Department of Basic Education
November 2014
Paper 1
Marks: 150
Time: 3 hours

Question 1

1.1 Solve for x:

1.1.1 $(x + 2)(3x - 7) = 0$

1.1.2 $x^2 - 5x = 2$ (Correct to TWO decimal places)

1.1.3 $\sqrt{x - 3} - 4 = 5$

1.1.4 $2x^2 - 7x - 4 \geq 0$

Departement van Basiese Onderwys
November 2014
Vraestel 1
Punte: 150
Tyd: 3 ure

B1

Vraag 1

1.1 Los op vir x:

1.1.1 $(x + 2)(3x - 7) = 0$ (2)

1.1.2 $x^2 - 5x = 2$ (Korrek tot TWEE desimale plekke) (4)

1.1.3 $\sqrt{x - 3} - 4 = 5$ (4)

1.1.4 $2x^2 - 7x - 4 \geq 0$ (4)

Memo: 19; 20

1.2 Solve the following equations simultaneously:

$x = 2y + 1$

$x^2 - 2y + 3xy = 6$ (6)

1.2 Los die volgende vergelykings gelyktydig op:

$x = 2y + 1$

$x^2 - 2y + 3xy = 6$

[20]

Question 2 **Vraag 2**

2.1 Simplify the following fully:

$$\frac{3^{x+1} - 3^{x-1}}{2.3^x}$$ (3)

2.1 Vereenvoudig die volgende volledig:

$$\frac{3^{x+1} - 3^{x-1}}{2.3^x}$$

2.2 Solve for x: $\sqrt{(x-2)^{-3}} = 64$ (4)

2.2 Los op vir x: $\sqrt{(x-2)^{-3}} = 64$

2.3 Rewrite the following expression as a power of x:

$$\frac{x\sqrt{x\sqrt{x\sqrt{x}}}}{\sqrt[8]{x^7}}$$ (4)

2.3 Herskryf die volgende uitdrukking as 'n mag van x:

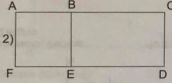
$$\frac{x\sqrt{x\sqrt{x\sqrt{x}}}}{\sqrt[8]{x^7}}$$

[11]

Question 3 **Vraag 3**

ACDF is a rectangle with an area of $(x^2 + 2x - 8)$ cm². B is a point on AC and E is a point on FD such that ABEF is a square with sides of length $(x - 2)$ cm each.

ACDF is 'n reghoek met 'n oppervlakte van $(x^2 + 2x - 8)$ cm². B is 'n punt op AC en E is 'n punt of FD sodanig dat ABEF 'n vierkant met sylengtes van $(x - 2)$ cm elk is.



Calculate the length of ED. Bereken die lengte van ED. [5]

Question 4 **Vraag 4**

Consider the following quadratic number pattern: –7; 0; 9; 20; ...

Beskou die volgende kwadratiese getalpatroon: –7; 0; 9; 20; ...

4.1 Show that the general term of the quadratic number pattern is given by $T_n = n^2 + 4n - 12$. (4)

4.1 Dui aan dat die algemene term van die kwadratiese getalpatroon gegee word deur $T_n = n^2 + 4n - 12$.

4.2 Which term of the quadratic pattern is equal to 128? (4)

4.2 Watter term van die kwadratiese getal-patroon is gelyk aan 128?

4.3 Determine the general term of the first differences. (3)

4.3 Bepaal die algemene term van die eerste verskille.

4.4 Between which TWO terms of the quadratic pattern will the first difference be 599? (3)

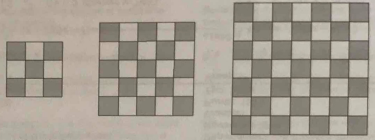
4.4 Tussen watter TWEE terme van die kwadratiese getalpatroon sal die eerste verskil 599 wees?

[14]

Question 5 **Vraag 5**

Grey and white squares are arranged into patterns as indicated below.

