basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

SENIOR CERTIFICATE EXAMINATIONS/
NATIONAL SENIOR CERTIFICATE EXAMINATIONS

MATHEMATICS P1

MAY/JUNE 2026

MARKS: 150

TIME: 3 hours

This question paper consists of 9 pages, 1 information sheet and an answer book of 21 pages.

INSTRUCTIONS AND INFORMATION

Read the following instructions and information carefully before answering the questions.

1. This question paper consists of 10 questions.
2. Answer ALL the questions in the SPECIAL ANSWER BOOK provided.
3. Clearly show ALL calculations, diagrams, graphs, etc. that you have used in determining your answers.
4. Answers only will NOT necessarily be awarded full marks.
5. You may use an approved scientific calculator (non-programmable and non-graphical), unless stated otherwise.
6. If necessary, round off answers correct to TWO decimal places, unless stated otherwise.
7. Diagrams are NOT necessarily drawn to scale.
8. An information sheet with formulae is included at the end of the question paper.
9. Write neatly and legibly.

QUESTION 1

1.1 Solve for x:

1.1.1 $x^2 - 9 = 0$ (2)

1.1.2 $2x^2 + 3x - 7 = 0$ (correct to TWO decimal places) (3)

1.1.3 $-x^2 + 3x > -4$ (4)

1.1.4 $\sqrt{7x+2} + 2x = 8$ (4)

1.2 Solve simultaneously for x and y:

$$\frac{2^x.2^y}{4} = 1 \quad \text{and} \quad -2x^2 + 3xy = y^2$$ (6)

1.3 Given: $\left(\sqrt{6p} + \sqrt[4]{128}\right)\left(\sqrt{6p} - \sqrt[4]{128}\right) = 54 + a\sqrt{2}$

Calculate $a - p$. (4)
[23]

QUESTION 2

2.1 Given the arithmetic series: $6 + 10 + 14 + \ldots$

2.1.1 Which term in the series has the value of 602? (2)

2.1.2 Show that $S_n = 2n^2 + 4n$ (2)

2.1.3 Calculate the value of $\sum_{n=100}^{150} (4n + 2)$ (2)

2.2 The first four terms of a quadratic number pattern are: -1 ; $-4x$; 11 ; $2x + 12$

2.2.1 Calculate the value of x. (4)

2.2.2 If $x = -2$, show that $T_n = -3n^2 + 18n - 16$ (3)

2.2.3 Consider the first n terms of the quadratic number pattern. Calculate the least value of n for which the sum of the first differences will be less than $-1\,380$. (4)
[17]

QUESTION 3

Two clocks, A and B, were observed from 09:00 to 10:00.

The following observations were made:

