basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 11

MATHEMATICS P1

NOVEMBER 2018

MARKS: 150

TIME: 3 hours

This question paper consists of 8 pages.

Copyright reserved

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. This question paper consists of NINE questions.
2. Answer ALL the questions.
3. Number the answers correctly according to the numbering system used in this question paper.
4. Clearly show ALL calculations, diagrams, graphs, etc. that you have used in determining your 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. 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 Solve for x in each of the following:

1.1.1 $x(2x+1)=0$ (2)

1.1.2 $5x^2+2x-6=0$ (correct to TWO decimal places) (3)

1.1.3 $2x^2-2\geq 3x$ (4)

1.1.4 $\sqrt{2x+5}-\dfrac{3}{\sqrt{2x+5}}=-2$ (6)

1.2 Solve for x and y simultaneously:

$y+x=2$ and $x^2+3xy+8=0$ (6)

1.3 The roots of the equation $f(x)=0$ are $x=\dfrac{4\pm\sqrt{16-4m(-m+5)}}{2m}$

Determine the values of m for which the roots will be non-real. (4)

1.4 Show that the maximum value of $\sqrt{-x^2+4x+12}$ is 4. (4)

[29]

QUESTION 2

2.1 Simplify fully, WITHOUT using a calculator: $\dfrac{2^{x-3}-3.2^{x+1}}{2^{x-2}}$ (4)

2.2 Solve for x:

2.2.1 $2-16x^{-\frac{3}{2}}=0$ (3)

2.2.2 $4^x+8=9.2^x$ (4)

2.2.3 $\sqrt[x]{9}=243$ (3)

2.3 Simplify fully:

$$\frac{\sqrt{p^2-q^2}\times(p+q)^{\frac{5}{2}}}{(p-q)^{\frac{1}{2}}} \quad \text{if } p\neq q$$

(3)

[17]

Copyright reserved

QUESTION 3

3.1 Given the linear pattern: $7 ; 2 ; -3 ; \ldots$

3.1.1 Determine the general term, T_n, of the linear pattern. (2)

3.1.2 Calculate the value of T_{20} . (2)

3.1.3 Which term in the pattern has a value of -138? (2)

3.2 6 ; $2x+1$ and $3x-3$ are the first three terms of a linear pattern.

Calculate the value of x. (3)
[9]

QUESTION 4

The quadratic number pattern: $4 ; p ; 11 ; q ; 22 ; \ldots$ has a constant second difference of 1.

4.1 Show that $p = 7$ and $q = 16$. (3)

4.2 Determine the general term, T_n, of the quadratic pattern. (4)

4.3 Determine the value of n if $T_n = 232$. (4)

4.4 If the sum of two consecutive terms in the pattern is 1 227, calculate the difference between these two terms. (5)
[16]

QUESTION 5

Given: $f(x)=\dfrac{4}{x-3}+2$ and $g(x)=x+2$

5.1 Write down the equations of the asymptotes of f. (2)

5.2 Determine the x-intercept of f. (3)

5.3 Determine the y-intercept of f. (2)

5.4 Sketch the graphs of f and g on the same system of axes. Show clearly ALL the intercepts with the axes and any asymptotes. (5)

5.5 Calculate the x-coordinates of the points of intersection of f and g. (4)

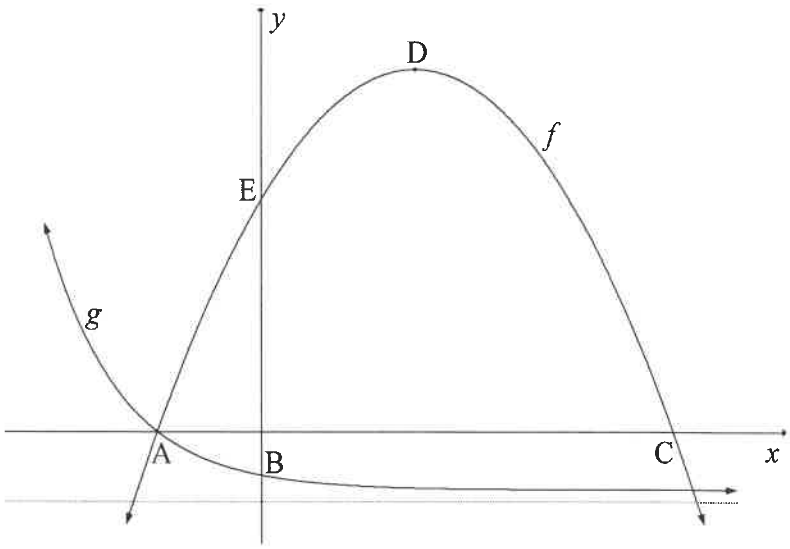
5.6 If $x<3$, determine the values of x for which $\dfrac{4}{x-3}+2<x+2$. (2)

5.7 The line $y=x-1$ cuts f at P(1 ; 0) and Q. Write down the coordinates of Q. (3)
[21]

QUESTION 6

The diagram below shows the graphs of $f(x) = -(x-3)^2 + 25$ and $g(x) = 2\left(\frac{1}{2}\right)^{x+1} - 4$.

