



# basic education

Department:  
Basic Education  
**REPUBLIC OF SOUTH AFRICA**

**NATIONAL  
SENIOR CERTIFICATE**

**GRADE 12**

**MATHEMATICS P1**

**NOVEMBER 2017**

**MARKS: 150**

**TIME: 3 hours**

**This question paper consists of 8 pages and 1 information sheet.**

**INSTRUCTIONS AND INFORMATION**

Read the following instructions carefully before answering the questions.

1. This question paper consists of 11 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 et cetera 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. If necessary, round off answers to TWO decimal places, unless stated otherwise.
8. Diagrams are NOT necessarily drawn to scale.
9. An information sheet with formulae is included at the end of the question paper.
10. Write neatly and legibly.

**QUESTION 1**1.1 Solve for  $x$ :

1.1.1  $x^2 + 9x + 14 = 0$  (3)

1.1.2  $4x^2 + 9x - 3 = 0$  (correct to TWO decimal places) (4)

1.1.3  $\sqrt{x^2 - 5} = 2\sqrt{x}$  (4)

1.2 Solve for  $x$  and  $y$  if:

$3x - y = 4$  and  $x^2 + 2xy - y^2 = -2$  (6)

1.3 Given:  $f(x) = x^2 + 8x + 16$ 

1.3.1 Solve for  $x$  if  $f(x) > 0$ . (3)

1.3.2 For which values of  $p$  will  $f(x) = p$  have TWO unequal negative roots? (4)

**[24]****QUESTION 2**2.1 Given the following quadratic number pattern:  $5 ; -4 ; -19 ; -40 ; \dots$ 

2.1.1 Determine the constant second difference of the sequence. (2)

2.1.2 Determine the  $n^{\text{th}}$  term ( $T_n$ ) of the pattern. (4)

2.1.3 Which term of the pattern will be equal to  $-25\,939$ ? (3)

2.2 The first three terms of an arithmetic sequence are  $2k - 7 ; k + 8$  and  $2k - 1$ .

2.2.1 Calculate the value of the  $15^{\text{th}}$  term of the sequence. (5)

2.2.2 Calculate the sum of the first 30 even terms of the sequence. (4)

**[18]****QUESTION 3**A convergent geometric series consisting of only positive terms has first term  $a$ , constant ratio

$r$  and  $n^{\text{th}}$  term,  $T_n$ , such that  $\sum_{n=3}^{\infty} T_n = \frac{1}{4}$ .

3.1 If  $T_1 + T_2 = 2$ , write down an expression for  $a$  in terms of  $r$ . (2)

3.2 Calculate the values of  $a$  and  $r$ . (6)

**[8]**

**QUESTION 4**

Given:  $f(x) = -ax^2 + bx + 6$

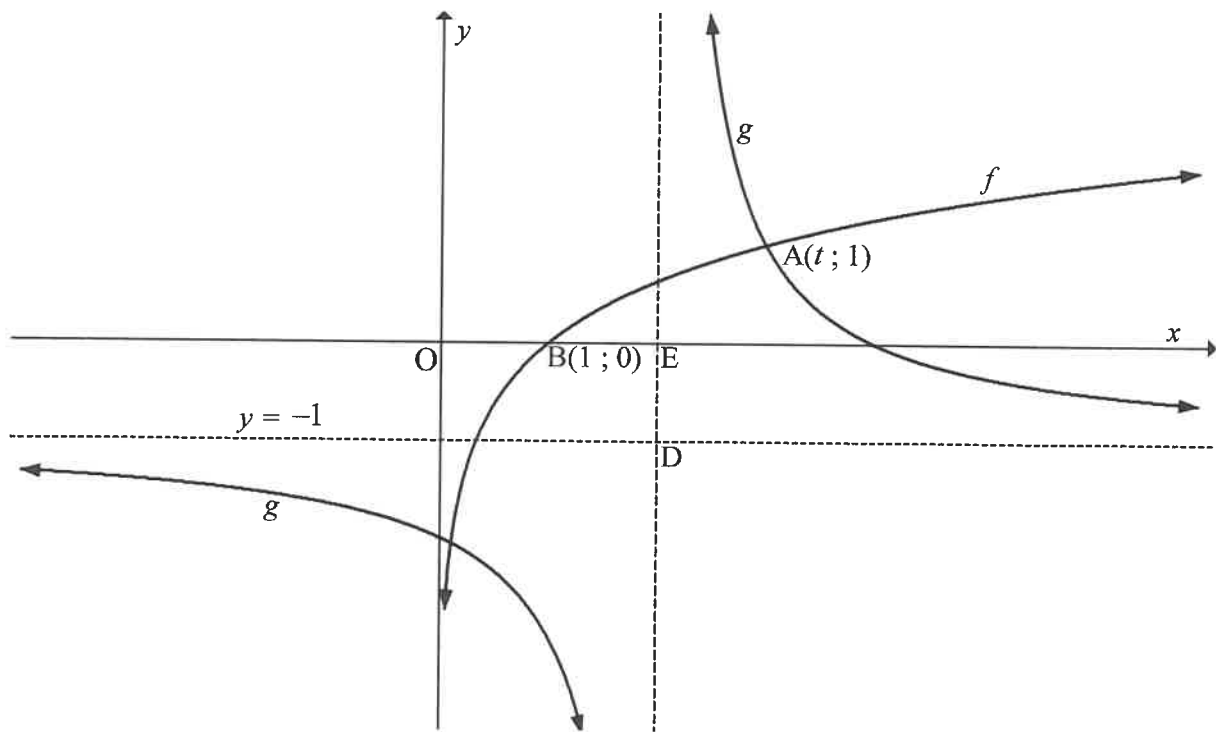
- 4.1 The gradient of the tangent to the graph of  $f$  at the point  $\left(-1; \frac{7}{2}\right)$  is 3.  
Show that  $a = \frac{1}{2}$  and  $b = 2$ . (5)
- 4.2 Calculate the  $x$ -intercepts of  $f$ . (3)
- 4.3 Calculate the coordinates of the turning point of  $f$ . (3)
- 4.4 Sketch the graph of  $f$ . Clearly indicate ALL intercepts with the axes and the turning point. (4)
- 4.5 Use the graph to determine the values of  $x$  for which  $f(x) > 6$ . (3)
- 4.6 Sketch the graph of  $g(x) = -x - 1$  on the same set of axes as  $f$ . Clearly indicate ALL intercepts with the axes. (2)
- 4.7 Write down the values of  $x$  for which  $f(x) \cdot g(x) \leq 0$ . (3)

**[23]**

**QUESTION 5**

The diagram below shows the graphs of  $g(x) = \frac{2}{x+p} + q$  and  $f(x) = \log_3 x$ .

- $y = -1$  is the horizontal asymptote of  $g$ .
- $B(1 ; 0)$  is the  $x$ -intercept of  $f$ .
- $A(t ; 1)$  is a point of intersection between  $f$  and  $g$ .
- The vertical asymptote of  $g$  intersects the  $x$ -axis at  $E$  and the horizontal asymptote at  $D$ .
- $OB = BE$ .



