



# 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.**

**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  $\sqrt{2x+5} - \frac{3}{\sqrt{2x+5}} = -2$  (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  $x = \frac{4 \pm \sqrt{16 - 4m(-m + 5)}}{2m}$ 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:  $\frac{2^{x-3} - 3 \cdot 2^{x+1}}{2^{x-2}}$  (4)2.2 Solve for  $x$ :

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

2.2.2  $4^x + 8 = 9 \cdot 2^x$  (4)

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

2.3 Simplify fully:

$$\frac{\sqrt{p^2 - q^2} \times (p + q)^{\frac{5}{2}}}{(p - q)^{\frac{1}{2}}} \text{ if } p \neq q$$
 (3)  
[17]

**QUESTION 3**

- 3.1 Given the linear pattern:  $7 ; 2 ; -3 ; \dots$
- 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:  $4 ; p ; 11 ; q ; 22 ; \dots$  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**

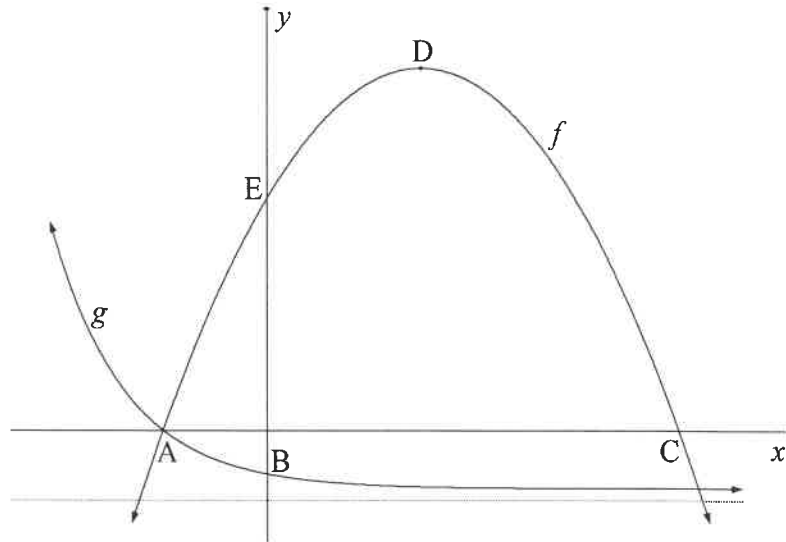
Given:  $f(x) = \frac{4}{x-3} + 2$  and  $g(x) = x + 2$

- 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  $\frac{4}{x-3} + 2 < x + 2$ . (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
<b>TOTAL</b>	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  $P(A \text{ and } B) = 0,12$ ,  $P(A \text{ or } B) = 0,83$  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  $P(\text{not } A)$ .

(2)

**[13]****TOTAL: 150**





# 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.**

**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.

**VRAAG 1**

1.1 Los op vir  $x$  in elk van die volgende:

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

$$1.1.2 \quad 5x^2 + 2x - 6 = 0 \text{ (korrek tot TWEE desimale plekke)} \quad (3)$$

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

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

1.2 Los gelyktydig op vir  $x$  en  $y$ :

$$y + x = 2 \text{ en } x^2 + 3xy + 8 = 0 \quad (6)$$

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

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:  $\frac{2^{x-3} - 3 \cdot 2^{x+1}}{2^{x-2}}$  (4)

2.2 Los op vir  $x$ :

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

$$2.2.2 \quad 4^x + 8 = 9 \cdot 2^x \quad (4)$$

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

2.3 Vereenvoudig volledig:

$$\frac{\sqrt{p^2 - q^2} \times (p+q)^{\frac{5}{2}}}{(p-q)^{\frac{1}{2}}} \text{ as } p \neq q \quad (3)$$

**[17]**

**VRAAG 3**

- 3.1 Gegee die liniêre patroon:  $7; 2; -3; \dots$
- 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:  $4; p; 11; q; 22; \dots$  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:  $f(x) = \frac{4}{x-3} + 2$  en  $g(x) = x + 2$

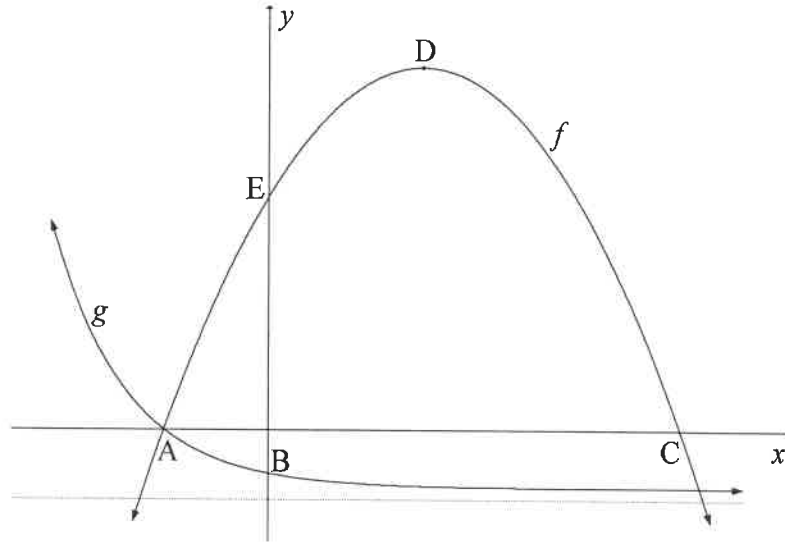
- 5.1 Skryf die vergelykings van die asimptote van  $f$  neer. (2)
- 5.2 Bepaal die  $x$ -afsnit van  $f$ . (3)
- 5.3 Bepaal die  $y$ -afsnit van  $f$ . (2)
- 5.4 Skets die grafieke van  $f$  en  $g$  op dieselfde assestelsel. Toon duidelik AL die afsnitte met die asse en enige asimptote. (5)
- 5.5 Bereken die  $x$ -koördinate van die sny punte van  $f$  en  $g$ . (4)
- 5.6 Indien  $x < 3$ , bepaal die waardes van  $x$  waarvoor  $\frac{4}{x-3} + 2 < x + 2$ . (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 uitkomst, 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
<b>TOTAAL</b>	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  $P(A \text{ en } B) = 0,12$ ,  $P(A \text{ of } B) = 0,83$  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  $P(\text{nie } A)$ .

