basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 10

MATHEMATICS P1

NOVEMBER 2017

MARKS: 100

TIME: 2 hours

This question paper consists of 7 pages.

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. This question paper consists of 7 questions.
2. Answer ALL the questions.
3. Clearly show ALL calculations, diagrams, graphs, et cetera that you have used to determine the answers.
4. Answers only will NOT necessarily be awarded full marks.
5. You must use an approved scientific calculator (non-programmable and non-graphical), unless stated otherwise.
6. Round off answers to TWO decimal places, unless stated otherwise.
7. Diagrams are NOT necessarily drawn to scale.
8. Number the answers correctly according to the numbering system used in this question paper.
9. Write neatly and legibly.

QUESTION 1

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

1.1.1 Determine the value of q if $a = 2$, $b = -1$ and $c = -4$.
Leave your answer in simplest surd form. (2)

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

1.1.3 Between which TWO consecutive integers does q lie? (1)

1.2 Factorise the following expressions fully:

1.2.1 $t^2(r-s) - r + s$ (3)

1.2.2 $\dfrac{x^3 + 1}{x^2 - x + 1}$ (2)

1.3 Simplify the following completely:

1.3.1 $(2y+3)(7y^2 - 6y - 8)$ (2)

1.3.2 $\dfrac{3}{x^2 - 9} + \dfrac{2}{(x-3)^2}$ (3)

1.3.3 $\dfrac{3^t - 3^{t-2}}{2.3^t - 3^t}$ (3)
[17]

QUESTION 2

2.1 Given: $4 - 2x < 16$ where $x \in R$

2.1.1 Solve the inequality. (2)

2.1.2 Hence, represent your answer to QUESTION 2.1.1 on a number line. (1)

2.2 Solve simultaneously for x and y:

$-2x - y = 10$ and $3x - 4y = -4$ (4)

2.3 Solve for x:

2.3.1 $\dfrac{x(x-5)}{6} - 1 = 0$ (3)

2.3.2 $c = \sqrt{a + 2x}$ (2)

2.4 Tabelo is currently four times as old as his daughter, Linda. Six years from now, Tabelo will be three times as old as Linda.

Calculate Linda's age currently. (4)
[16]

QUESTION 3

3.1 Consider the linear sequence: 5 ; 8 ; 11 ; b ; 17 ; ...

3.1.1 Write down the value of b. (2)

3.1.2 Determine the n^{th} term of the sequence. (2)

3.1.3 Calculate the value of the 15^{th} term of the sequence. (2)

3.1.4 Which term in the sequence is equal to 83? (2)

3.2 Consider the number pattern below created by using the numbers of the sequence 2 ; 6 ; 10 ; 14 ; 18 ; ...

				2				
			6		10			
		14		18		22		
	26		30		34		38	
42		...		...		...		...

3.2.1 Calculate the sum of the numbers in the 8^{th} row. (3)

3.2.2 Determine the mean of the numbers in the 20^{th} row. (2)
[13]

QUESTION 4

4.1 Seven years ago, Mrs Grey decided to invest R18 000 in a bank account that paid simple interest at 4,5% p.a.

4.1.1 Calculate how much interest Mrs Grey has earned over the 7 years. (2)

4.1.2 Mrs Grey wants to buy a television set that costs R27 660,00 now. If the average rate of inflation over the last 5 years was 6,7% p.a., calculate the cost of the television set 5 years ago. (3)

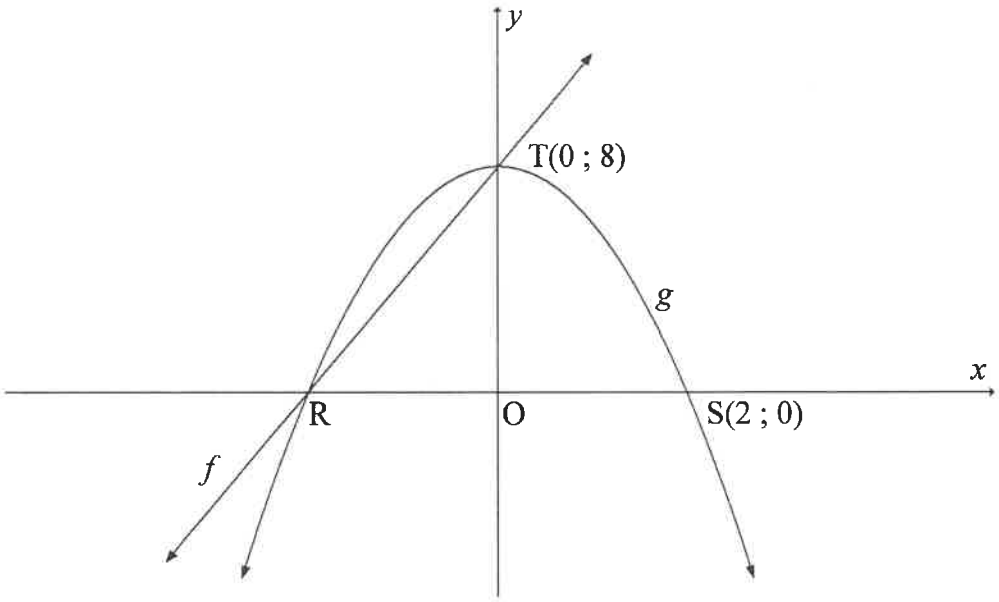
4.1.3 At what rate of simple interest should Mrs Grey have invested her money 7 years ago if she intends buying the television set now using only her original investment of R18 000 and the interest earned over the last 7 years? (3)

4.2 On a certain day the exchange rate between the US dollar and South African rand is \$1 = R12,91. At the same time the exchange rate between the British pound and the South African rand is £1 = R16,52.