- 5.1 Write down the range of  $g$ . (2)
- 5.2 Determine the equation of  $g$ . (2)
- 5.3 Calculate the value of  $t$ . (3)
- 5.4 Write down the equation of  $f^{-1}$ , the inverse of  $f$ , in the form  $y = \dots$  (2)
- 5.5 For which values of  $x$  will  $f^{-1}(x) < 3$ ? (2)
- 5.6 Determine the point of intersection of the graphs of  $f$  and the axis of symmetry of  $g$  that has a negative gradient. (3)
- [14]**

**QUESTION 6**

- 6.1 Mbali invested R10 000 for 3 years at an interest rate of  $r$  % p.a., compounded monthly. At the end of this period, she received R12 146,72. Calculate  $r$ , correct to ONE decimal place. (5)
- 6.2 Piet takes a loan from a bank to buy a car for R235 000. He agrees to repay the loan over a period of 54 months. The first instalment will be paid one month after the loan is granted. The bank charges interest at 11% p.a., compounded monthly.
- 6.2.1 Calculate Piet's monthly instalment. (4)
- 6.2.2 Calculate the total amount of interest that Piet will pay during the first year of the repayment of the loan. (6)
- [15]**

**QUESTION 7**

- 7.1 Given:  $f(x) = 2x^2 - x$
- Determine  $f'(x)$  from first principles. (6)
- 7.2 Determine:
- 7.2.1  $D_x[(x+1)(3x-7)]$  (2)
- 7.2.2  $\frac{dy}{dx}$  if  $y = \sqrt{x^3} - \frac{5}{x} + \frac{1}{2}\pi$  (4)
- [12]**

**QUESTION 8**

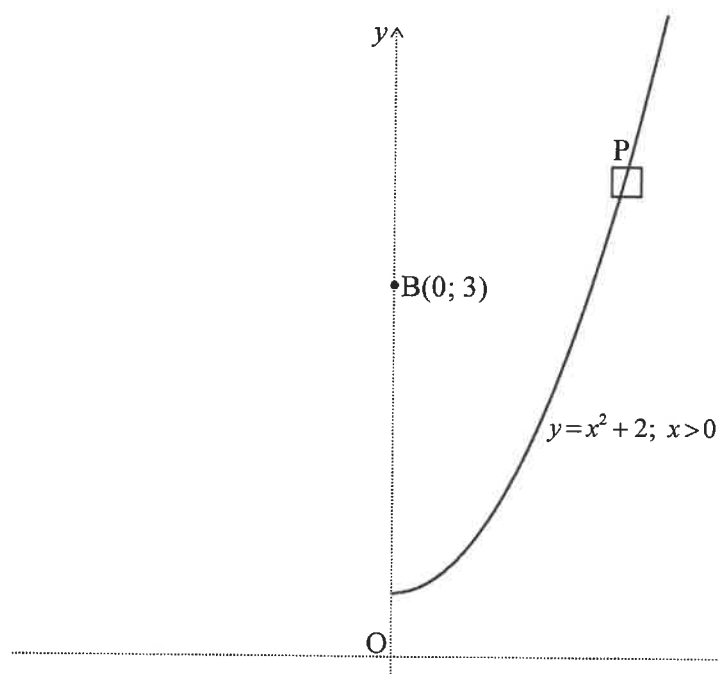
Given:  $f(x) = x(x-3)^2$  with  $f'(1) = f'(3) = 0$  and  $f(1) = 4$

- 8.1 Show that  $f$  has a point of inflection at  $x = 2$ . (5)
- 8.2 Sketch the graph of  $f$ , clearly indicating the intercepts with the axes and the turning points. (4)
- 8.3 For which values of  $x$  will  $y = -f(x)$  be concave down? (2)
- 8.4 Use your graph to answer the following questions:
- 8.4.1 Determine the coordinates of the local maximum of  $h$  if  $h(x) = f(x-2) + 3$ . (2)
- 8.4.2 Claire claims that  $f'(2) = 1$ .  
Do you agree with Claire? Justify your answer. (2)
- [15]**

**QUESTION 9**

An aerial view of a stretch of road is shown in the diagram below. The road can be described by the function  $y = x^2 + 2$ ,  $x \geq 0$  if the coordinate axes (dotted lines) are chosen as shown in the diagram.

Benny sits at a vantage point  $B(0; 3)$  and observes a car, P, travelling along the road.



Calculate the distance between Benny and the car, when the car is closest to Benny.

**[7]**

**QUESTION 10**

A survey was conducted among 100 Grade 12 learners about their use of Instagram (I), Twitter (T) and WhatsApp (W) on their cell phones. The survey revealed the following:

- 8 use all three.
- 12 use Instagram and Twitter.
- 5 use Twitter and WhatsApp, but not Instagram.
- $x$  use Instagram and WhatsApp, but not Twitter.
- 61 use Instagram.
- 19 use Twitter.
- 73 use WhatsApp.
- 14 use none of these applications.

10.1 Draw a Venn diagram to illustrate the information above. (4)

10.2 Calculate the value of  $x$ . (2)

10.3 Calculate the probability that a learner, chosen randomly, uses only ONE of these applications. (2)

**[8]**

**QUESTION 11**

A company uses a coding system to identify its clients. Each code is made up of two letters and a sequence of digits, for example AD108 or RR 45789.

The letters are chosen from A; D; R; S and U. Letters may be repeated in the code.

The digits 0 to 9 are used, but NO digit may be repeated in the code.

11.1 How many different clients can be identified with a coding system that is made up of TWO letters and TWO digits? (3)

11.2 Determine the least number of digits that is required for a company to uniquely identify 700 000 clients using their coding system. (3)

**[6]**

**TOTAL: 150**



## INFORMATION SHEET: MATHEMATICS

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$A = P(1 + ni)$$

$$A = P(1 - ni)$$

$$A = P(1 - i)^n$$

$$A = P(1 + i)^n$$

$$T_n = a + (n-1)d$$

$$S_n = \frac{n}{2}[2a + (n-1)d]$$

$$T_n = ar^{n-1}$$

$$S_n = \frac{a(r^n - 1)}{r - 1}; r \neq 1$$

$$S_\infty = \frac{a}{1 - r}; -1 < r < 1$$

$$F = \frac{x[(1+i)^n - 1]}{i}$$

$$P = \frac{x[1 - (1+i)^{-n}]}{i}$$

$$f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$$

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$M\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$

$$y = mx + c$$

$$y - y_1 = m(x - x_1)$$

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$m = \tan \theta$$

$$(x - a)^2 + (y - b)^2 = r^2$$

In  $\triangle ABC$ :