(2)

**[13]****TOTAAL: 150**





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**NATIONAL  
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**GRADE/GRAAD 11**

**MATHEMATICS P1/WISKUNDE VI**

**NOVEMBER 2018**

**MARKING GUIDELINES/NASIENRIGLYNE**

**MARKS/PUNTE: 150**

**These marking guidelines consist of 18 pages.  
*Hierdie nasienriglyne bestaan uit 18 bladsye.***

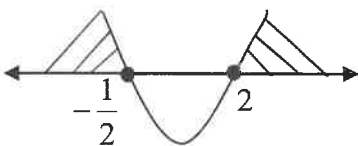
**NOTE:**

- If a candidate answered a question TWICE, mark only the FIRST attempt.
- If a candidate crossed out an answer and did not redo it, mark the crossed-out answer.
- Consistent accuracy applies to ALL aspects of the marking marking guidelines.
- Assuming values/answers in order to solve a problem is unacceptable.

**LET WEL:**

- As 'n kandidaat 'n vraag TWEE keer beantwoord het, sien slegs die EERSTE poging na.
- As 'n kandidaat 'n antwoord deurgehaal en nie oorgedoen het nie, sien die deurgehaalde antwoord na.
- Volgehoue akkuraatheid is op ALLE aspekte van die nasienriglyne van toepassing.
- Dit is onaanvaarbaar om waardes/antwoorde te veronderstel om 'n probleem op te los.

**QUESTION/VRAAG 1**

1.1.1	$x(2x + 1) = 0$ $x = 0 \text{ or/of } x = -\frac{1}{2}$	$\checkmark x = 0$ $\checkmark x = -\frac{1}{2}$ <p style="text-align: right;">(2)</p>
1.1.2	$5x^2 + 2x - 6 = 0$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $= \frac{-(2) \pm \sqrt{(2)^2 - 4(5)(-6)}}{2(5)}$ $= \frac{5 \pm \sqrt{124}}{10}$ $x = 0,91 \text{ or/of } x = -1,31$	$\checkmark \text{ substitution into correct formula/}$ $\text{vervanging in korrekte formule}$ $\checkmark \text{ answer/antw.}$ $\checkmark \text{ answer/antw.}$ <p style="text-align: right;">(3)</p>
1.1.3	$2x^2 - 2 \geq 3x$ $2x^2 - 3x - 2 \geq 0$ $(2x + 1)(x - 2) \geq 0$  $x \leq -\frac{1}{2} \text{ or/of } x \geq 2$	$\checkmark \text{ std form/stand. vorm}$ $\checkmark \text{ factors or using formula/}$ $\text{faktore of gebruik formule}$ $\checkmark \checkmark x \leq -\frac{1}{2} \text{ or/of } x \geq 2$ <p style="text-align: right;">(4)</p>

