\dot{1}\dot{7} \;;\; \frac{26}{13} \;;\; \frac{5}{0} \;;\; 3$$

Which numbers on the list are:

1.1.1. Undefined (1)

1.1.2. Non real (1)

1.1.3. Irrational (1)

1.2. For which value(s) of x is the expression, $\frac{1}{x-3}$,

1.2.1. Undefined (1)

1.2.2. Greater than 2 (1)

[5]

QUESTION 2

Fully simplify the following expressions without the use of a calculator:

2.1. $\frac{5^0(p^3)^2}{p^{-2}.p^4}$ (3)

2.2. $\frac{3}{b-4}+\frac{2}{b+3}-\frac{21}{b^2-b-12}$ (5)

2.3. $\frac{2x-2}{x^2-3x}\div\frac{x^2+2x-3}{x^2-9}$ (5)

2.4. $\frac{2.3^x+4.3^{x-2}}{3^x-3^{x+1}}$ (4)

2.5. If $p\in\mathbb{Z}$, show that p^2-p is divisible by 2. (3)

[20]

QUESTION 3

Solve for x in each of the following:

3.1. $\frac{x-7}{2} = 3(1-2x)$ (3)

3.2. $3^{x+1} = \frac{1}{9}$ (3)

3.3. $(x-7)(3-x) = -16$ (4)

3.4. Given $-11 \leq 3x - 8 \leq 4$
Show the solution on a number line. (4)

[14]

QUESTION 4

Solve the following equations **simultaneously.** (4)

$-2x - y = 10 \qquad 3x - 4y = -4$

[4]

QUESTION 5

Factorise fully.

5.1. $x^3(x-y) + 27(y-x)$ (4)

5.2. $3x^2 + 3px - 2mx - 2mp$ (3)

[7]

QUESTION 6

Ten years ago, Gerald invested in a savings account, offering a **simple interest** rate of 7,5% per annum, in the hopes of being able to afford a new car.

6.1. If the value of his account is R105 000, how much did Gerald originally deposit? (3)

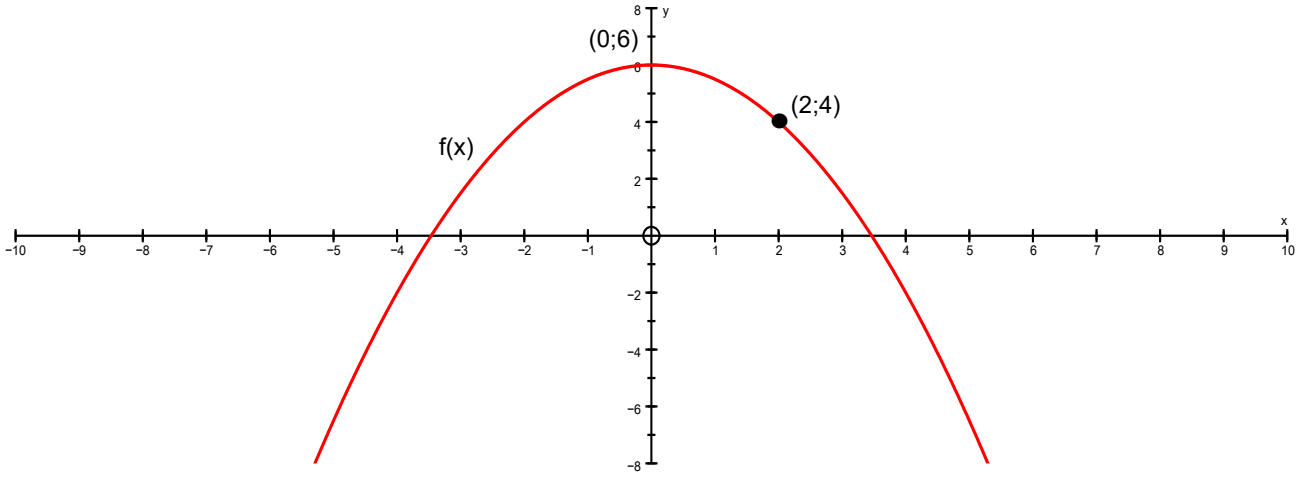
6.2. If his car cost R100 000 ten years ago, calculate how much that same car would cost today (assuming the inflation rate is calculated at 4,8% per annum, **compounded annually**). (2)