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$a^2 = b^2 + c^2 - 2bc \cos A$$

$$\text{area } \triangle ABC = \frac{1}{2} ab \sin C$$

$$\sin(\alpha + \beta) = \sin \alpha \cos \beta + \cos \alpha \sin \beta$$

$$\sin(\alpha - \beta) = \sin \alpha \cos \beta - \cos \alpha \sin \beta$$

$$\cos(\alpha + \beta) = \cos \alpha \cos \beta - \sin \alpha \sin \beta$$

$$\cos(\alpha - \beta) = \cos \alpha \cos \beta + \sin \alpha \sin \beta$$

$$\cos 2\alpha = \begin{cases} \cos^2 \alpha - \sin^2 \alpha \\ 1 - 2\sin^2 \alpha \\ 2\cos^2 \alpha - 1 \end{cases}$$

$$\sin 2\alpha = 2 \sin \alpha \cos \alpha$$

$$\bar{x} = \frac{\sum x}{n}$$

$$\sigma^2 = \frac{\sum_{i=1}^n (x_i - \bar{x})^2}{n}$$

$$P(A) = \frac{n(A)}{n(S)}$$

$$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$$

$$\hat{y} = a + bx$$

$$b = \frac{\sum (x - \bar{x})(y - \bar{y})}{\sum (x - \bar{x})^2}$$



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**NATIONAL  
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NASIONALE SENIOR  
SERTIFIKAAT**

**GRADE 12/GRAAD 12**

**MATHEMATICS P1/WISKUNDE V1**

**NOVEMBER 2017**

**MARKING GUIDELINES/NASIENRIGLYNE**

**MARKS/PUNTE: 150**

**This memorandum consists of 22 pages.  
Hierdie memorandum bestaan uit 22 bladsye.**

**NOTE:**

- If a candidate answers a question TWICE, only mark the FIRST attempt.
- Consistent accuracy applies in ALL aspects of the marking guidelines.

**LET WEL:**

- Indien 'n kandidaat 'n vraag TWEE KEER beantwoord, merk slegs die EERSTE poging.
- Volgehoue akkuraatheid is op ALLE aspekte van die nasienriglyne van toepassing.

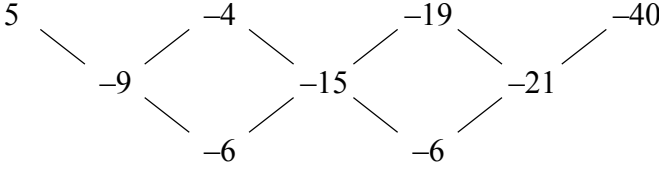
**QUESTION/VRAAG 1**

1.1.1	$x^2 + 9x + 14 = 0$ $(x + 7)(x + 2) = 0$ $x = -7 \text{ or } x = -2$	✓ factors ✓ $x = -7$ ✓ $x = -2$ (3)
1.1.2	$4x^2 + 9x - 3 = 0$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $= \frac{-9 \pm \sqrt{9^2 - 4(4)(-3)}}{2(4)}$ $= \frac{-9 \pm \sqrt{129}}{8}$ $x = 0,29 \text{ or } x = -2,54$ <p><b>OR/OF</b></p> $x^2 + \frac{9}{4}x + \frac{81}{64} = \frac{3}{4} + \frac{81}{64}$ $\left(x + \frac{9}{8}\right)^2 = \frac{129}{64}$ $x + \frac{9}{8} = \pm \frac{\sqrt{129}}{8}$ $x = \frac{-9 \pm \sqrt{129}}{8}$ $x = 0,29 \text{ or } x = -2,54$	✓ substitution ✓ simplification ✓ $x = 0,29$ ✓ $x = -2,54$ <b>OR/OF</b> ✓ for adding $\frac{81}{64}$ on both sides ✓ simplification ✓ $x = 0,29$ ✓ $x = -2,54$ (4)
1.1.3	$\sqrt{x^2 - 5} = 2\sqrt{x}$ $x^2 - 5 = 4x$ $x^2 - 4x - 5 = 0$ $(x - 5)(x + 1) = 0$ $x = 5 \text{ or } x = -1$ $x = 5$	✓ $x^2 - 5 = 4x$ ✓ standard form ✓ both answers ✓ select $x = 5$ (4)

<p>1.2</p>	$3x - y = 4$ $y = 3x - 4$ $x^2 + 2xy - y^2 = -2$ $x^2 + 2x(3x - 4) - (3x - 4)^2 = -2$ $x^2 + 6x^2 - 8x - (9x^2 - 24x + 16) = -2$ $7x^2 - 8x - 9x^2 + 24x - 16 = -2$ $-2x^2 + 16x - 14 = 0$ $x^2 - 8x + 7 = 0$ $(x - 7)(x - 1) = 0$ $x = 1 \quad \text{or} \quad x = 7$ $y = 3(1) - 4 \quad y = 3(7) - 4$ $y = -1 \quad \text{or} \quad y = 17$ <p><b>OR/OF</b></p> $3x - y = 4$ $x = \frac{y + 4}{3}$ $x^2 + 2xy - y^2 = -2$ $x^2 + 2xy - y^2 = -2$ $\left(\frac{y + 4}{3}\right)^2 + 2\left(\frac{y + 4}{3}\right)y - y^2 = -2$ $y^2 + 8y + 16 + 6y^2 + 24y - 9y^2 = -18$ $-2y^2 + 32y + 34 = 0$ $y^2 - 16y - 17 = 0$ $(y - 17)(y + 1) = 0$ $y = -1 \quad \text{or} \quad y = 17$ $x = \frac{-1 + 4}{3} \quad x = \frac{17 + 4}{3}$ $x = 1 \quad \text{or} \quad x = 7$	<p>✓ y subject of formula</p> <p>✓ substitution</p> <p>✓ correct standard form</p> <p>✓ factors</p> <p>✓ x-values</p> <p>✓ y-values</p> <p><b>OR/OF</b></p> <p>✓ x subject of formula</p> <p>✓ substitution</p> <p>✓ correct standard form</p> <p>✓ factors</p> <p>✓ y-values</p> <p>✓ x-values</p> <p>(6)</p>
<p>1.3.1</p>	$x^2 + 8x + 16 > 0$ $(x + 4)(x + 4) > 0$ $x \in \mathbb{R}, x \neq -4 \quad \text{or}$ $x \in (-\infty; -4) \quad \text{or} \quad x \in (-4; \infty) \quad \text{or}$ $x < -4 \quad \text{or} \quad x > -4$ <p><b>OR/OF</b></p> $x^2 + 8x + 16 > 0$ $(x + 4)(x + 4) > 0$ <div style="text-align: center;"> </div> <p>The function values remain positive</p> $x \in \mathbb{R}, x \neq -4$	<p>✓ <math>(x + 4)(x + 4)</math></p> <p>✓✓ any one of the solutions</p> <p><b>OR/OF</b></p> <p>✓ <math>(x + 4)(x + 4)</math></p> <p>✓✓ any one of the solutions</p> <p>(3)</p>