1.1.4	$\sqrt{2x+5} - \frac{3}{\sqrt{2x+5}} = -2$ <p>Let <math>\sqrt{2x+5} = k</math></p> $k - \frac{3}{k} = -2$ $k^2 - 3 = -2k$ $k^2 + 2k - 3 = 0$ $(k+3)(k-1) = 0$ $k = -3 \text{ or/of } k = 1$ $\sqrt{2x+5} = -3$ <p>no solution</p> <p>or/of</p> $\sqrt{2x+5} = 1$ $2x+5 = 1$ $2x = -4$ $x = -2$ <p><b>OR/OF</b></p> $\sqrt{2x+5} - \frac{3}{\sqrt{2x+5}} = -2$ $(\sqrt{2x+5})^2 - 3 = -2\sqrt{2x+5}$ $(\sqrt{2x+5})^2 + 2(\sqrt{2x+5}) - 3 = 0$ $(\sqrt{2x+5} + 3)(\sqrt{2x+5} - 1) = 0$ $\sqrt{2x+5} = -3 \text{ or } \sqrt{2x+5} = 1$ $\sqrt{2x+5} = -3$ <p>no solution</p> <p>or/of</p> $\sqrt{2x+5} = 1$ $2x+5 = 1$ $2x = -4$ $x = -2$ <p><b>OR/OF</b></p>	<p>✓ changing to quadratic/ verander na kwadraties</p> <p>✓ factors or using formula/ faktore of gebruik formule</p> <p>✓ <math>k = 3</math> or/of <math>k = 1</math></p> <p>✓ no solution/ geen oplossing</p> <p>✓ square both sides/ kwadreer beide kante</p> <p>✓ <math>x = -2</math></p> <p>(6)</p> <p>✓ changing to quadratic/ verander na kwadraties</p> <p>✓ factors/fakt.</p> <p>✓ <math>\sqrt{2x+5} = -3</math> or/of <math>\sqrt{2x+5} = 1</math></p> <p>✓ no solution/ geen oplossing</p> <p>✓ square both sides/ kwadreer beide kante</p> <p>✓ <math>x = -2</math></p> <p>(6)</p>
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	$\sqrt{2x+5} - \frac{3}{\sqrt{2x+5}} = -2$ $2x+5-3 = -2\sqrt{2x+5}$ $2x+2 = -2\sqrt{2x+5}$ $(2x+2)^2 = (-2\sqrt{2x+5})^2$ $4x^2 + 8x + 4 = 4(2x+5)$ $4x^2 + 8x + 4 = 8x + 20$ $4x^2 - 16 = 0$ $x^2 - 4 = 0$ $(x+2)(x-2) = 0$ $x = -2 \quad \text{or / of } x \neq 2$	<ul style="list-style-type: none"> <li>✓ Multiplying by/ <i>Vermenigv. met</i> <math>\sqrt{2x+5}</math> /</li> <li>✓ square both sides/ <i>kwadreer beide kante</i></li> <li>✓ std form/ <i>vorm</i></li> <li>✓ factors/ <i>fakt.</i></li> <li>✓ <math>x \neq 2</math></li> <li>✓ <math>x = -2</math></li> </ul> <p style="text-align: right;">(6)</p>
<p>1.2</p>	<p style="text-align: center;"><math>y + x = 2</math>      and/en      <math>x^2 + 3xy + 8 = 0</math></p> <p style="text-align: center;"><math>\therefore y = 2 - x</math></p> $x^2 + 3x(2-x) + 8 = 0$ $x^2 + 6x - 3x^2 + 8 = 0$ $-2x^2 + 6x + 8 = 0$ $x^2 - 3x - 4 = 0$ $(x-4)(x+1) = 0$ <p style="text-align: center;"><math>x = 4</math> or <math>x = -1</math></p> <p style="text-align: center;"><math>y = 2 - 4</math>      or / of      <math>y = 2 - (-1)</math></p> <p style="text-align: center;"><math>y = -2</math>                              <math>y = 3</math></p> <p><b>OR/OF</b></p> <p style="text-align: center;"><math>y + x = 2</math>      and      <math>x^2 + 3xy + 8 = 0</math></p> <p style="text-align: center;"><math>\therefore x = 2 - y</math></p> $(2-y)^2 + 3(2-y)y + 8 = 0$ $4 - 4y + y^2 + 6y - 3y^2 + 8 = 0$ $-2y^2 + 2y + 12 = 0$ $y^2 - y - 6 = 0$ $(y-3)(y+2) = 0$ <p style="text-align: center;"><math>y = 3</math> or <math>y = -2</math></p> <p style="text-align: center;"><math>x = 2 - 3</math>      or      <math>x = 2 - (-2)</math></p> <p style="text-align: center;"><math>x = -1</math>      or      <math>x = 4</math></p>	<ul style="list-style-type: none"> <li>✓ <math>y = 2 - x</math></li> <li>✓ substitution/ <i>verv.</i></li> <li>✓ std form/ <i>stand. vorm</i></li> <li>✓ factors or using formula/ <i>faktore of gebruik formule</i></li> <li>✓ both x-values/ <i>wrdes</i></li> <li>✓ both y-values/ <i>wrdes</i></li> </ul> <p style="text-align: right;">(6)</p> <ul style="list-style-type: none"> <li>✓ <math>x = 2 - y</math></li> <li>✓ substitution/ <i>verv.</i></li> <li>✓ std form/ <i>stand. vorm</i></li> <li>✓ factors or using formula/ <i>faktore of gebruik formule</i></li> <li>✓ both y-values/ <i>wrdes</i></li> <li>✓ both x-values/ <i>wrdes</i></li> </ul> <p style="text-align: right;">(6)</p>

<p>1.3</p>	$x = \frac{4 \pm \sqrt{16 - 4m(-m + 5)}}{2m}$ <p>For non - real roots/Vir nie - reële wortels: <math>16 - 4m(-m + 5) &lt; 0</math></p> $16 + 4m^2 - 20m < 0$ $m^2 - 5m + 4 < 0$ $(m - 4)(m - 1) < 0$ $1 < m < 4$	<p>✓ <math>16 - 4m(-m + 5) &lt; 0</math></p> <p>✓ factors or using formula/ faktore of gebruik formule</p> <p>✓ ✓ <math>1 &lt; m &lt; 4</math></p> <p>(4)</p>
<p>1.4</p>	$-x^2 + 4x + 12$ $= -1(x^2 - 4x - 12)$ $= -1(x^2 - 4x + 4 - 4 - 12)$ $= -1(x - 2)^2 + 16$ <p>The maximum value of/Die maksimum waarde van <math>-x^2 + 4x + 12</math> is 16</p> <p>∴ max value of <math>\sqrt{-x^2 + 4x + 12}</math> is 4</p> <p><b>OR/OF</b></p> $\sqrt{-x^2 + 4x + 12}$ <p>max when <math>x = \frac{-b}{2a}</math></p> $= \frac{-4}{2(-1)}$ $= 2$ <p>max value <math>y = -(2)^2 + 4(2) + 12</math></p> $= 16$ <p>The maximum value of/Die maksimum waarde van <math>-x^2 + 4x + 12</math> is 16</p> <p>∴ max value of <math>\sqrt{-x^2 + 4x + 12}</math> is 4</p>	<p>✓ <math>-1(x^2 - 4x - 12)</math></p> <p>✓ <math>-1(x^2 - 4x + 4 - 4 - 12)</math></p> <p>✓ <math>-1(x - 2)^2 + 16</math></p> <p>✓ <math>\sqrt{16} = 4</math></p> <p>(4)</p> <p><b>OR/OF</b></p> <p>✓ subst/verv.</p> <p>✓ x-value/waarde</p> <p>✓ y-value/waarde</p> <p>✓ <math>\sqrt{16} = 4</math></p> <p>(4)</p> <p>[29]</p>