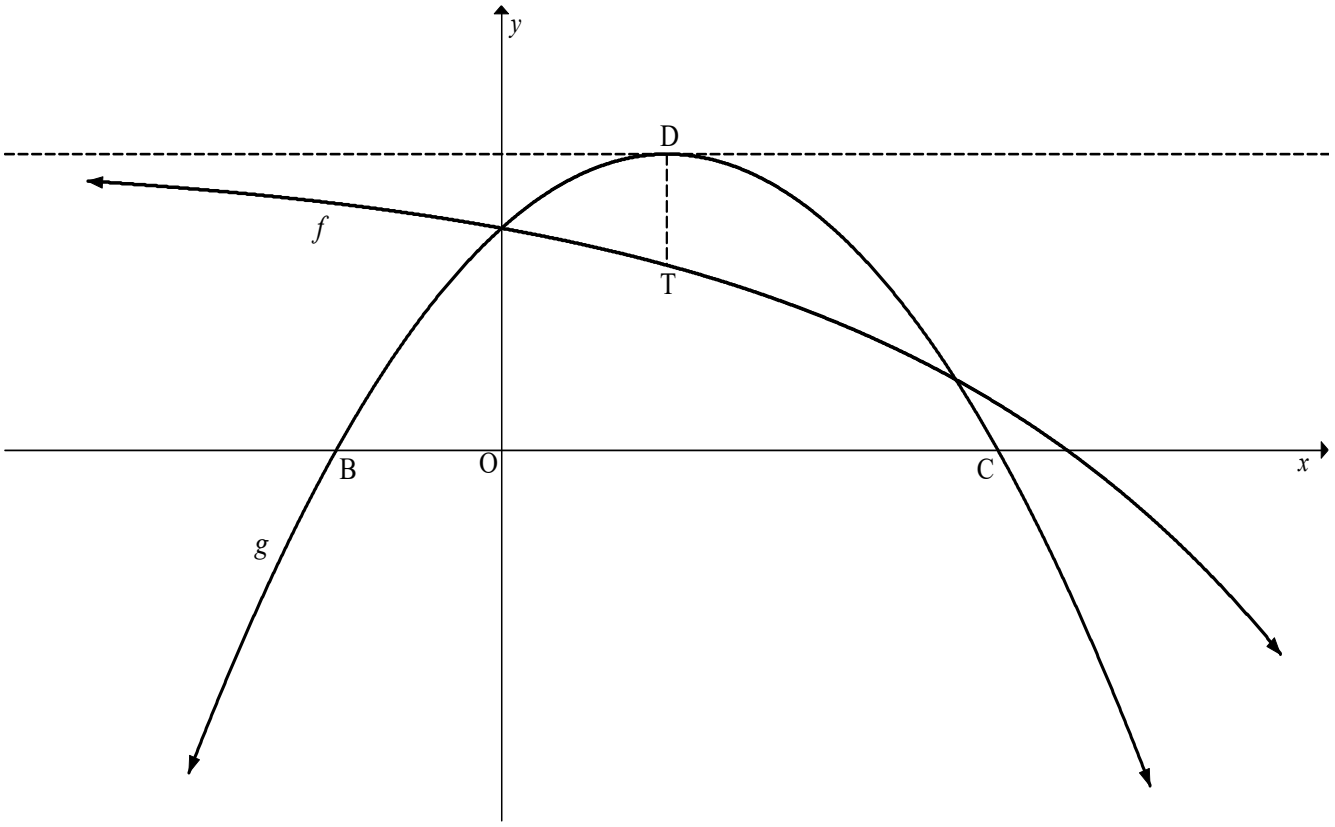
- The time on both clocks was exactly 09:00.
- Clock A measured time correctly from 09:00 to 10:00.
- Clock B measured half the time that clock A measured in the first five minutes.
- Thereafter, for every five minutes, clock B measured 50% of the time it measured in the previous 5 minutes.

3.1 What was the time on clock B when clock A reached 10:00? (5)

3.2 How long will it take clock B to reach the time of 09:06? Justify your answer. (2)
[7]

QUESTION 4

Sketched below are the graphs of $f(x) = -a^x + q$ and $g(x) = -x^2 + 2x + 3$.
B and C are the x-intercepts of g. D, the turning point of g, is also a point on the asymptote of f. T is a point on f such that DT is parallel to the y-axis.



4.1 Calculate the coordinates of D. (3)

4.2 Write down the values of x where g is increasing. (1)

4.3 Calculate the x-intercepts of g. (3)

4.4 Determine the values of k such that $g(x) = k$ has TWO distinct positive roots. (2)

4.5 Write down the range of f. (1)

4.6 If DT $= \frac{3}{2}$ units, calculate the values of a and q. (4)

4.7 Why is f a function? (1)

4.8 It is further given that $f(x) = -\left(\frac{3}{2}\right)^x + 4$ and $h(x) = -f(x) + 4$. Determine the equation of h^{-1}, the inverse of h, in the form $y = \ldots$ (3)