<p>1.3.2</p>	<p>For two negative unequal roots:  <math>0 &lt; p &lt; 16</math></p> <p><b>OR/OF</b></p> $x^2 + 8x + 16 = p$ $x^2 + 8x + 16 - p = 0$ $0 < 16 - p < 16$ $-16 < -p < 0$ $0 < p < 16$ <p><b>OR/OF</b></p> $x^2 + 8x + 16 - p = 0$ $x = \frac{-8 \pm \sqrt{64 - 4(16 - p)}}{2}$ $0 < 64 - 4(16 - p) < 64$ $0 < 4p < 64$ $0 < p < 16$ <p><b>OR/OF</b></p> $x^2 + 8x + 16 = p$ $x^2 + 8x + 16 - p = 0$ <p>Roots are real and unequal:</p> $8^2 - 4(16 - p) > 0$ $4p > 0$ $p > 0$ <p>Roots are: <math>\frac{-8 \pm \sqrt{4p}}{2}</math></p> <p>For both roots to be negative:</p> $\sqrt{4p} < 8$ $4p < 64$ $p < 16$ $0 < p < 16$	<p>✓ 0                  ✓ 16</p> <p>✓ ✓ <math>0 &lt; p &lt; 16</math> (4)</p> <p><b>OR/OF</b></p> <p>✓ 0                  ✓ 16</p> <p>✓ ✓ <math>0 &lt; p &lt; 16</math> (4)</p> <p>✓ 0                  ✓ 16</p> <p>✓ ✓ <math>0 &lt; p &lt; 16</math> (4)</p> <p>✓ 0                  ✓ 16</p> <p>✓ ✓ <math>0 &lt; p &lt; 16</math> (4)</p> <p>✓ 0                  ✓ 16</p> <p>✓ ✓ <math>0 &lt; p &lt; 16</math> (4)</p> <p><b>[24]</b></p>
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**QUESTION/VRAAG 2**

<p>2.1.1</p>	 <p>first differences: <math>-9; -15; -21</math>              second difference = <math>-6</math></p>	<p>✓ first differences                  ✓ <math>-6</math></p> <p style="text-align: right;">(2)</p>
<p>2.1.2</p>	$T_n = an^2 + bn + c$ $a = \frac{\text{second difference}}{2} = -3$ $3a + b = -9$ $3(-3) + b = -9$ $b = 0$ $a + b + c = 5$ $-3 + 0 + c = 5$ $c = 8$ $T_n = -3n^2 + 8$ <p><b>OR/OF</b></p> $T_n = T_1 + (n-1)d_1 + \frac{(n-1)(n-2)d_2}{2}$ $= 5 + (n-1)(-9) + \frac{(n-1)(n-2)(-6)}{2}$ $= 5 - 9n + 9 - 3n^2 + 9n - 6$ $T_n = -3n^2 + 8$	<p>✓ <math>a = -3</math></p> <p>✓ <math>b = 0</math></p> <p>✓ <math>c = 8</math></p> <p>✓ <math>T_n = -3n^2 + 8</math></p> <p><b>OR/OF</b></p> <p>✓ <math>a = -3</math>                  ✓ <math>b = 0</math>                  ✓ <math>c = 8</math>                  ✓ <math>T_n = -3n^2 + 8</math></p> <p style="text-align: right;">(4)</p>
<p>2.1.3</p>	$-3n^2 + 8 = -25\,939$ $-3n^2 = -25947$ $n^2 = 8649$ $n = -93 \text{ or } n = 93$ <p>The 93<sup>rd</sup> term has a value of <math>-25\,939</math></p>	<p>✓ <math>T_n = -25\,939</math></p> <p>✓ <math>n^2 = 8649</math>                  ✓ answer</p> <p style="text-align: right;">(3)</p>

<p>2.2.1</p>	<p><math>2k - 7 ; k + 8</math> and <math>2k - 1</math>  <math>k + 8 - (2k - 7) = 2k - 1 - (k + 8)</math>  <math>-k + 15 = k - 9</math>  <math>2k = 24</math>  <math>k = 12</math>  <math>2k - 7 ; k + 8</math> and <math>2k - 1</math>  <math>17 ; 20 ; 23 \dots\dots</math>  <math>d = 3</math>  <math>T_{15} = 17 + 14(3)</math>  <math>= 59</math></p>	<p>✓  <math>k + 8 - (2k - 7) = 2k - 1 - (k + 8)</math>                   ✓ <math>k = 12</math>                   ✓ 17                  ✓ <math>d = 3</math>                   ✓ <math>T_{15} = 59</math>                   (5)</p>
<p>2.2.2</p>	<p>Sequence is <math>17 ; 20 ; 23 ; 26 ; 29 ; 32 \dots\dots</math>                  Every alternate term of the sequence will be even /  <i>Elke tweede term van die ry sal ewe wees</i>  <math>20 + 26 + 32 + \dots\dots</math>  <math>S_{30} = \frac{30}{2} [2(20) + (29)(6)]</math>  <math>= 15[40 + 174]</math>  <math>= 3210</math>   <b>OR/OF</b>  <math>T_{30} = 20 + 29(6)</math>  <math>= 94</math>   <math>S_{30} = \frac{30}{2} (20 + 194)</math>  <math>= 3210</math></p>	<p>✓ <math>20 + 26 + 32 + \dots\dots</math>                   ✓ <math>a = 20 \quad d = 6</math>                  ✓ subst into correct formula                   ✓ answer                   (4)                   ✓ <math>a = 20 \quad d = 6</math>                   ✓ <math>T_{30} = 94</math>                  ✓ <math>S_{30} = \frac{30}{2} (20 + 194)</math>                  ✓ answer                   (4)   <b>[18]</b></p>