**QUESTION/VRAAG 2**

2.1	$\frac{2^{x-3} - 3 \cdot 2^{x+1}}{2^{x-2}}$ $= \frac{2^x \cdot 2^{-3} - 3 \cdot 2^x \cdot 2^1}{2^x \cdot 2^{-2}}$ $= \frac{2^x(2^{-3} - 3 \cdot 2)}{2^x \cdot 2^{-2}}$ $= \frac{1}{8} - 6$ $= \frac{1}{4}$ $= -\frac{47}{2}$	<p>✓ separate bases/aparte basisse</p> <p>✓ common factor/gemene fakt. ✓ <math>(2^{-3} - 3 \cdot 2)</math></p> <p>✓ answer/antw.</p> <p style="text-align: right;">(4)</p>
2.2.1	$16x^{\frac{3}{2}} = 2$ $x^{\frac{3}{2}} = \frac{1}{8}$ $\left(x^{\frac{3}{2}}\right)^{\frac{2}{3}} = \left(2^{-3}\right)^{\frac{2}{3}}$ $x = 4$ <p><b>OR/OF</b></p> $2 - 16x^{\frac{3}{2}} = 0$ $2 = 2^4 \cdot x^{\frac{3}{2}}$ $2^{-3} = x^{\frac{3}{2}}$ $x = 2^{-3 \cdot \frac{2}{3}}$ $x = 4$	<p>✓ isolating/soleer <math>x</math></p> <p>✓ raising both sides by/verhef albei kante met <math>-\frac{2}{3}</math></p> <p>✓ answer/antw.</p> <p style="text-align: right;">(3)</p> <p>✓ prime base/priembasis</p> <p>✓ exp law/eksp. wet</p> <p>✓ answer/antw.</p> <p style="text-align: right;">(3)</p>

2.2.2	$4^x + 8 = 9 \cdot 2^x$ $(2^2)^x - 9 \cdot 2^x + 8 = 0$ $2^{2x} - 9 \cdot 2^x + 8 = 0$ $(2^x - 8)(2^x - 1) = 0$ $2^x = 8 \quad \text{or} \quad 2^x = 1$ $2^x = 2^3 \quad 2^x = 2^0$ $x = 3 \quad x = 0$ <p><b>OR/OF</b></p> $4^x + 8 = 9 \cdot 2^x$ $(2^2)^x - 9 \cdot 2^x + 8 = 0$ $2^{2x} - 9 \cdot 2^x + 8 = 0$ <p>Let <math>2^x = k</math></p> $k^2 - 9k + 8 = 0$ $(k - 8)(k - 1) = 0$ $k = 8 \quad \text{or} \quad k = 1$ $2^x = 8 \quad 2^x = 2^0$ $2^x = 2^3 \quad x = 0$ $x = 3$	<p>✓ standard form/stand. vorm</p> <p>✓ <math>2^x = 8</math> or <math>2^x = 1</math></p> <p>✓ <math>x = 3</math></p> <p>✓ <math>x = 0</math></p> <p>(4)</p> <p>✓ standard form/stand. vorm</p> <p>✓ <math>2^x = 8</math> or <math>2^x = 1</math></p> <p>✓ <math>x = 3</math></p> <p>✓ <math>x = 0</math></p> <p>(4)</p>
2.2.3	$\sqrt[5]{9} = 243$ $3^{\frac{2}{x}} = 3^5$ $\frac{2}{x} = 5 \quad \text{OR/ OF}$ $x = \frac{2}{5}$ $\left(\sqrt[5]{3^2}\right)^x = (3^5)^x$ $3^2 = 3^{5x}$ $2 = 5x$ $x = \frac{2}{5}$	<p>✓ exp form/eksp. vorm</p> <p>✓ equating the exp/gelykst van eks</p> <p>✓ answer/antw.</p> <p>(3)</p>
2.3	$\frac{\sqrt{p^2 - q^2} \times (p + q)^{\frac{5}{2}}}{(p - q)^{\frac{1}{2}}}$ $= \frac{\sqrt{(p - q)(p + q)} \times (p + q)^{\frac{5}{2}}}{(p - q)^{\frac{1}{2}}}$ $= \frac{\cancel{(p - q)}^{\frac{1}{2}} (p + q)^{\frac{1}{2}} \times (p + q)^{\frac{5}{2}}}{\cancel{(p - q)}^{\frac{1}{2}}}$ $= (p + q)^{\frac{1}{2} + \frac{5}{2}}$ $= (p + q)^3$	<p>✓ difference of 2 squares verskil van 2 kwadrate</p> <p>✓ exponent law/eksponentwet</p> <p>✓ answer/antw.</p> <p>(3)</p>