Grys en wit vierkante word in patrone gepak, soos hieronder aangedui.



Pattern 1 Patroon 1 | Pattern 2 Patroon 2 | Pattern 3/ Patroon 3

	Pattern 1/ Patroon 1	Pattern 2/ Patroon 2	Pattern 3/ Patroon 3
Number of grey squares/ Getal grys vierkante	5	13	25

The number of grey squares in the n^{th} pattern is given by $T_n = 2n^2 + 2n + 1$.

Die getal grys vierkante in die n^{de} patroon word gegee deur $T_n = 2n^2 + 2n + 1$.

5.1 How many white squares will be in the FOURTH pattern? (2)

5.1 Hoeveel wit vierkante sal daar in die VIERDE patroon wees?

5.2 Determine the number of white squares in the 157th pattern. (3)

5.2 Bepaal die getal wit vierkante in die 157de patroon.

5.3 Calculate the largest value of n for which the pattern will have less than 613 grey squares. (4)

5.3 Bereken die grootste waarde van n waarvoor die patroon minder as 613 grys vierkante sal hê.

5.4 Show that the TOTAL number of squares in the n^{th} pattern is always an odd number. (3)

5.4 Dui aan dat die TOTALE getal vierkante in die n^{de} patroon altyd 'n onewe getal sal wees.

[12]

Question 6 **Vraag 6**

Given: $f(x) = \frac{8}{x-2} + 3$

Gegee: $f(x) = \frac{8}{x-2} + 3$

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

6.1 Skryf die vergelykings van die asimptote van f neer.

6.2 Calculate the x- and y-intercepts of f. (3)

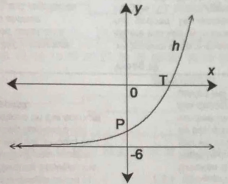
6.3 Sketch the graph of f. Show clearly the intercepts with the axes and the asymptotes. (3)

6.4 If $y = x + k$ is an equation of the line of symmetry of f, calculate the value of k. (2)

[10]

Question 7

Given: $h(x) = a.2^{x-1} + q$. The line $y = -6$ is an asymptote to the graph of h. P is the y-intercept of h and T is the x-intercept of h.



7.1 Write down the value of q. (1)

7.2 If the graph of h passes through the point $\left(-1; -5\frac{1}{4}\right)$, calculate the value of a. (4)

7.3 Calculate the average gradient between the x-intercept and the y-intercept of h. (5)

7.4 Determine the equation of p if $p(x) = h(x-2)$ in the form $p(x) = a.2^{x-1} + q$. (2)

[12]

Question 8

The graph of $f(x) = x^2 + bx + c$ and the straight line g are sketched below. A and B are the points of intersection of f and g. A is also the turning point of f. The graph of f intersects the x-axis at B(3; 0) and C. The axis of symmetry of f is $x = 1$.

Vraag 7

Gegee: $h(x) = a.2^{x-1} + q$. Die lyn $y = -6$ is 'n asimptoot van die grafiek van h. P is die y-afsnit van h en T is die x-afsnit van h.

7.1 Skryf die waarde van q neer. (1)

7.2 Indien die grafiek van h deur die punt $\left(-1; -5\frac{1}{4}\right)$ gaan, bereken die waarde van a. (4)

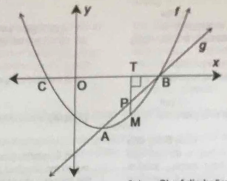
7.3 Bereken die gemiddelde gradiënt tussen die x-afsnit en die y-afsnit van h. (5)

7.4 Bepaal die vergelyking van p indien $p(x) = h(x-2)$ in die vorm $p(x) = a.2^{x-1} + q$. (2)

[12]

Vraag 8

Die grafiek van $f(x) = x^2 + bx + c$ en die reguitlyn g is hieronder geskets. A en B is die snypunte van f en g. A is ook die draaipunt van f. Die grafiek van f sny die x-as by B(3; 0) en C. Die simmetrie-as van f is $x = 1$.