**QUESTION/VRAAG 3**

3.1	$a + ar = 2$ $a(1 + r) = 2$ $a = \frac{2}{1+r}$ <p><b>OR/OF</b></p> $\frac{a}{1-r} - 2 = \frac{1}{4}$ $4a - 8(1-r) = 1-r$ $4a - 8 + 8r = 1-r$ $4a = 9 - 9r$ $a = \frac{9-9r}{4}$ <p><b>OR/OF</b></p> $S_n = \frac{a(r^n - 1)}{r-1}$ $2 = \frac{a(r^2 - 1)}{r-1}$ $2 = \frac{a(r-1)(r+1)}{r-1}$ $2 = a(r+1)$ $a = \frac{2}{r+1}$ <p><b>OR/OF</b></p> $\frac{ar^2}{1-r} = \frac{1}{4}$ $a = \frac{1-r}{4r^2}$	$\checkmark a + ar = 2$  $\checkmark a = \frac{2}{1+r} \quad (2)$  $\checkmark \frac{a}{1-r} - 2 = \frac{1}{4}$  $\checkmark a = \frac{9-9r}{4} \quad (2)$  <p><b>OR/OF</b></p> $\checkmark 2 = \frac{a(r^2 - 1)}{r-1}$  $\checkmark a = \frac{2}{r+1} \quad (2)$  <p><b>OR/OF</b></p> $\checkmark \frac{ar^2}{1-r} = \frac{1}{4}$  $\checkmark a = \frac{1-r}{4r^2} \quad (2)$
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<p>3.2</p>	$S_{\infty} = T_1 + T_2 + \sum_{n=3}^{\infty} T_n$ $S_{\infty} = 2 + \frac{1}{4}$ $\frac{a}{1-r} = 2 + \frac{1}{4}$ $\frac{a}{1-r} = \frac{9}{4}$ $\left(\frac{2}{1+r}\right) \times \left(\frac{1}{1-r}\right) = \frac{9}{4}$ $\frac{2}{1-r^2} = \frac{9}{4}$ $8 = 9 - 9r^2$ $9r^2 = 1$ $r = \frac{1}{3}$ $a = \frac{3}{2}$ <p><b>OR/OF</b></p> $S_{\infty} = T_1 + T_2 + \sum_{n=3}^{\infty} T_n$ $S_{\infty} = 2 + \frac{1}{4}$ $\frac{a}{1-r} = 2 + \frac{1}{4}$ $\frac{a}{1-r} = \frac{9}{4}$ $4a = 9 - 9r$ $r = \frac{9-4a}{9}$ $a + a\left(\frac{9-4a}{9}\right) = 2$ $9a + 9a - 4a^2 = 18$ $2a^2 - 9a + 9 = 0$ $(a-3)(2a-3) = 0$ $a = \frac{3}{2} \text{ or } a = 3$ $r = \frac{1}{3} \text{ or } r = -\frac{1}{3}$ <p style="text-align: center;">N/A</p>	$\checkmark S_{\infty} = 2 + \frac{1}{4}$ $\checkmark \frac{a}{1-r} = \frac{9}{4}$ <p><math>\checkmark</math> substitution of <math>a</math> into the correct formula</p> $\checkmark 9r^2 = 1$ $\checkmark r = \frac{1}{3}$ $\checkmark a = \frac{3}{2}$ <p style="text-align: right;">(6)</p> <p><b>OR/OF</b></p> $\checkmark S_{\infty} = 2 + \frac{1}{4}$ $\checkmark \frac{a}{1-r} = \frac{9}{4}$ $\checkmark r = \frac{9-4a}{9}$ <p><math>\checkmark</math> substitution of <math>a</math> into the correct formula</p> $\checkmark a = \frac{3}{2}$
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<p><b>OR/OF</b></p> $r = \frac{2-a}{a}$ $\frac{ar^2}{1-r} = \frac{1}{4}$ $4ar^2 = 1-r$ $4a\left(\frac{2-a}{a}\right)^2 = 1 - \frac{2-a}{a}$ $16-16a+4a^2 = 2a+2$ $2a^2 - 9a + 9 = 0$ $(2a-3)(a-3) = 0$ $a = \frac{3}{2} \quad a \neq 3$ $r = \frac{1}{3} \quad r \neq -\frac{1}{3}$	<p>✓ <math>r = \frac{1}{3}</math></p> <p>(6)</p> <p><b>OR/OF</b></p> $\checkmark r = \frac{2-a}{a}$ $\checkmark \frac{ar^2}{1-r} = \frac{1}{4}$ <p>✓ substitution of <math>a</math></p> $\checkmark (2a-3)(a-3) = 0$ $\checkmark a = \frac{3}{2}$ $\checkmark r = \frac{1}{3}$
<p><b>OR/OF</b></p> $S_{\infty} = T_1 + T_2 + \sum_{n=3}^{\infty} T_n$ $S_{\infty} = 2 + \frac{1}{4}$ $\frac{a}{1-r} = 2 + \frac{1}{4}$ $\frac{a}{1-r} = \frac{9}{4}$ $\left(\frac{1-r}{4r^2}\right) \times \left(\frac{1}{1-r}\right) = \frac{9}{4}$ $\frac{1}{4r^2} = \frac{9}{4}$ $4 = 36r^2$ $9r^2 = 1$ $r = \frac{1}{3}$ $a = \frac{3}{2}$	<p>(6)</p> <p><b>OR/OF</b></p> $\checkmark S_{\infty} = 2 + \frac{1}{4}$ $\checkmark \frac{a}{1-r} = \frac{9}{4}$ <p>✓ substitution of <math>a</math></p> $\checkmark 9r^2 = 1$ $\checkmark r = \frac{1}{3}$ $\checkmark a = \frac{3}{2}$ <p>(6)</p> <p><b>[8]</b></p>

**QUESTION/VRAAG 4**

<p>4.1</p>	$f(x) = -ax^2 + bx + 6$ $f'(x) = -2ax + b$ $-2ax + b = 3$ <p style="text-align: center;">at <math>x = -1</math></p> $2a + b = 3 \quad [1]$ $f(-1) = \frac{7}{2}$ $-a - b + 6 = \frac{7}{2}$ $-2a - 2b + 12 = 7$ $2a + 2b = 5 \quad [2]$ $[2] - [1]$ $b = 2$ $2a + 2 = 3$ $a = \frac{1}{2}$ <p><b>OR/OF</b></p> $f'(x) = -2ax + b$ $3 = 2a + b$ $b = 3 - 2a$ $\frac{7}{2} = -a(-1)^2 + (3 - 2a)(-1) + 6$ $a + 3 = \frac{7}{2}$ $a = \frac{1}{2}$ $b = 2$	$\checkmark -2ax + b$ $\checkmark \checkmark 2a + b = 3$ $\checkmark -a - b + 6 = \frac{7}{2}$ $\checkmark \text{solve simultaneously}$ <p style="text-align: right;">(5)</p> $\checkmark -2ax + b$ $\checkmark \checkmark 2a + b = 3$ $\checkmark$ $\frac{7}{2} = -a(-1)^2 + (3 - 2a)(-1) + 6$ $\checkmark \text{solve simultaneously}$ <p style="text-align: right;">(5)</p>
<p>4.2</p>	$f(x) = -\frac{1}{2}x^2 + 2x + 6$ <p><math>x</math> – intercepts :</p> $-\frac{1}{2}x^2 + 2x + 6 = 0$ $-x^2 + 4x + 12 = 0$ $x^2 - 4x - 12 = 0$ $(x - 6)(x + 2) = 0$ $(-2 ; 0) \quad (6 ; 0)$	$\checkmark -\frac{1}{2}x^2 + 2x + 6 = 0$ $\checkmark (-2 ; 0)$ $\checkmark (6 ; 0)$ <p style="text-align: right;">(3)</p>

<p>4.3</p>	$f(x) = -\frac{1}{2}x^2 + 2x + 6$ $f'(x) = 0 \quad \text{or} \quad x = -\frac{b}{2a} \quad \text{or} \quad x = \frac{-2+6}{2}$ $-x + 2 = 0 \quad \quad \quad x = -\frac{2}{2 \cdot \left(-\frac{1}{2}\right)} \quad \quad \quad x = 2$ $x = 2 \quad \quad \quad x = 2$ $y = -\frac{1}{2}(2)^2 + 2(2) + 6$ $= -2 + 4 + 6$ $= 8$ <p>TP (2; 8)</p> <p><b>OR/OF</b></p> $y = -\frac{1}{2}(x^2 - 4x - 12)$ $= -\frac{1}{2}[(x-2)^2 - 4 - 12]$ $= -\frac{1}{2}(x-2)^2 + 8$ <p>TP (2; 8)</p>	$\checkmark -x + 2 \quad / \quad -\frac{2}{2 \cdot \left(-\frac{1}{2}\right)} \quad /$ $\frac{-2+6}{2}$ $\checkmark x = 2$ $\checkmark y = 8$ <p><b>OR/OF</b></p> $\checkmark -\frac{1}{2}(x-2)^2 + 8$ $\checkmark x = 2$ $\checkmark y = 8$ <p style="text-align: right;">(3)</p>
<p>4.4 4.6</p>		<p>4.4: f:  <math>\checkmark</math> shape  <math>\checkmark</math> x- intercepts  <math>\checkmark</math> y- intercept  <math>\checkmark</math> (2; 8)</p> <p style="text-align: right;">(4)</p> <p>4.6: g:  <math>\checkmark</math> x- intercept  <math>\checkmark</math> y- intercept</p> <p style="text-align: right;">(2)</p>
<p>4.5</p>	<p><math>0 &lt; x &lt; 4</math> or (0; 4)</p>	$\checkmark 4$ $\checkmark \checkmark 0 < x < 4$ <p style="text-align: right;">(3)</p>
<p>4.7</p>	<p><math>x \leq -2</math> or <math>-1 \leq x \leq 6</math></p> <p><b>OR/OF</b></p> <p><math>(-\infty ; -2]</math> or <math>[-1; 6]</math></p>	$\checkmark x \leq -2$ $\checkmark \checkmark -1 \leq x \leq 6$ <p style="text-align: right;">(3) <b>[23]</b></p>