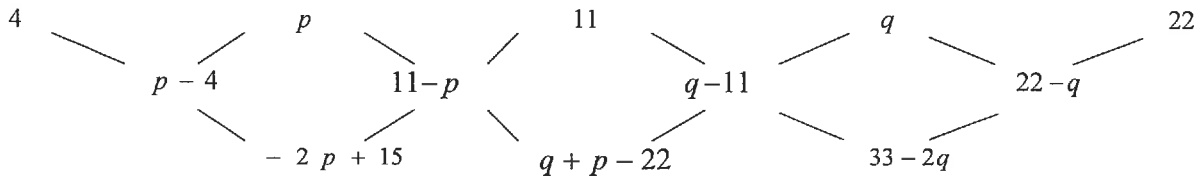
	<p><b>OR/OF</b></p> $\frac{\sqrt{p^2 - q^2} \times (p + q)^{\frac{5}{2}}}{(p - q)^{\frac{1}{2}}}$ $= \sqrt{\frac{(p - q)(p + q)(p + q)^5}{(p - q)}}$ $= \sqrt{(p + q)^6}$ $= (p + q)^3$	<p>✓ difference of 2 squares <i>verskil van 2 kwadrate</i></p> <p>✓ exponent law/<i>eksponentwet</i></p> <p>✓ answer/<i>antw.</i></p>
	(3)	[17]

**QUESTION/VRAAG 3**

3.1.1	<p><math>T_n = an + b</math> <math>= -5n + 12</math></p>	<p>✓ <math>-5n</math> ✓ 12</p>
	(2)	
3.1.2	$T_{20} = -5(20) + 12$ $= -88$	<p>✓ substitution/<i>verv.</i> ✓ answer/<i>antw.</i></p>
	(2)	
3.1.3	$-5n + 12 = -138$ $-5n = -150$ $n = 30$ 30 <sup>th</sup> term ( $T_{30}$ )	<p>✓ substitution/<i>verv.</i> ✓ answer/<i>antw.</i></p>
	(2)	
3.2	<p><math>2x - 5 = x - 4</math> <math>x = 1</math></p>	<p>✓ <math>2x - 5</math> and/<i>en</i> <math>x - 4</math></p> <p>✓ equating/<i>verg.</i> ✓ answer/<i>antw.</i></p>
	(3)	[9]



**QUESTION/VRAAG 4**



<p>4.1</p>	<p>1<sup>st</sup> difference/1<sup>ste</sup> verskil:  <math>p-4; 11-p; q-11; 22-q</math>                  2<sup>nd</sup> difference/2<sup>de</sup> verskil:  <math>-2p+15; q+p-22; 33-2q</math>  <math>-2p+15=1</math>  <math>-2p=-14</math>  <math>p=7</math>  <math>33-2q=1</math>                      <math>q+p-22=1</math>  <math>-2q=-32</math>    or/of    <math>q+7-22=1</math>  <math>q=16</math>                                      <math>q=16</math></p> <p><b>OR/ OF</b></p> <p><math>-2p+15=1</math>  <math>-2p=-14</math>  <math>p=7</math></p>	<p>✓ <math>p-4; 11-p; q-11; 22-q</math>                  ✓ <math>-2p+15; q+p-22; 33-2q</math></p> <p>✓ <math>-2p+15=1</math>                  and/en <math>33-2q=1</math></p> <p style="text-align: right;">(3)</p>
	<p><math>-2p+15=1</math>  <math>-2p=-14</math>  <math>p=7</math></p> <p>✓ <math>p-4; 11-p</math>                  ✓ <math>-2p+15=1</math></p> <p>✓ subst. of <math>p</math> in pattern to find <math>q</math>/ vervang <math>p</math> in patroon om <math>q</math> te vind</p> <p style="text-align: right;">(3)</p>	

4.2

$$2a = 1$$

$$a = \frac{1}{2}$$

$$3a + b = 3$$

$$3\left(\frac{1}{2}\right) + b = 3$$

$$b = \frac{3}{2}$$

$$a + b + c = 4$$

$$\frac{1}{2} + \frac{3}{2} + c = 4$$

$$c = 2$$

$$T_n = \frac{1}{2}n^2 + \frac{3}{2}n + 2$$

$$\checkmark a = \frac{1}{2}$$

$$\checkmark b = \frac{3}{2}$$

$$\checkmark c = 2$$

$$\checkmark T_n = \frac{1}{2}n^2 + \frac{3}{2}n + 2$$

(4)

**OR/OF**

$$T_0 = c = 2$$

$$2a = 1$$

$$a = \frac{1}{2}$$

$$T_n = an^2 + bn + c$$

$$4 = \frac{1}{2}n^2 + b(1) + 2$$

$$b = \frac{3}{2}$$

$$T_n = \frac{1}{2}n^2 + \frac{3}{2}n + 2$$

$$\checkmark c = 2$$

$$\checkmark a = \frac{1}{2}$$

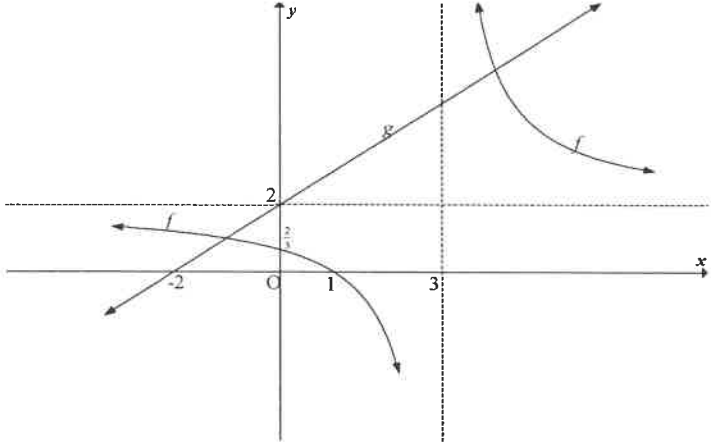
$$\checkmark b = \frac{3}{2}$$

$$\checkmark T_n = \frac{1}{2}n^2 + \frac{3}{2}n + 2$$

(4)