6.3. How much extra will Gerald have to pay in order to buy the car? (1)

[6]

QUESTION 7

7.1. Sketched below is the graph of $f(x) = ax^2 + c$.



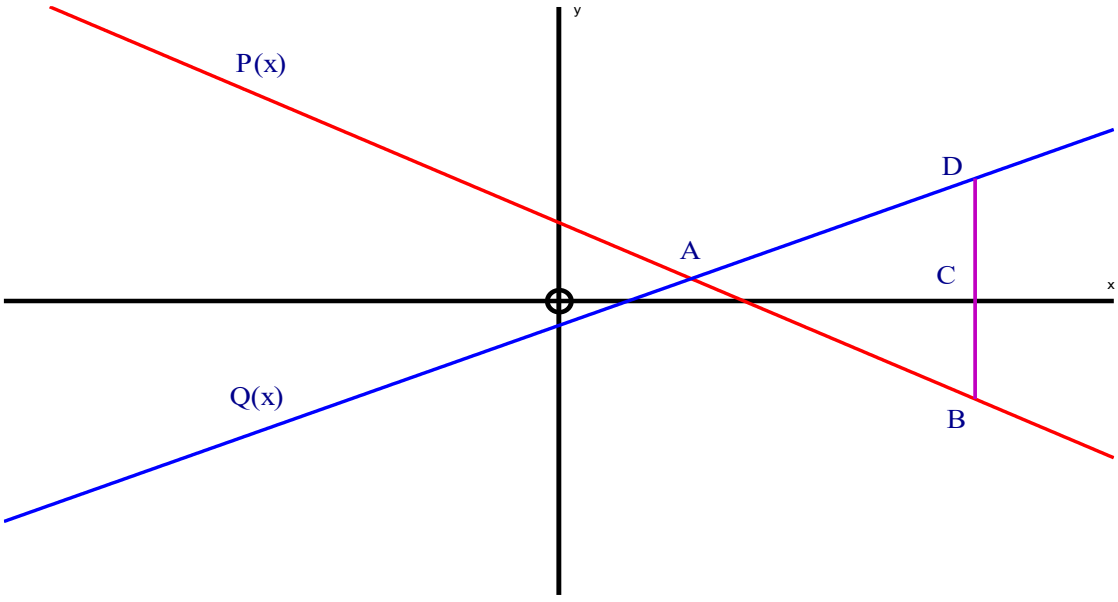
7.1.1. State the range of f. (1)

7.1.2. Determine the equation of f. (3)

7.1.3. For which value(s) of x is $f(x)$ decreasing? (2)

7.1.4. Write down the equation of $g(x)$, if g is the graph of f reflected about the x-axis and shifted up by 2 units. (3)

7.2. Sketched below are the following graphs, $P(x): 3x + 5y = 8$ and $Q(x): x - 2y = 1$



7.2.1. Determine the equation of the line perpendicular to $P(x): 3x + 5y = 8$ passing through the point (-3;2). (6)

7.2.2. If C(6;0), find the length of BD (show all calculations). (3)

[18]

QUESTION 8

8.1. Given: $f(x)=\frac{3}{x}+1$ and $g(x)=2^x$

8.1.1. Write down the equation of the asymptotes of $f(x)$. (2)

8.1.2. Write down the equation of the asymptote of $g(x)$. (2)

8.1.3 Sketch the graphs of $f(x)$ and $g(x)$ on the graph paper provided, showing all intercepts with the axes as well as any asymptotes. (6)

8.2. Given: $f(x)=-3x-2$ and $g(x)=-x+2$

Simplify the following:

8.2.1. $f(3)+g(3)$ (4)

8.2.2. $2\left(g(x+1)\right)$ (2)

[16]

QUESTION 9

In a grade 10 class of 30 boys, it is given that:

- 18 students play basketball **(B)**
- 15 students play hockey **(H)**
- 5 students do not play basketball or hockey.
- An unknown number, *x*, of students play both hockey and basketball.

9.1. Represent the information given in a Venn diagram, in terms of *x*. (4)

9.2. Calculate the value of *x.* (2)

9.3. If a boy is chosen at random, determine the probability that he:

a) Plays hockey and basketball (1)

b) Does not play basketball. (1)

9.4. Determine P(B or H). (2)

[10]

TOTAL: 100 marks

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DIAGRAM SHEET

NAME : _____ TEACHER: _____