**QUESTION/VRAAG 6**

<p>6.1</p>	$A = P(1+i)^n$ $12\,146,72 = 10\,000 \left(1 + \frac{r}{12}\right)^{36}$ $\left(1 + \frac{r}{12}\right)^{36} = 1,214672$ $1 + \frac{r}{12} = \sqrt[36]{1,214672}$ $= 1,005416$ $\frac{r}{12} = 0,005416$ $r = 0,06500$ $r = 6,5\%$	<p>✓ <math>\frac{r}{12}</math>                  ✓ <math>n = 36</math>                  ✓ correct substitution into formula                  ✓ <math>1 + \frac{r}{12} = \sqrt[36]{1,214672}</math>                  ✓ 6,5%</p> <p style="text-align: right;">(5)</p>
<p>6.2.1</p>	$P = \frac{x[1 - (1+i)^{-n}]}{i}$ $235\,000 = \frac{x \left[1 - \left(1 + \frac{0,11}{12}\right)^{-54}\right]}{\frac{0,11}{12}}$ $x = \frac{235\,000 \times \frac{0,11}{12}}{\left[1 - \left(1 + \frac{0,11}{12}\right)^{-54}\right]}$ $= R5\,536,95$ <p>His monthly instalment is R 5 536,95</p>	<p>✓ <math>i = \frac{0,11}{12}</math>                  ✓ <math>n = 54</math>                  ✓ correct substitution in P                  ✓ answer</p> <p style="text-align: right;">(4)</p>
<p>6.2.2</p>	<p>Amount paid for the year : <math>(5\,536,95 \times 12) = R66\,443,40</math></p> $\text{Balance} = 235\,000 \left(1 + \frac{0,11}{12}\right)^{12} - \frac{5\,536,95 \left[\left(1 + \frac{0,11}{12}\right)^{12} - 1\right]}{\frac{0,11}{12}}$ $= 192\,296,17$ <p>Interest = <math>(5\,536,95 \times 12) - (235\,000 - 192\,296,17)</math>  <math>= 66\,443,40 - 42\,703,83</math>  <math>= 23\,739,57</math></p> <p><b>OR/OF</b></p>	<p>✓ R66 443,40                  ✓ <math>235\,000 \left(1 + \frac{0,11}{12}\right)^{12}</math>                  ✓ <math>\frac{5\,536,95 \left[\left(1 + \frac{0,11}{12}\right)^{12} - 1\right]}{\frac{0,11}{12}}</math>                  ✓ R192 296,17                  ✓ R42 703,83                  ✓ R23 739,57</p> <p><b>OR/OF</b></p>

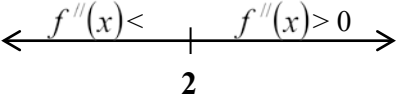
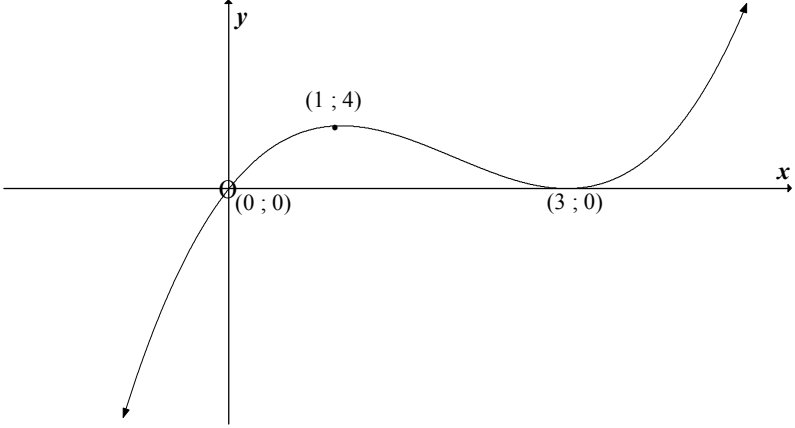
<p>Total amount paid in first year = R 5 536.95 × 12                  = R66 443,40</p> <p>Balance on loan after 1 year = P of remaining installments</p> $P = \frac{x[1 - (1+i)^{-n}]}{i}$ $= \frac{5\,536,95 \left[ 1 - \left( 1 + \frac{0,11}{12} \right)^{-42} \right]}{\frac{0,11}{12}}$ <p>= R192 296,20</p> <p>Amount paid off in the first year:                  R235 000 – R192 296,20 = R42 703,80</p> <p>Amount of interest = R66 443,40 – R42 703,80                  = R23 739,60</p> <p><b>OR/OF</b></p> $P = \frac{5536,95 \left[ 1 - \left( 1 + \frac{0,11}{12} \right)^{-12} \right]}{\frac{0,11}{12}}$ <p>= R 62 648,18</p> <p>235 000 – 62 648,18 = R172 351,82</p> <p>After 12 months, money owed on house is</p> $172\,351,82 \left( 1 + \frac{0,11}{12} \right)^{12}$ <p>= 192 296,17</p> <p>Amount paid after 12 months is</p> <p>5 536,95 × 12 = R 66 443, 40</p> <p>Amount of interest paid:</p> <p>R 66 443, 40 – (235 000 – 192 296,17)                  = R 23 739, 57</p>	<p>✓ R66 443,40</p> <p>✓ <math>n = - 42</math></p> <p>✓ substitution into correct formula</p> <p>✓ R192 296,20</p> <p>✓ R42 703,80</p> <p>✓ R23 739,60</p> <p><b>OR/OF</b></p> <p>✓ R62 648,18</p> <p>✓ R172 351,82</p> <p>✓ R192 296,17</p> <p>✓ R66 443,40</p> <p>✓ 235 000 – 192 296,17</p> <p>✓ R23 739,57</p> <p>(6)</p> <p>(6)</p> <p><b>[15]</b></p>
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**QUESTION/VRAAG 7**