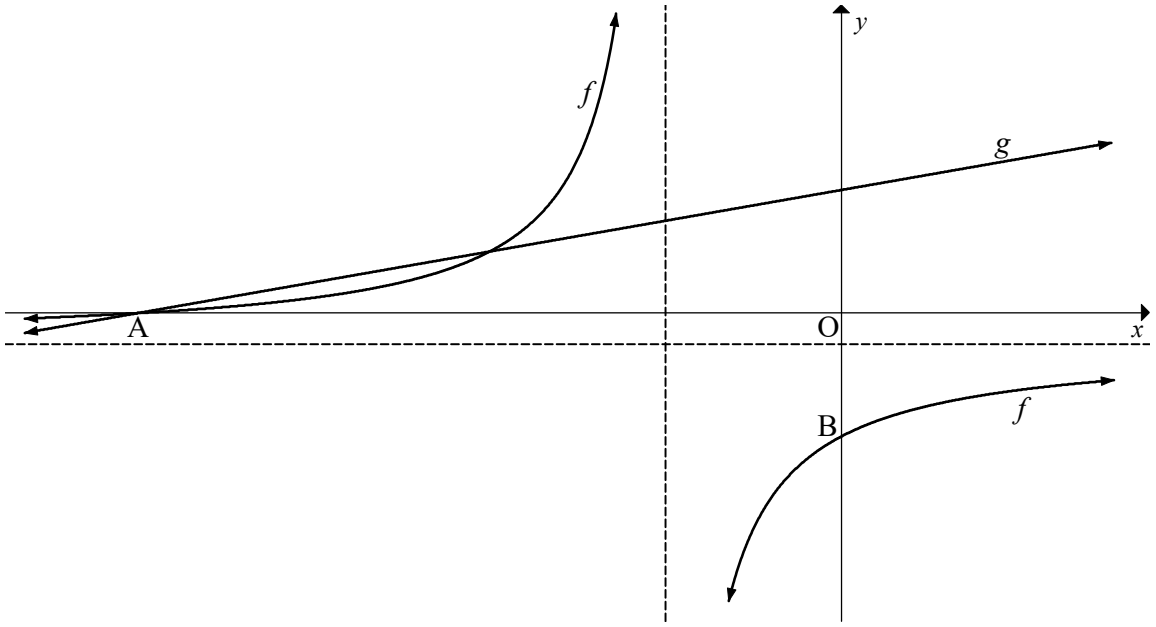
4.9 T' is the image of T on h. Sketch the graph of $h^{-1}(x)$. Indicate clearly on your graph the intercepts with the axes, the coordinates of T'', the image of T' on $h^{-1}(x)$ and any asymptotes. (3)

[21]

QUESTION 5

The graphs of $f(x)=\frac{-6}{x+2}-1$ and $g(x)=\frac{1}{2}x+4$ are drawn below.

A and B are the x- and y-intercepts of f respectively. A is also a point of intersection of f and g.



5.1 Write down the domain of f. (1)

5.2 Calculate the coordinates of:

5.2.1 B (1)

5.2.2 A (2)

5.3 h is the axis of symmetry of f that has a positive gradient. Determine the equation of h in the form $h(x) = \ldots$ (2)

5.4 Calculate the coordinates of the point of intersection of g and h. (3)

5.5 Use the graphs to determine the values of x for which $f(x)+g(x)\geq 0$ (3)

5.6 A right-angled triangle is created, having A as one of its vertices, D$(k\,;0)$ as another vertex and g as one of its sides. Calculate the values of k when the area of the right-angled triangle is 64 units^2. (4)

[16]

QUESTION 6

6.1 On 1 January 2025, the balance in Ben's savings account was R75 000. This savings account earns interest at $r\%$ p.a., compounded half-yearly. Calculate the value of r if Ben will have R85 000 in the account on 1 January 2027. (3)

6.2 William wants to buy a house. The bank requires William to pay a deposit of 10% of the purchase price of the house. The bank will grant William a loan to cover the outstanding amount, subject to the following conditions:

- The loan is to be repaid over 20 years.
- Interest on the loan is fixed at 11,5% p.a., compounded monthly.
- An instalment of R10 665 is payable at the end of each month after the loan has been granted, starting one month after the loan has been granted.

6.2.1 Calculate the deposit required on the purchase price of the house. (5)

6.2.2 After negotiating with the seller, it was agreed that the purchase price of the house will be R1 100 000. William decides to pay a deposit of R120 000 and a monthly instalment of R11 000 at the end of each month, starting one month after the loan has been granted.