4.3	$T_n = 232$ $\frac{1}{2}n^2 + \frac{3}{2}n + 2 = 232$ $\frac{1}{2}n^2 + \frac{3}{2}n - 230 = 0$ $n^2 + 3n - 460 = 0$ $(n+23)(n-20) = 0$ $n \neq -23 \text{ or } n = 20$	$\checkmark \frac{1}{2}n^2 + \frac{3}{2}n + 2 = 232$ $\checkmark \text{ standard form/std. vorm}$ $\checkmark \text{ factors/subst quad. eq. /faktore/ verv kwadr. verg}$ $\checkmark \text{ selecting/kies } n=20$ <p style="text-align: right;">(4)</p>
4.4	$\frac{1}{2}n^2 + \frac{3}{2}n + 2 + \frac{1}{2}(n+1)^2 + \frac{3}{2}(n+1) + 2 = 1227$ $\frac{1}{2}n^2 + \frac{3}{2}n + 2 + \frac{1}{2}(n^2 + 2n + 1) + \frac{3}{2}n + \frac{3}{2} + 2 = 1227$ $\frac{1}{2}n^2 + \frac{3}{2}n + 2 + \frac{1}{2}n^2 + n + \frac{1}{2} + \frac{3}{2}n + \frac{3}{2} + 2 = 1227$ $n^2 + 4n + 6 = 1227$ $n^2 + 4n - 1221 = 0$ $(n+37)(n-33) = 0$ $n \neq -37 \quad n = 33$ $T_{34} - T_{33} = \frac{1}{2}(34)^2 + \frac{3}{2}(34) + 2 - \left( \frac{1}{2}(33)^2 + \frac{3}{2}(33) + 2 \right)$ $T_{34} - T_{33} = 631 - 596$ $T_{34} - T_{33} = 35$	$\checkmark \text{ subst into/verv. in } T_n + T_{n+1} = 1227$ $\checkmark \text{ expansion/ontw.}$ $\checkmark \text{ standard form/std. vorm}$ $\checkmark \text{ value of/wrde van } n$  $\checkmark \text{ answer/antw.}$ <p style="text-align: right;">(5) [16]</p>

**QUESTION/VRAAG 5**

5.1	$x = 3$ $y = 2$	✓ $x = 3$ ✓ $y = 2$ (2)
5.2	$0 = \frac{4}{x-3} + 2$ $-2 = \frac{4}{x-3}$ $-2(x-3) = 4$ $-2x + 6 = 4$ $x = 1$ <p><b>OR/OF</b></p> <p>(1;0)</p>	✓ subst./verv. $y = 0$ ✓ simplification/vereenv.  ✓ answer/antw. (3)  ✓ ✓ ✓ answer/antw (3)
5.3	$y = \frac{4}{0-3} + 2$ $= \frac{2}{3}$ <p><b>OR/OF</b></p> <p><math>(0; \frac{2}{3})</math></p>	✓ subst./verv. $x = 0$ ✓ answer/antw. (2)  ✓ ✓ answer/antw (2)
5.4		For/Vir $f$ ✓ asymptotes/asimptote ✓ shape/vorm ✓ x- and y- int./afsnit  For/Vir $g$ ✓ x-int./afsnit ✓ y-int./afsnit  (5)

<p>5.5</p>	$\frac{4}{x-3} + 2 = x + 2$ $\frac{4}{x-3} = x + 2 - 2$ $\frac{4}{x-3} = x$ $x(x-3) = 4$ $x^2 - 3x - 4 = 0$ $(x-4)(x+1) = 0$ $x = 4 \text{ or } x = -1$	$\checkmark \frac{4}{x-3} + 2 = x + 2$ $\checkmark \text{std vorm/stand. vorm}$ $\checkmark \text{factors/faktore}$ $\checkmark \text{answers/antw.}$ <p style="text-align: right;">(4)</p>
<p>5.6</p>	$-1 < x < 3$	$\checkmark \checkmark \text{answer/antwoord}$ <p style="text-align: right;">(2)</p>
<p>5.7</p>	$y = x + c$ $2 = (3) + c$ $-1 = c$ <p><math>\therefore y = x - 1</math> Is an axis of symmetry of/ <i>simmetrie-as van f</i></p> $Q(\sqrt{4} + 3; \sqrt{4} + 2) = Q(5; 4)$ <p><b>OR/ OF</b></p> $x - 1 = \frac{4}{x-3} + 2$ $x - 3 = \frac{4}{x-3}$ $(x-3)^2 = 4$ $x^2 - 6x + 5 = 0$ $(x-5)(x-1) = 0$ $x = 5 \text{ or } x = 1$ $y = 5 - 1 = 4$ $Q(5; 4)$	$\checkmark Q(\sqrt{4} + 3; \sqrt{4} + 2)$ $\checkmark 5$ $\checkmark 4$ <p style="text-align: right;">(3)</p> $\checkmark \text{equating / vergelyk}$ $\checkmark 5$ $\checkmark 4$ <p style="text-align: right;">(3) [21]</p>