Graph f cuts the x-axis at A and C, the y-axis at E and has a turning point at D.
Graph g cuts the x-axis at A and the y-axis at B.



6.1 Write down the equation of the asymptote of g. (1)

6.2 Write down the coordinates of D. (2)

6.3 Write down the range of f. (1)

6.4 Calculate the length of EB. (4)

6.5 Determine the values of x for which f is decreasing. (2)

6.6 Calculate the average gradient between points A and B. (5)

6.7 Graph t is obtained by reflecting g about the x-axis. Write down the range of t. (2)

6.8 If $p(x) = f(x) + 2$, write down the coordinates of the turning point of p. (2)

6.9 Determine the value of k for which the straight line $y = 2x + k$ will be a tangent to f. (4)

[23]

QUESTION 7

7.1 Calculate the effective interest rate per annum if an investment earns interest at a rate of 11,5% p.a., compounded monthly. (3)

7.2 Karabo bought a computer for R4 700. The value of the computer depreciated at a rate of 18% p.a. Using the reducing-balance method, calculate the book value of the computer 4 years after it was bought. (3)

7.3 Nhlanhla made an initial deposit of R20 000 into an investment account that paid interest at the rate of 7,2% p.a., compounded quarterly. After 2 years the interest rate changed to 7,8% p.a., compounded monthly. Four years after his initial deposit, Nhlanhla withdrew R2 500 from his investment.

7.3.1 Calculate how much Nhlanhla had in this investment account 2 years after the initial deposit was made. (3)

7.3.2 How much will the investment be worth 7 years after the initial deposit was made? (4)

[13]

QUESTION 8

A bag contains 6 red balls, 8 green balls and an unknown number of yellow balls. The probability of randomly choosing a green ball from the bag is 25%.

8.1 Show that there are 32 balls in the bag. (1)

8.2 A ball is drawn from the bag, the colour is recorded and it is not returned to the bag. Thereafter another ball is drawn from the bag, the colour is recorded and it is also not returned to the bag.

Draw a tree diagram to represent ALL the possible ways in which the two balls could have been drawn from the bag. Show the probabilities associated with EACH branch, as well as the outcomes. (4)

8.3 Calculate the probability that the two balls drawn from the bag will have the same colour. (4)

[9]

QUESTION 9

9.1 On a flight, passengers could choose between a vegetarian snack and a chicken snack. The snacks selected by the passengers were recorded. The results are shown in the table below.

SNACK	MALE	FEMALE	TOTAL
Vegetarian	12	20	32
Chicken	55	63	118
TOTAL	67	83	150

Was the choice of snack on this flight independent of gender? Motivate your answer with the necessary calculations. (5)

9.2 For any two events, A and B, it is given that P(A and B) = 0,12, P(A or B) = 0,83 and P(B) = 4 P(A).

9.2.1 Are events A and B mutually exclusive? Justify your answer. (2)

9.2.2 Calculate P(B). (4)

9.2.3 Calculate P(not A). (2)
[13]

TOTAL: 150

Copyright reserved

basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NASIONALE SENIOR SERTIFIKAAT

GRAAD 11

WISKUNDE V1

NOVEMBER 2018

PUNTE: 150

TYD: 3 uur

Hierdie vraestel bestaan uit 8 bladsye.

Kopiereg voorbehou

INSTRUKSIES EN INLIGTING

Lees die volgende instruksies aandagtig deur voordat jy die vrae beantwoord.

1. Hierdie vraestel bestaan uit NEGE vrae.
2. Beantwoord AL die vrae.
3. Nommer die antwoorde korrek volgens die nommeringstelsel wat in hierdie vraestel gebruik is.
4. Dui ALLE berekeninge, diagramme, grafieke, ens. wat jy gebruik het om die antwoorde te bepaal, duidelik aan.
5. Volpunte sal nie noodwendig aan slegs antwoorde toegeken word nie.
6. Jy mag 'n goedgekeurde wetenskaplike sakrekenaar (nieprogrammeerbaar en niegrafies) gebruik, tensy anders aangedui.
7. Rond antwoorde tot TWEE desimale plekke af, tensy anders aangedui.
8. Diagramme is NIE noodwendig volgens skaal geteken NIE.
9. Skryf netjies en leesbaar.