<p>7.1</p>	$f(x+h) = 2(x+h)^2 - (x+h)$ $= 2(x^2 + 2xh + h^2) - x - h$ $= 2x^2 + 4xh + 2h^2 - x - h$ $f(x+h) - f(x) = 2x^2 + 4xh + 2h^2 - x - h - 2x^2 + x$ $= 4xh + 2h^2 - h$ $f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ $= \lim_{h \rightarrow 0} \frac{4xh + 2h^2 - h}{h}$ $= \lim_{h \rightarrow 0} \frac{h(4x + 2h - 1)}{h}$ $= \lim_{h \rightarrow 0} (4x + 2h - 1)$ $= 4x - 1$ <p><b>OR/OF</b></p> $f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ $= \lim_{h \rightarrow 0} \frac{2(x+h)^2 - (x+h) - (2x^2 - x)}{h}$ $= \lim_{h \rightarrow 0} \frac{2x^2 + 4xh + 2h^2 - x - h - 2x^2 + x}{h}$ $= \lim_{h \rightarrow 0} \frac{4xh + 2h^2 - h}{h}$ $= \lim_{h \rightarrow 0} \frac{h(4x + 2h - 1)}{h}$ $= \lim_{h \rightarrow 0} (4x + 2h - 1)$ $= 4x - 1$	<p>✓ <math>2x^2 + 4xh + 2h^2 - x - h</math></p> <p>✓ <math>4xh + 2h^2 - h</math></p> <p>✓ <math>f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}</math></p> <p>✓ subst. into formula</p> <p>✓ <math>\lim_{h \rightarrow 0} (4x + 2h - 1)</math></p> <p>✓ <math>4x - 1</math></p> <p><b>OR/OF</b></p> <p>✓ <math>f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}</math></p> <p>✓ subst. into formula</p> <p>✓ <math>2x^2 + 4xh + 2h^2 - x - h</math></p> <p>✓ <math>4xh + 2h^2 - h</math></p> <p>✓ <math>\lim_{h \rightarrow 0} (4x + 2h - 1)</math></p> <p>✓ <math>4x - 1</math></p> <p style="text-align: right;">(6)</p>
<p>7.2.1</p>	$D_x[(x+1)(3x-7)]$ $= D_x(3x^2 - 4x - 7)$ $= 6x - 4$	<p>✓ <math>3x^2 - 4x - 7</math></p> <p>✓ <math>6x - 4</math></p> <p style="text-align: right;">(2)</p>
<p>7.2.2</p>	$y = \sqrt{x^3} - \frac{5}{x} + \frac{1}{2}\pi$ $y = x^{\frac{3}{2}} - 5x^{-1} + \frac{1}{2}\pi$ $\frac{dy}{dx} = \frac{3}{2}x^{\frac{1}{2}} + 5x^{-2}$	<p>✓ <math>x^{\frac{3}{2}} - 5x^{-1}</math></p> <p>✓ <math>\frac{3}{2}x^{\frac{1}{2}}</math></p> <p>✓ <math>+ 5x^{-2}</math></p> <p>✓ derivative of <math>\frac{1}{2}\pi</math> is 0</p> <p style="text-align: right;">(4) [12]</p>



**QUESTION/VRAAG 8**

<p>8.1</p>	$f(x) = x^3 - 6x^2 + 9x$ $f'(x) = 3x^2 - 12x + 9$ $f''(x) = 6x - 12 = 0$ $x = 2$ $f''(0) = 6(0) - 12$ $= -12$ $f''(3) = 6(3) - 12$ $= 6$ <p style="text-align: center;">  </p> <p>Point of inflection at <math>x = 2</math></p>	<p>                 ✓ <math>x^3 - 6x^2 + 9x</math>                  ✓ <math>3x^2 - 12x + 9</math>                  ✓ <math>6x - 12</math>                  ✓ <math>6x - 12 = 0</math> </p> <p>✓ explanation</p> <p style="text-align: right;">(5)</p>
<p>8.2</p>		<p>                 ✓ shape                  ✓ (0 ; 0)                  ✓ (3 ; 0) as TP                  ✓ (1 ; 4)             </p> <p style="text-align: right;">(4)</p>
<p>8.3</p>	<p><math>f</math> concave up for <math>x &gt; 2</math>  <math>y = -f(x)</math> will be concave down for <math>x &gt; 2</math></p>	<p>✓✓ <math>x &gt; 2</math></p> <p style="text-align: right;">(2)</p>
<p>8.4.1</p>	<p>(3;7)</p>	<p>                 ✓ 3                  ✓ 7             </p> <p style="text-align: right;">(2)</p>
<p>8.4.2</p>	<p>Do not agree with Claire as her statement is incorrect.                  Between <math>x = 1</math> and <math>x = 3</math> the graph of <math>f</math> is decreasing.                  Therefore at <math>x = 2</math> the gradient will have a negative value.</p> <p><i>Stem nie saam met Claire nie, want haar stelling in verkeerd.                  Die grafiek van <math>f</math> is dalend/afnemend tussen <math>x = 1</math> en <math>x = 3</math>.                  By <math>x = 2</math> moet die gradiënt dus 'n negatiewe waarde hê.</i></p> <p style="text-align: center;"><b>OR/OF</b></p> $f'(2) = 3(2)^2 - 12(2) + 9$ $= -3$ $\neq 1$	<p>✓ no</p> <p>✓ justification</p> <p style="text-align: right;">(2)</p> <p style="text-align: right;"><b>[15]</b></p>