**QUESTION/VRAAG 6**

6.1	$y = -4$	✓ answer/antwoord  (1)
6.2	D(3;25)	✓ 3 ✓ 25  (2)
6.3	$y \leq 25$ or $y \in (-\infty; 25]$	✓ answer/antwoord  (1)
6.4	$f(0) = -(x-3)^2 + 25$ $= -(0-3)^2 + 25$ $= 16 \quad E(0;16)$ $g(0) = 2\left(\frac{1}{2}\right)^{0+1} - 4$ $= -3 \quad B(0;-3)$ $EB = 16 - (-3) = 19 \text{ units/eenhede}$	✓ substitute/verv. $x=0$ ✓ $f(0) = 16$  ✓ $g(0) = -3$ ✓ answer/antwoord  (4)
6.5	$x > 3$ or/ of $x \in (3; \infty)$  Accept/Aanvaar $x \geq 3$ or/ of $x \in [3; \infty)$	✓✓ answer/antwoord  (2)

6.6	$0 = 2\left(\frac{1}{2}\right)^{x+1} - 4$ $4 = 2\left(\frac{1}{2}\right)^{x+1}$ $2 = \left(\frac{1}{2}\right)^{x+1}$ $2 = 2^{-x-1}$ $1 = -x - 1$ $x = -2$ <p>A(-2;0) B(0;-3)</p> <p>Ave gradient/Gemid gradiënt = <math>\frac{y_2 - y_1}{x_2 - x_1}</math></p> $= \frac{-3 - 0}{0 + 2}$ $= -\frac{3}{2}$ <p><b>OR/ OF</b></p> $-(x-3)^2 + 25 = 0$ $(x-3)^2 = 25$ $x-3 = 5 \quad \text{or} \quad x-3 = -5$ $x = 8 \quad \quad \quad x = -2$ <p>A(-2;0) B(0;-3)</p> <p>Ave gradient/Gemid gradiënt = <math>\frac{y_2 - y_1}{x_2 - x_1}</math></p> $= \frac{-3 - 0}{0 + 2}$ $= -\frac{3}{2}$	<p>✓ substitution/<i>verv.</i></p> <p>✓ equating exponent/<i>gelykst. eksp.</i></p> <p>✓ answer/<i>antwoord</i></p> <p>✓ subst. into correct formula <i>/verv. in formule</i></p> <p>✓ answer/<i>antwoord</i> (5)</p> <p>✓ substitution/<i>verv.</i></p> <p>✓ factors or using formula/ <i>faktore of gebruik formule</i></p> <p>✓ answer/<i>antwoord</i></p> <p>✓ subst. into correct formula <i>/verv. in formule</i></p> <p>✓ answer/<i>antwoord</i> (5)</p>
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6.7	$t(x) = -g(x)$ $= -\left(2\left(\frac{1}{2}\right)^{x+1} - 4\right)$ $= -2\left(\frac{1}{2}\right)^{x+1} + 4$ <p>Range/Waardeversameling: <math>y &lt; 4</math> or <math>y \in (-\infty; 4)</math></p>	$\checkmark -2\left(\frac{1}{2}\right)^{x+1} + 4$ $\checkmark y < 4 \text{ or } y \in (-\infty; 4)$ <p style="text-align: right;">(2)</p>
6.8	Turning point/ draaipunt ; (3;27)	$\checkmark 3$ $\checkmark 27$ <p style="text-align: right;">(2)</p>
6.9	$f(x) = -(x-3)^2 + 25$ $= -x^2 + 6x + 16$ $-x^2 + 6x + 16 = 2x + k$ $-x^2 + 4x + 16 - k = 0$ <p>tangent has one point of intersection thus two equal roots/ raaklyn het een snypunt dus twee gelyke wortels</p> $\Delta = (4)^2 - 4(-1)(16 - k) = 0$ $16 + 64 - 4k = 0$ $80 = 4k$ $k = 20$	$\checkmark -x^2 + 6x + 16$ $\checkmark \text{equating/vergelijk}$ $\checkmark (4)^2 - 4(-1)(16 - k) = 0$ $\checkmark \text{answer/antw.}$ <p style="text-align: right;">(4) [23]</p>