8.1 Write down the coordinates of C. (1)

8.2 Determine the equation of f in the form $y = x^2 + bx + c$. (3)

8.3 Determine the range of f. (2)

8.4 Calculate the equation of g in the form $y = mx + c$. (3)

8.5 For which values of x will:

8.5.1 $f(x) \geq 0$ (2)

8.5.2 $\frac{f(x)}{g(x)} > 0$ (2)

8.5.3 $x \,.\, f(x) > 0$ (2)

8.6 For what values of p will $x^2 - 2x = p$ have non-real roots? (2)

8.7 T is a point on the x-axis and M is a point on f such that TM $\perp$ x-axis. TM intersects g at P. Calculate the maximum length of PM. (4)

[21]

Vraag 9

8.1 Skryf die koördinate van C neer. (1)

8.2 Bepaal die vergelyking van f in die vorm $y = x^2 + bx + c$. (3)

8.3 Bepaal die waardeversameling van f. (2)

8.4 Bereken die vergelyking van g in die vorm $y = mx + c$. (3)

8.5 Vir watter waardes van x sal:

8.5.1 $f(x) \geq 0$ (2)

8.5.2 $\frac{f(x)}{g(x)} > 0$ (2)

8.5.3 $x \,.\, f(x) > 0$ (2)

8.6 Vir watter waardes van p sal $x^2 - 2x = p$ nie-reële wortels hê? (2)

8.7 T is 'n punt op die x-as en M is 'n punt op f sodanig dat TM $\perp$ x-as. TM sny g by P. Bereken die maksimum lengte van PM. (4)

[21]

Question 9

9.1 A tractor bought for R120 000 depreciates to R11 090,41 after 12 years by using the reducing balance method. Calculate the rate of depreciation per annum. (The rate was fixed over the 12 years.)

9.2 Calculate the effective interest rate if interest is 9,8% p.a., compounded monthly.

Vraag 9

9.1 'n Trekker wat vir R120 000 gekoop is, se waarde neem na 12 jaar tot R11 090,41 af deur die verminderde-saldo-metode te gebruik. Bereken die jaarlikse depresiasiekoers. (Die koers was onveranderd vir die 12 jaar.) (4)

9.2 Bereken die effektiewe rentekoers indien rente 9,8% p.j., maandeliks saamgestel, is. (3)

B1

9.3 Mrs Pillay invested R80 000 in an account which offers the following:

* 7,5% p.a., compounded quarterly, for the first 4 years and thereafter
* 9,2% p.a., compounded monthly, for the next 3 years.

Calculate the total amount of money that will be in the account at the end of 7 years if no further transactions happen on the account.

9.3 Mev Pillay het R80 000 belê in 'n rekening wat die volgende bied:

* 7,5% p.j., kwartaalliks saamgestel, vir die eerste 4 jaar en daarna
* 9,2% p.j., maandeliks saamgestel, vir die volgende 3 jaar.

Bereken die totale bedrag geld wat aan die einde van 7 jaar in die rekening sal wees indien geen ander transaksies op die rekening plaasvind nie. (4)

9.4 Exactly 8 years ago Tashil invested R30 000 in an account earning 6,5% interest per annum,compounded monthly.

9.4 Presies 8 jaar gelede het Tashil R30 000 belê in 'n rekening wat 6,5% rente per jaar, maandeliks saamgestel, verdien.

9.4.1 How much will he receive if he withdrew his money today?

9.4.1 Hoeveel geld sal hy ontvang as hy sy geld vandag onttrek? (3)

9.4.2 Tashil withdrew R10 000 three years after making the initial deposit and re-invested R10 000 five years after making the initial deposit.