(a) How long (in years) will it take for him to pay off the loan? (5)

(b) How much will William have paid in total towards the purchase of the house at the end of 16 years after the loan was granted? (3)

[16]

QUESTION 7

7.1 Determine $f'(x)$ from first principles if it is given that $f(x) = x^2 + 2x$ (5)

7.2 Determine:

7.2.1 $f'(x)$ if $f(x) = x^2 - x - 6$ (2)

7.2.2 $\dfrac{d}{dx}\left(\sqrt[3]{27x^4} + \dfrac{2}{x^3}\right)$ (4)

7.3 The graph of $k(x) = 2x^3 + bx^2 + cx + d$ has turning points at $x = -2$ and $x = 0$. Determine the values of x for which:

7.3.1 $k'(x) = 0$ (1)

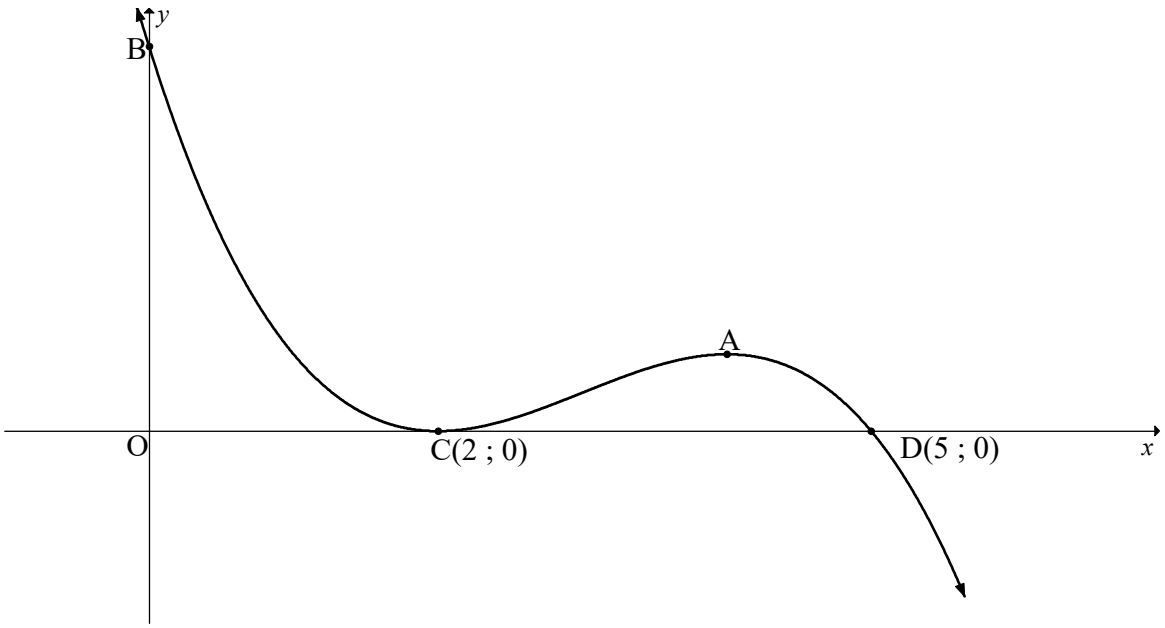
7.3.2 $k''(x) < 0$ (2)

7.3.3 $k'(x - 3) > 0$ (2)

[16]

QUESTION 8

The graph of $h(x) = -x^3 + px^2 + qx + r$ is drawn below. C(2 ; 0) and D(5 ; 0) are the x-intercepts and B is the y-intercept of h. A and C are the turning points of h.



8.1 Show that $p = 9$, $q = -24$ and $r = 20$ (3)

8.2 Write down the length of OB. (1)

8.3 Calculate the coordinates of the point of inflection of h. (4)

8.4 Determine the equation of the tangent to h that has an angle of inclination of $96,34°$ and touches h between B and C. (5)
[13]

QUESTION 9

The oxygen content in the water, t days after organic waste was dumped into a lake, can be represented by $C(t) = \frac{1}{1\ 200}\left(t^3 - 15t^2 + 1\ 200\right)$ for $0 \le t \le 15$

9.1 What was the initial oxygen content in the lake at the time that organic waste was dumped? (2)

9.2 When will the oxygen content be at the lowest level? (3)

9.3 Calculate the value of t for which the rate of change of oxygen content is a maximum. (2)
[7]

QUESTION 10

10.1 Dr Calculus's wardrobe has:

TIES	TROUSERS	SHIRTS
6 blue	1 blue	3 red
4 red	1 black	2 pink
5 green	1 brown	4 white
	1 grey	3 blue
		4 green

10.1.1 An outfit comprises a tie, trousers and shirt. How many different outfits are possible from the items in the wardrobe? (1)

10.1.2 How many different outfits are possible if Dr Calculus does not wear red and pink at the same time? (2)

10.1.3 Calculate the probability that only blue and black items will be used in an outfit. (2)

10.2 A survey was conducted among 54 people to determine which of the three types of tea (A, B or C) they drank. The results are summarised below.