Kopiereg voorbehou

VRAAG 1

1.1 Los op vir x in elk van die volgende:

1.1.1 $x(2x+1)=0$ (2)

1.1.2 $5x^2+2x-6=0$ (korrek tot TWEE desimale plekke) (3)

1.1.3 $2x^2-2 \geq 3x$ (4)

1.1.4 $\sqrt{2x+5}-\dfrac{3}{\sqrt{2x+5}}=-2$ (6)

1.2 Los gelyktydig op vir x en y:

$y+x=2$ en $x^2+3xy+8=0$ (6)

1.3 Die wortels van die vergelyking $f(x)=0$ is $x=\dfrac{4\pm\sqrt{16-4m(-m+5)}}{2m}$

Bepaal die waardes van m waarvoor die wortels nie-reëel sal wees. (4)

1.4 Toon dat die maksimum waarde van $\sqrt{-x^2+4x+12}$, 4 is. (4)

[29]

VRAAG 2

2.1 Vereenvoudig volledig, SONDER om 'n sakrekenaar te gebruik: $\dfrac{2^{x-3}-3.2^{x+1}}{2^{x-2}}$ (4)

2.2 Los op vir x:

2.2.1 $2-16x^{-\frac{3}{2}}=0$ (3)

2.2.2 $4^x+8=9.2^x$ (4)

2.2.3 $\sqrt[x]{9}=243$ (3)

2.3 Vereenvoudig volledig:

$$\frac{\sqrt{p^2-q^2}\times(p+q)^{\frac{5}{2}}}{(p-q)^{\frac{1}{2}}} \quad \text{as} \quad p\neq q$$

(3)

[17]

VRAAG 3

3.1 Gegee die liniêre patroon: 7 ; 2 ; –3 ; …

3.1.1 Bepaal die algemene term, T_n, van die liniêre patroon. (2)

3.1.2 Bereken die waarde van T_{20} . (2)

3.1.3 Watter term in die patroon het 'n waarde van -138? (2)

3.2 6 ; $2x+1$ en $3x-3$ is die eerste drie terme van 'n liniêre patroon.

Bereken die waarde van x. (3)

[9]

VRAAG 4

Die kwadratiese syferpatroon: 4 ; p ; 11 ; q ; 22 ; … het 'n konstante tweede verskil van 1.

4.1 Toon dat $p=7$ en $q=16$. (3)

4.2 Bepaal die algemene term, T_n, van die kwadratiese patroon. (4)

4.3 Bepaal die waarde van n as $T_n = 232$. (4)

4.4 Indien die som van twee opeenvolgende terme in die patroon 1 227 is, bereken die verskil tussen hierdie twee terme. (5)

[16]

VRAAG 5

Gegee: $f(x)=\dfrac{4}{x-3}+2$ en $g(x)=x+2$

5.1 Skryf die vergelykings van die asimptote van f neer. (2)

5.2 Bepaal die x-afsnit van f. (3)

5.3 Bepaal die y-afsnit van f. (2)

5.4 Skets die grafieke van f en g op dieselfde assestelsel. Toon duidelik AL die afsnitte met die asse en enige asimptote. (5)

5.5 Bereken die x-koördinate van die snypunte van f en g. (4)

5.6 Indien $x<3$, bepaal die waardes van x waarvoor $\dfrac{4}{x-3}+2<x+2$. (2)

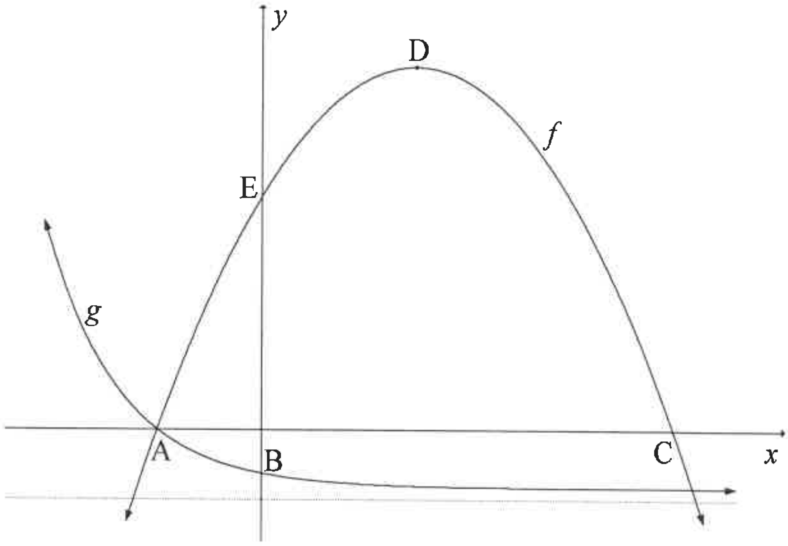
5.7 Die lyn $y=x-1$ sny f by P(1 ; 0) en Q. Skryf die koördinate van Q neer. (3)

[21]

VRAAG 6

Die diagram hieronder toon die grafieke van $f(x) = -(x-3)^2 + 25$ en $g(x) = 2\left(\frac{1}{2}\right)^{x+1} - 4$.

