Province of the
EASTERN CAPE
EDUCATION

NATIONAL SENIOR CERTIFICATE

GRADE 10

NOVEMBER 2018

TECHNICAL MATHEMATICS P 1

MARKS: **100**

TIME: **2 hours**

This question paper consists of 7 pages, including 1 diagram sheet.

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions in the question paper.

1. This question paper consists of SIX questions.
2. Answer ALL the questions.
3. A DIAGRAM SHEET is attached at the back of this question paper. Use it to answer QUESTION 5.4.
4. Clearly show ALL calculations, diagrams, graphs, etc. which you have used in determining the answers.
5. Answers only will NOT necessarily be awarded full marks.
6. You may use an approved scientific calculator (non-programmable and non-graphical), unless stated otherwise.
7. If necessary, round off answers to TWO decimal places, unless stated otherwise.
8. Diagrams are not necessarily drawn to scale.
9. Write neatly and legibly.

QUESTION 1

1.1 Consider the following numbers:

$\sqrt[3]{9}\ ;\ \sqrt{9};\ \sqrt{-9}$

Which one of the above numbers is:

1.1.1 irrational? (1)

1.1.2 imaginary? (1)

1.2 Between which TWO integers does $\sqrt{11}$ lie? (2)

1.3 Subtract $3x^2 - 5x - 7$ from $7x^2 - 2x - 6$. (2)

1.4 Use the long division method to calculate:

$111111_2 \div 1001_2$ (leave your answer in decimal form) (3)

1.5 Determine the product and simplify:

1.5.1 $2x(x+2) - 2x^2 + 3(x+1)$ (3)

1.5.2 $(a-3)(a^2 + 3a + 9)$ (3)

1.5.3 $(2+3i)(-1+3i)$ (3)

[18]

QUESTION 2

2.1 Factorise the following expressions fully:

2.1.1 $x^4 - 81$ (2)

2.1.2 $6x^2y - 10xy + 15x - 25$ (3)

2.2 Simplify the following expressions fully:

2.2.1 $\dfrac{3^{x+2}.27^{x-2}}{81^x}$ (4)

2.2.2 $\dfrac{x^3 + y^3}{2x^3 - x^2y - 3xy^2} \div \dfrac{x^3y - x^2y^2 + xy^3}{4x^4 - 9x^2y^2}$ (5)

[14]

QUESTION 3

3.1 Solve for x:

3.1.1 $5^x = \frac{1}{125}$ (2)

3.1.2 $\frac{3x+1}{x} = 2$ (3)

3.1.3 $(x+13)(x-1) = 0$ (2)

3.1.4 $3(x+7) < \frac{x}{2} + 1$, and represent your answer graphically. (4)

[11]

QUESTION 4

4.1 A neutron weighs 0,000 000 000 000 000 000 000 000 001675 kg:

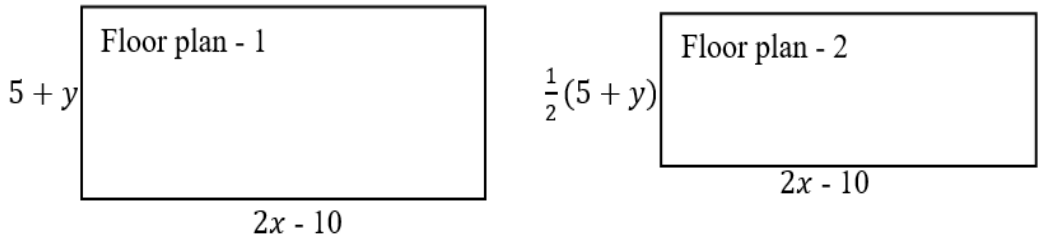
Write the mass of the neutron in scientific notation. (2)

4.2 Given:
$A = \pi(R - r)$

Make R the subject of the formula. (2)

4.3 The distance between two towns is 380 km. At the same time, a passenger car and a truck start moving towards each other from the different towns. They meet four hours later. If the car drives 5 km/h faster than the truck, what are their speeds? (6)

4.4 Given below are two rectangles representing floor plan designs for a new dwelling. The dimensions are given in terms of x and y. Both designs are equal in length and the width of Floor plan -2 is half the width of Floor plan -1.



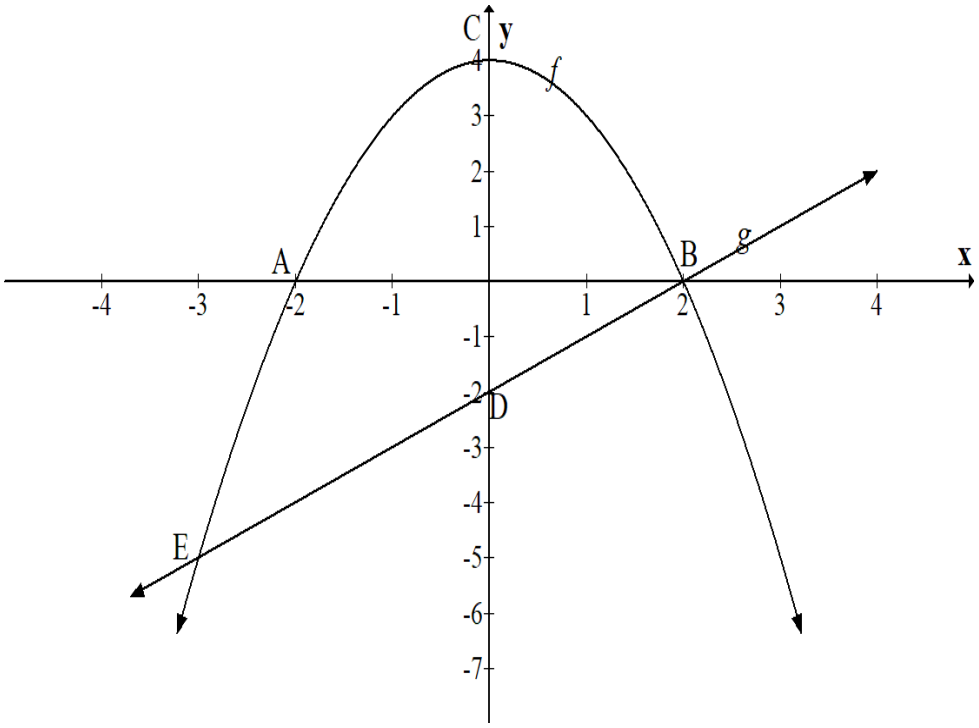
4.4.1 Make the system of equations in terms of x and y relating to this problem if the perimeter of Floor plan -1 is 70 m and the perimeter of Floor plan - 2 is 60 m. (4)