**QUESTION/VRAAG 7**

7.1	$1 + i_{eff} = \left(1 + \frac{i_{nom}}{m}\right)^m$ $1 + i_{eff} = \left(1 + \frac{0,115}{12}\right)^{12}$ $i_{eff} = \left(1 + \frac{0,115}{12}\right)^{12} - 1$ $i_{eff} = 12,13\%$	<p>✓ formula/form.</p> <p>✓ <math>i = \frac{0,115}{12}</math></p> <p>✓ answer/antw. (3)</p>
7.2	$A = P(1 - i)^n$ $= 4\,700(1 - 0,18)^4$ $= R\,2\,124,97$	<p>✓ formula/form.</p> <p>✓ substitution/verv.</p> <p>✓ answer/antw. (3)</p>
7.3.1	$A = P(1 + i)^n$ $= 20\,000\left(1 + \frac{0,072}{4}\right)^{2 \times 4}$ $= R\,23\,068,12$	<p>✓ formula/form.</p> <p>✓ substitution/verv.</p> <p>✓ answer/antw. (3)</p>
7.3.2	$A = P(1 + i)^n$ $= 23\,068,12\left(1 + \frac{0,078}{12}\right)^{2 \times 12}$ $= R\,26\,949,12$ $R\,26\,949,12 - R\,2\,500$ $= R\,24\,449,12$ $A = P(1 + i)^n$ $= 24\,449,12\left(1 + \frac{0,078}{12}\right)^{3 \times 12}$ $= R\,30\,871,61$ <p><b>OR/OF</b></p> $A = 23\,068,12\left(1 + \frac{0,078}{12}\right)^{12 \times 5} - 2\,500\left(1 + \frac{0,078}{12}\right)^{12 \times 3}$ $= R\,30\,871,48$	<p>✓ <math>\frac{0,078}{12}</math> and <math>n = 24</math></p> <p>✓ A(after 2 years) – R2 500</p> <p>✓ <math>n = 36</math></p> <p>✓ answer/antw. (4)</p> <p>✓ <math>i = \frac{0,078}{12}</math> and <math>n = 60</math></p> <p>✓ ✓ <math>-2\,500\left(1 + \frac{0,078}{12}\right)^{12 \times 3}</math></p> <p>✓ answer/antw. (4)</p>
		<b>[13]</b>

**QUESTION/VRAAG 8**

<p>8.1</p>	<p>Given/Gegee: <math>P(G) = 0,25</math>                  Let <math>x</math> be the total number of balls</p> $P(G) = \frac{8}{x} = \frac{1}{4}$ $x = 32$ $n(S) = 32$ <p><b>OR/OF</b>                  Let <math>x</math> be the number of yellow balls  <math>\therefore x+14</math> be the total number of balls</p> $P(G) = \frac{8}{x+14} = \frac{1}{4}$ $x+14=32$ $n(S)=32$	<p>✓ <math>\frac{8}{x} = \frac{1}{4}</math></p> <p>(1)</p> <p>✓ <math>\frac{8}{x+14} = \frac{1}{4}</math></p> <p>(1)</p>
<p>8.2</p>		<p>✓ 18 (number of yellow balls/                  aantal geel balle)</p> <p>✓ branches/takke</p> <p>✓ probabilities/waarskynlikhede</p> <p>✓ outcomes/uitkomst</p> <p>(4)</p>
<p>8.3</p>	$P(G, G) + P(R, R) + P(Y, Y)$ $= \left(\frac{8}{32} \times \frac{7}{31}\right) + \left(\frac{6}{32} \times \frac{5}{31}\right) + \left(\frac{18}{32} \times \frac{17}{31}\right)$ $= \frac{49}{124}$	<p>✓ <math>\left(\frac{8}{32} \times \frac{7}{31}\right)</math></p> <p>✓ <math>\left(\frac{6}{32} \times \frac{5}{31}\right)</math></p> <p>✓ <math>\left(\frac{18}{32} \times \frac{17}{31}\right)</math></p> <p>✓ answer/ antw</p> <p>(4)</p> <p><b>[9]</b></p>

**QUESTION/VRAAG 9**

9.1	$P(V) \times P(M)$ $\frac{32}{150} \times \frac{67}{150} = 0,095$ $P(V \text{ and/en } M) = \frac{12}{150} = 0,08$ $P(V \text{ and/en } M) \neq P(V) \times P(M)$ <p>The events are not independent/<i>Die gebeurtenisse is nie onafhanklik</i></p> <p><b>OR/OF</b></p> $P(V) \times P(F)$ $\frac{32}{150} \times \frac{83}{150} = 0,118$ $P(V \text{ and } F) = \frac{20}{150} = 0,133$ $P(V \text{ and } F) \neq P(V) \times P(F)$ <p>The events are not independent/<i>Die gebeurtenisse is nie onafhanklik</i></p>	$\checkmark \frac{32}{150}$ $\checkmark \frac{67}{150}$ $\checkmark P(V) \times P(M) = 0,095$ $\checkmark P(V \text{ and/en } M) = 0,08$ $\checkmark \text{conclusion/gevolgtr.}$ <p style="text-align: right;">(5)</p> $\checkmark \frac{32}{150}$ $\checkmark \frac{83}{150}$ $\checkmark P(V) \times P(F) = 0,118$ $\checkmark P(V \text{ and } F) = 0,133$ $\checkmark \text{conclusion/gevolgtr.}$ <p style="text-align: right;">(5)</p>
9.2.1	$P(A \text{ and/en } B) = 0,12 \neq 0$ <p>Events are not mutually exclusive/<i>Gebeurtenisse nie onderling uitsluitend nie</i></p>	$\checkmark P(A \text{ and } B) \neq 0$ $\checkmark \text{conclusion/gevolgtr.}$ <p style="text-align: right;">(2)</p>
9.2.2	$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$ $0,83 = P(A) + 4P(A) - 0,12$ $0,95 = 5P(A)$ $P(A) = 0,19$ $P(B) = 4(0,19) = 0,76$	$\checkmark \text{formula/ formule}$ $\checkmark \text{substitution/verv.}$ $\checkmark P(A)$ $\checkmark P(B)$ <p style="text-align: right;">(4)</p>
9.2.3	$P(\text{not } A) = 1 - P(A)$ $= 1 - 0,19$ $= 0,81$	$\checkmark P(\text{not } A) = 1 - P(A)$ $\checkmark \text{answer/antw.}$ <p style="text-align: right;">(2)</p>

**[13]****TOTAL/TOTAAL: 150**