Calculate the difference between the final amount Tashil will now receive after eight years and the amount he would have received had there not been any transactions on the account after the initial deposit. (7)

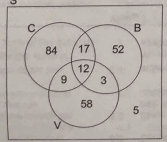
9.4.2 Drie jaar nadat hy die oorspronklike deposito gemaak het, het Tashil R10 000 onttrek en vyf jaar nadat hy die oorspronklike deposito gemaak het, het hy R10 000 herbelê.

Bereken die verskil tussen die finale bedrag wat Tashil nou na 8 jaar sal ontvang en die bedrag wat hy sou ontvang het indien daar geen verdere transaksies na die aanvanklike deposito op die rekening plaasgevind het nie. (7)

[21]

Question 10

A survey was carried out with 240 customers who bought food from a fastfood outlet on a particular day. The outlet sells cheese burgers (C), bacon burgers (B) and vegetarian burgers (V). The Venn diagram below shows the number of customers who bought different types of burgers.



Vraag 10

'n Opname is op 'n spesifieke dag met 240 kliënte wat kos by 'n kitskosrestaurant gekoop het, gedoen. Die restaurant verkoop kaasburgers (C), spekburgers (B) en vegetariese burgers (V). Die Venn-diagram hieronder dui die getal kliënte aan wat verskillende soorte burgers op die dag gekoop het.

B1

10.1 How many customers did NOT buy burgers on the day?

10.2 Are events B and C mutually exclusive? Give a reason for your answer.

10.3 If a customer from this group is selected at random, determine the probability that he/she:

10.3.1 Bought only a vegetarian burger.

10.3.2 Bought a cheese burger and a bacon burger.

10.3.3 Did not buy a cheese burger.

10.3.4 Bought a bacon burger or a vegetarian burger.

10.1 Hoeveel kliënte het op die dag NIE burgers gekoop NIE? (1)

10.2 Is gebeurtenis B en C onderling uitsluitend? Gee 'n rede vir jou antwoord. (2)

10.3 Indien 'n kliënt ewekansig uit die groep gekies word, bepaal die waarskynlikheid dat hy/sy:

10.3.1 Slegs 'n vegetariese burger gekoop het. (1)

10.3.2 'n Kaasburger en 'n spekburger gekoop het. (1)

10.3.3 Nie 'n kaasburger gekoop het nie. (3)

10.3.4 'n Spekburger of 'n vegetariese burger gekoop het. (4)

[12]

Question 11

Given: P(A) = 0,12
P(B) = 0,35
P(A or B) = 0,428

Determine whether events A and B are independent or not. Show ALL relevant calculations used in determining the answer.

Vraag 11

Gegee: P(A) = 0,12
P(B) = 0,35
P(A of B) = 0,428

Bepaal of gebeurtenis A en B onafhanklik is, of nie. Toon al die relevante berekeninge wat jy gebruik het om die antwoord te bepaal. **[4]**

Question 12

Paballo has a bag containing 80 marbles that are either green, yellow or red in colour. $\frac{3}{5}$ of the marbles are green and 10% of the marbles are yellow. Paballo picks TWO marbles out of the bag, one at a time and without replacing the first one.

12.1 How many red marbles are in the bag?

12.2 Draw a tree diagram to represent the above situation.

12.3 What is the probability that Paballo will choose a GREEN and a YELLOW marble?

Vraag 12

Paballo het 'n sak met 80 albasters wat elk groen, geel of rooi van kleur is. $\frac{3}{5}$ van die albasters is groen en 10% van die albasters is geel. Paballo kies TWEE albasters uit die sak, een op 'n slag en sonder om die eerste een terug te sit.

12.1 Hoeveel rooi albasters is daar in die sak? (2)

12.2 Teken 'n boomdiagram om die situasie hierbo voor te stel. (3)

12.3 Wat is die waarskynlikheid dat Paballo 'n GROEN en GEEL albaster sal kies? (3)

[8]

[150]