Grafiek f sny die x-as by A en C, die y-as by E en het 'n draaipunt by D.
Grafiek g sny die x-as by A en die y-as by B.



6.1	Skryf die vergelyking van die asimptoot van g neer.	(1)
6.2	Skryf die koördinate van D neer.	(2)
6.3	Skryf die waardeversameling van f neer.	(1)
6.4	Bereken die lengte van EB.	(4)
6.5	Bepaal die waardes van x waarvoor f afneem.	(2)
6.6	Bereken die gemiddelde gradiënt tussen punt A en B.	(5)
6.7	Grafiek t word verkry deur g om die x-as te reflekteer. Skryf die waardeversameling van t neer.	(2)
6.8	Indien $p(x) = f(x) + 2$, skryf die koördinate van die draaipunt van p neer.	(2)
6.9	Bepaal die waarde van k waarvoor die reguitlyn $y = 2x + k$ 'n raaklyn aan f sal wees.	(4)

[23]

VRAAG 7

7.1 Bereken die effektiewe rentekoers per jaar indien 'n belegging rente verdien teen 'n koers van 11,5% p.j., maandeliks saamgestel. (3)

7.2 Karabo het 'n rekenaar vir R4 700 gekoop. Die waarde van die rekenaar het teen 'n koers van 18% p.j. verminder. Gebruik die verminderdesaldo-metode en bereken die boekwaarde van die rekenaar 4 jaar nadat dit gekoop is. (3)

7.3 Nhlanhla het 'n aanvanklike deposito van R20 000 in 'n beleggingsrekening gemaak wat rente betaal het teen 'n koers van 7,2% p.j., kwartaalliks saamgestel. Die rentekoers het na 2 jaar verander na 7,8% p.j., maandeliks saamgestel. Nhlanhla het 4 jaar na sy aanvanklike deposito R2 500 uit sy belegging onttrek.

7.3.1 Bereken hoeveel Nhlanhla in hierdie beleggingsrekening gehad het 2 jaar nadat die aanvanklike deposito gemaak is. (3)

7.3.2 Hoeveel sal die belegging werd wees 7 jaar nadat die aanvanklike deposito gemaak is? (4)

[13]

VRAAG 8

'n Sak bevat 6 rooi balle, 8 groen balle en 'n onbekende aantal geel balle. Die waarskynlikheid dat 'n groen bal willekeurig uit die sak gekies sal word, is 25%.

8.1 Toon dat daar 32 balle in die sak is. (1)

8.2 'n Bal word uit die sak gehaal, die kleur word aangeteken en dit word nie in die sak teruggesit nie. Daarna word nog 'n bal uit die sak gehaal, die kleur word aangeteken en dit word ook nie in die sak teruggesit nie.

Teken 'n boomdiagram om AL die moontlike maniere waarop die twee balle uit die sak gehaal kon word, voor te stel. Toon die waarskynlikhede wat met ELKE tak, asook die uitkomste, geassosieer word. (4)

8.3 Bereken die waarskynlikheid dat die twee balle wat uit die sak gehaal is, dieselfde kleur sal hê. (4)

[9]

VRAAG 9

9.1 Passasiers kon op 'n vlug tussen 'n vegetariese peuselhappie en 'n hoenderpeuselhappie kies. Die peuselhappies wat die passasiers gekies het, is aangeteken. Die resultate word in die tabel hieronder getoon.

PEUSELHAPPIE	**MANLIK**	**VROULIK**	**TOTAAL**
Vegetaries	12	20	32
Hoender	55	63	118
TOTAAL	67	83	150

Was die keuse van peuselhappie op hierdie vlug onafhanklik van geslag? Motiveer jou antwoord met die nodige berekeninge. (5)

9.2 Vir enige twee gebeurtenisse, A en B, word gegee dat P(A en B) = 0,12, P(A of B) = 0,83 en P(B) = 4 P(A).

9.2.1 Is gebeurtenisse A en B onderling uitsluitend? Regverdig jou antwoord. (2)

9.2.2 Bereken P(B). (4)

9.2.3 Bereken P(nie A). (2)

[13]

TOTAAL: 150

Kopiereg voorbehou