4.4.2 Hence solve for x and y in the system of equations. (4)

[18]

QUESTION 5

5.1 The graphs of $f(x) = -x^2 + 4$ and $g(x) = x - 2$ are given. A and B are x-intercepts of the graph of f, and C is the turning point of f. The graph of g meets f at B and E. D is the y-intercept of g.



Determine:

5.1.1 The coordinates of A, B, C and D (8)

5.1.2 The coordinates of E (6)

5.1.3 The length of CD (2)

5.2 Write down:

5.2.1 The domain of g (1)

5.2.2 The range of f (1)

5.3 Determine the equation of j if $j(x) = -f(x)$. (2)

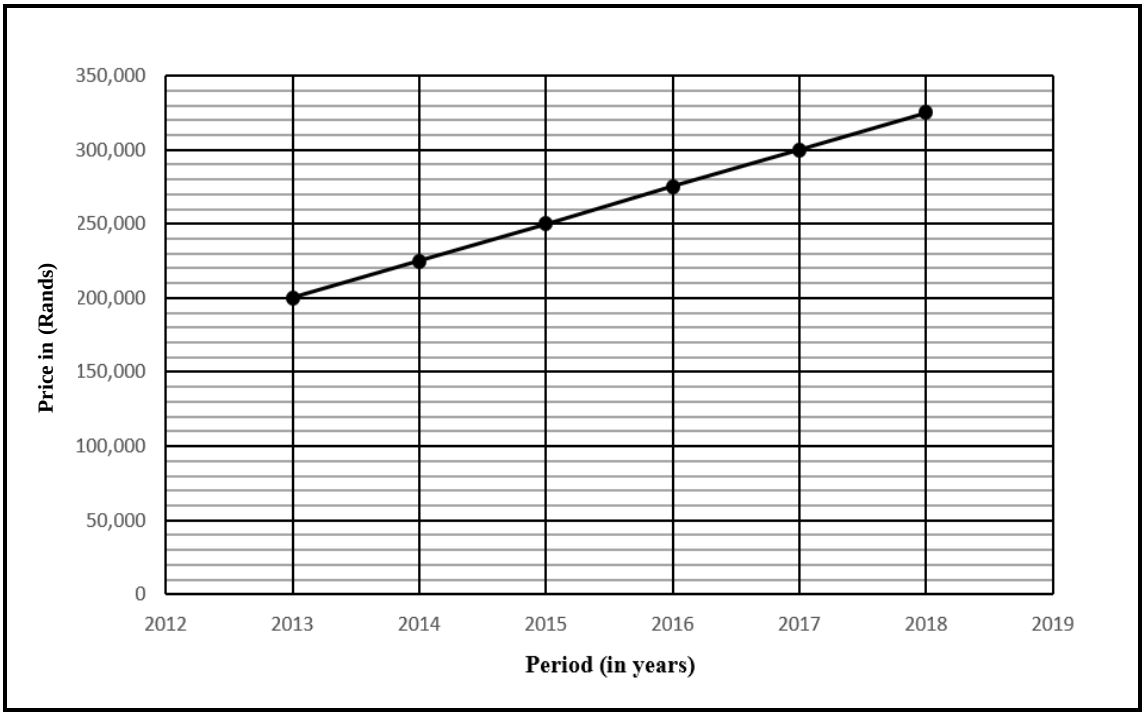
5.4 Use the DIAGRAM SHEET provided to sketch the graphs of $k(x) = -\frac{6}{x}$ and $h(x) = 2^x$ on the same set of axes. Show all the intercepts with the axes and the asymptotes. (5)

[25]

QUESTION 6

6.1 A boy's parents gave him R30 000 for his 21st birthday. His parents said that they had invested a sum of money on his 10th birthday that had grown at 13,5% p.a. compound interest for 11 years. How much was invested 11 years ago? (3)

6.2 The sketch below represents Lebo's house that she bought in 2013. The price of the house accumulates at a constant rate annually. The x-axis represents the period in years and the y-axis represents the price of the house in Rands.



6.2.1 How much was Lebo's house in 2013? (1)

6.2.2 If the price of Lebo's house accumulates like this continuously, is the interest earned simple or compound? Explain your answer. (2)

6.2.3 How much will Lebo's house cost in 2019? (2)

6.2.4 Hence calculate the interest rate per annum. (4)

6.3 Mpho buys a car worth R385 000 in 2013. What will the value of the car be at the end of 2018 if the car depreciates at 6% pa. straight line depreciation? (2)

[14]

TOTAL: 100

DIAGRAM SHEET

NAME OF LEARNER: …….. **CLASS**: ……

SCHOOL: ……

QUESTION 5.4