Calculate the exchange rate between the British pound and US dollar on that day. (2)
[10]

QUESTION 5

The diagram shows the graphs of $g(x) = ax^2 + q$ and $f(x) = mx + c$.
R and S(2 ; 0) are the x-intercepts of g and T(0 ; 8) is the y-intercept of g.
Graph f passes through R and T.



5.1 Write down the range of g. (1)

5.2 Write down the x-coordinate of R. (1)

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

5.4 Determine the equation of f. (3)

5.5 Use the graphs to determine the value(s) of x for which:

5.5.1 $f(x) = g(x)$ (2)

5.5.2 $x \cdot g(x) \leq 0$ (3)

5.6 The graph h is obtained when g is reflected along the line $y = 0$.
Write down the equation of h in the form $h(x) = px^2 + k$. (2)
[15]

QUESTION 6

6.1 The function $p(x) = k^x + q$ is described by the following properties:

- $k > 0; k \neq 1$
- x-intercept at (2 ; 0)
- The horizontal asymptote is $y = -9$

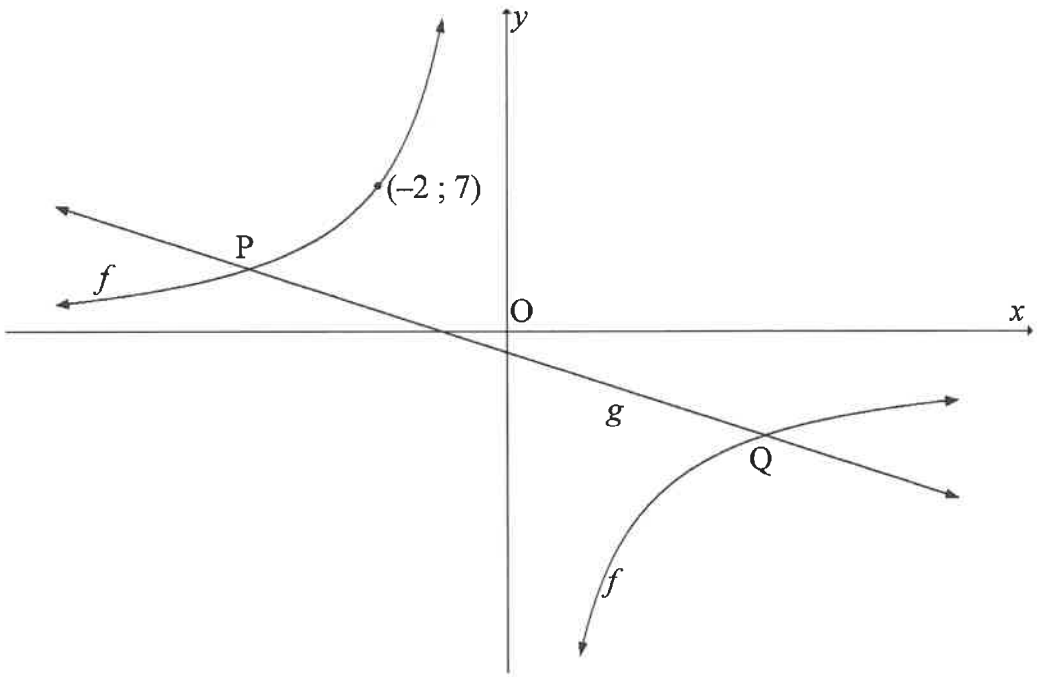
6.1.1 Write down the range of p. (1)

6.1.2 Determine the equation of p. (3)

6.1.3 Sketch the graph of p. Show clearly the intercepts with the axes and the asymptote. (3)

6.2 The sketch below shows the graphs of $f(x) = \frac{k}{x} + w$ and $g(x) = -x - 1$.

The graph g is an axis of symmetry of f. The graphs f and g intersect at P and Q.



6.2.1 Write down the value of w. (1)

6.2.2 The point (–2 ; 7) lies on f. Calculate the value of k. (2)

6.2.3 Calculate the x-coordinates of P and Q. (4)

6.2.4 Write down the values of x for which $\frac{-16}{x} > -x$. (2)

[16]

QUESTION 7

7.1 Two events, A and B, are complementary and make up the entire sample space. Also, $P(A') = 0,35$.

7.1.1 Complete the statement: $P(A) + P(B) = ...$ (1)

7.1.2 Write down the value of $P(A \text{ and } B)$. (1)

7.1.3 Write down the value of $P(B)$. (1)

7.2 A survey was conducted among 150 learners in Grade 10 at a certain school to establish how many of them owned the following devices: smartphone (S) or tablet (T).

The results were as follows:

- 8 learners did not own either a smartphone or a tablet.
- 20 learners owned both a smartphone and a tablet.
- 48 learners owned a tablet.
- x learners owned a smartphone.

7.2.1 Represent the information above in a Venn diagram. (4)

7.2.2 How many learners owned only a smartphone? (3)

7.2.3 Calculate the probability that a learner selected at random from this group:

(a) Owned only a smartphone (1)

(b) Owned at most one type of device (2)
[13]

TOTAL: 100