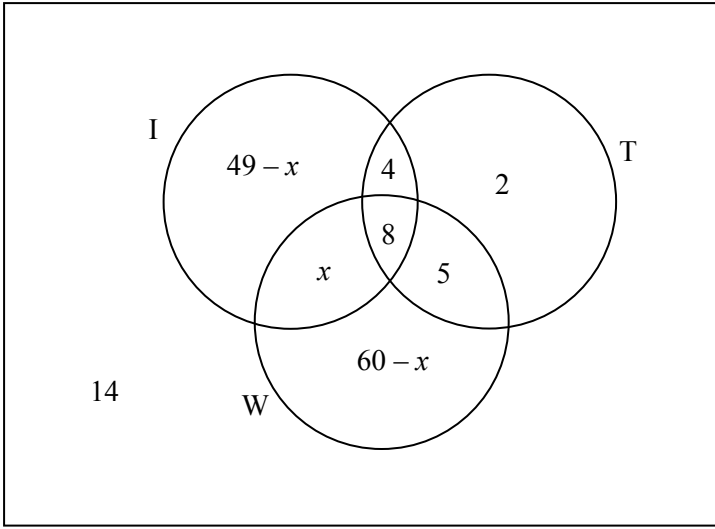
**QUESTION/VRAAG 9**

$y = x^2 + 2$ $P(x; x^2 + 2)$ $B(0; 3)$ $PB^2 = (x - 0)^2 + (x^2 + 2 - 3)^2$ $= x^2 + x^4 - 2x^2 + 1$ $= x^4 - x^2 + 1$ <p>PB will be a minimum if <math>PB^2</math> is a minimum</p> $\frac{d(PB^2)}{dx} = 4x^3 - 2x$ $4x^3 - 2x = 0$ $x(2x^2 - 1) = 0$ $x = 0 \text{ or } x^2 = \frac{1}{2}$ $x = \frac{1}{\sqrt{2}}$ $PB^2 = \left(\frac{1}{\sqrt{2}}\right)^4 - \left(\frac{1}{\sqrt{2}}\right)^2 + 1$ $= \frac{1}{4} - \frac{1}{2} + 1$ $= \frac{3}{4}$ $PB = \frac{\sqrt{3}}{2} = 0,87$ <p><b>OR/OF</b></p>	$\checkmark (x - 0)^2 + (x^2 + 2 - 3)^2$ $\checkmark x^4 - x^2 + 1$ $\checkmark 4x^3 - 2x$ $\checkmark \frac{d(PB^2)}{dx} = 0$ $\checkmark x = \frac{1}{\sqrt{2}}$ $\checkmark PB^2 = \left(\frac{1}{\sqrt{2}}\right)^4 - \left(\frac{1}{\sqrt{2}}\right)^2 + 1$ $\checkmark \text{ answer}$ <p><b>OR/OF</b></p>
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<p>Gradient of tangent to curve = <math>2x</math></p> <p>Gradient of line joining B and the curve = <math>\frac{x^2 + 2 - 3}{x - 0}</math>  <math>= \frac{x^2 - 1}{x}</math></p> <p>Shortest distance will be where tangent to curve is perpendicular to the line joining P and the curve.</p> $\frac{x^2 - 1}{x} = -\frac{1}{2x}$ $2x(x^2 - 1) = -x$ $2x^3 - 2x = 0$ $x(2x^2 - 1) = 0$ $x = 0 \text{ or } x^2 = \frac{1}{2}$ $x = \frac{1}{\sqrt{2}}$ $PB^2 = \left(\frac{1}{\sqrt{2}}\right)^4 - \left(\frac{1}{\sqrt{2}}\right)^2 + 1$ $= \frac{1}{4} - \frac{1}{2} + 1$ $= \frac{3}{4}$ $PB = \frac{\sqrt{3}}{2} = 0,87$ <p><b>OR/OF</b></p> <p><math>P(k; k^2 + 2)</math> and <math>B(0; 3)</math></p> <p><math>BP \perp</math> tangent passing through <math>y = x^2 + 2</math> at P.</p> $m_{\text{tangent at P}} = 2k$ $m_{BP} = -\frac{1}{2k}$ <p>Equation of BP: <math>y = \left(-\frac{1}{2k}\right)x + 3</math></p> $y_P = \left(-\frac{1}{2k}\right)(k) + 3 = 2,5$ $\Rightarrow k^2 + 2 = 2,5 \text{ and so } k = \sqrt{0,5} \text{ and } P(\sqrt{0,5}; 2,5)$ $BP = \sqrt{(\sqrt{0,5} - 0)^2 + (2,5 - 3)^2} = \sqrt{\frac{3}{4}} = \frac{\sqrt{3}}{2} = 0,87$	<p>✓ = <math>2x</math></p> <p>✓ = <math>\frac{x^2 - 1}{x}</math></p> <p>✓ <math>\frac{x^2 - 1}{x} = -\frac{1}{2x}</math></p> <p>✓ <math>2x^3 - 2x = 0</math></p> <p>✓ <math>x = \frac{1}{\sqrt{2}}</math></p> <p>✓ <math>PB^2 = \left(\frac{1}{\sqrt{2}}\right)^4 - \left(\frac{1}{\sqrt{2}}\right)^2 + 1</math></p> <p>✓ answer</p> <p><b>OR/OF</b></p> <p>✓ <math>P(k; k^2 + 2)</math></p> <p>✓ <math>m_{\text{tangent at P}} = 2k</math></p> <p>✓ <math>m_{BP} = -\frac{1}{2k}</math></p> <p>✓ <math>y = \left(-\frac{1}{2k}\right)x + 3</math></p> <p>✓ value of y at P</p> <p>✓ value of k</p> <p>✓ answer</p>
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[7]

**QUESTION/VRAAG 10**

10.1	<p style="text-align: right;"><math>n(S) = 100</math></p> 	<p>8 values need to be placed in correct position:</p> <p>2 or 3 correct: 1 mark                  4 or 5 correct: 2 marks                  6 or 7 correct: 3 marks                  8 correct: 4 marks</p> <p style="text-align: right;">(4)</p>
10.2	$(49 - x) + x + 8 + 4 + 5 + 2 + (60 - x) + 14 = 100$ $-x + 142 = 100$ $x = 42$	<p>✓ setting up equation</p> <p>✓ answer</p> <p style="text-align: right;">(2)</p>
10.3	<p>P (use only one application) = <math>\frac{7 + 2 + 18}{100}</math></p> $= \frac{27}{100} \text{ or } 27\%$	<p>✓ <math>\frac{7 + 2 + 18}{100}</math></p> <p>✓ answer</p> <p style="text-align: right;">(2)</p> <p style="text-align: right;"><b>[8]</b></p>

**QUESTION/VRAAG 11**

11.1	$5 \times 5 \times 10 \times 9$ $= 2250$	<p>✓ <math>5 \times 5</math>                  ✓ <math>10 \times 9</math>                  ✓ 2250</p> <p style="text-align: right;">(3)</p>																								
11.2	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th>No of digits used</th> <th>Letters</th> <th>Digits</th> <th>Total</th> </tr> </thead> <tbody> <tr> <td>1</td> <td><math>5 \times 5</math></td> <td>10</td> <td>250</td> </tr> <tr> <td>2</td> <td><math>5 \times 5</math></td> <td><math>10 \times 9</math></td> <td>2 250</td> </tr> <tr> <td>3</td> <td><math>5 \times 5</math></td> <td><math>10 \times 9 \times 8</math></td> <td>18 000</td> </tr> <tr> <td>4</td> <td><math>5 \times 5</math></td> <td><math>10 \times 9 \times 8 \times 7</math></td> <td>126 000</td> </tr> <tr> <td>5</td> <td><math>5 \times 5</math></td> <td><math>10 \times 9 \times 8 \times 7 \times 6</math></td> <td>756 000</td> </tr> </tbody> </table> <p>Codes of two letters and five digits will ensure unique numbers for 700 000 clients.</p>	No of digits used	Letters	Digits	Total	1	$5 \times 5$	10	250	2	$5 \times 5$	$10 \times 9$	2 250	3	$5 \times 5$	$10 \times 9 \times 8$	18 000	4	$5 \times 5$	$10 \times 9 \times 8 \times 7$	126 000	5	$5 \times 5$	$10 \times 9 \times 8 \times 7 \times 6$	756 000	<p>✓ <math>5 \times 5 \times 10 \times 9 \times 8 \times 7 \times 6</math>                  ✓✓ five digits</p> <p style="text-align: right;">(3)</p> <p style="text-align: right;"><b>[6]</b></p>
No of digits used	Letters	Digits	Total																							
1	$5 \times 5$	10	250																							
2	$5 \times 5$	$10 \times 9$	2 250																							
3	$5 \times 5$	$10 \times 9 \times 8$	18 000																							
4	$5 \times 5$	$10 \times 9 \times 8 \times 7$	126 000																							
5	$5 \times 5$	$10 \times 9 \times 8 \times 7 \times 6$	756 000																							

**TOTAL/TOTAAL: 150**