- Some people did not drink any tea at all.
- P(drinking types A and B and C) = $\frac{7}{54}$
- 9 people drank types B and C.
- 2 people drank types A and B but not type C.
- 18 people drank type B.
- No-one drank types A and C but not type B.
- Drinking type A is independent from drinking type B.
- P(not drinking type (A or B)) = 2P(not drinking types (A or B or C)).

10.2.1 Calculate how many people drank type A tea. (3)

10.2.2 Use the given information to complete the Venn diagram provided in the ANSWER BOOK. (6)
[14]

TOTAL: 150

INFORMATION SHEET

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

$$A = P(1+ni) \qquad A = P(1-ni) \qquad A = P(1-i)^n \qquad A = P(1+i)^n$$

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

$$T_n = ar^{n-1} \qquad S_n = \frac{a(r^n - 1)}{r-1} \;; r \neq 1 \qquad S_\infty = \frac{a}{1-r} \;; -1 < r < 1$$

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

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

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \qquad \text{M}\left(\frac{x_1 + x_2}{2}; \frac{y_1 + y_2}{2}\right)$$

$$y = mx + c \qquad y - y_1 = m(x - x_1) \qquad m = \frac{y_2 - y_1}{x_2 - x_1} \qquad m = \tan\theta$$

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

In ΔABC: $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

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

$$area\ \Delta ABC = \frac{1}{2}ab.\sin C$$

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

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

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

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

$$P(A) = \frac{n(A)}{n(S)} \qquad P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$$

$$\hat{y} = a + bx \qquad b = \frac{\sum(x - \bar{x})(y - \bar{y})}{\sum(x - \bar{x})^2}$$

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SENIORSERTIFIKAAT-EKSAMEN/
NASIONALE SENIORSERTIFIKAAT-EKSAMEN

MATHEMATICS P1/*WISKUNDE V1*

MAY/JUNE/*MEI/JUNIE* 2026

MARKING GUIDELINES/*NASIENRIGLYNE*

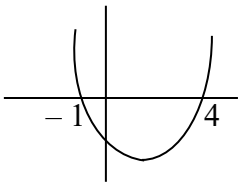
MARKS/*PUNTE*: 150

These marking guidelines consist of 15 pages.
Hierdie nasienriglyne bestaan uit 15 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, sien slegs die EERSTE poging na.*
- *Volgehoue akkuraatheid is DEURGAANS op ALLE aspekte van die nasienriglyne van toepassing.*

QUESTION1/*VRAAG* 1

1.1.1	$x^2-9=0$ $(x-3)(x+3)=0$ **OR/*OF*** $x^2=9$ $\therefore x=3$ or $x=-3$ $\therefore x=3$ or $x=-3$	✓ factors/root/formula ✓ both answers (2)
1.1.2	$2x^2+3x-7=0$ $x=\dfrac{-3\pm\sqrt{(3)^2-4(2)(-7)}}{2(2)}$ $x=\dfrac{-3\pm\sqrt{65}}{4}$ $\therefore x=1,27$ or $x=-2,77$	✓ correct substitution into correct formula ✓ answer ✓ answer (3)
1.1.3	$-x^2+3x>-4$ $-x^2+3x+4>0$ $x^2-3x-4<0$ $(x-4)(x+1)<0$ cv's: 4 ; -1  $-1<x<4$ **OR/*OF*** $x\in(-1\,;\,4)$	✓ standard form ✓ critical values ✓✓ answer (4)
1.1.4	$\sqrt{7x+2}+2x=8$ $\sqrt{7x+2}=8-2x$ $\left(\sqrt{7x+2}\right)^2=(8-2x)^2$ $7x+2=64-32x+4x^2$ $4x^2-39x+62=0$ $(4x-31)(x-2)=0$ $\therefore x\neq\dfrac{31}{4}$ or $x=2$	✓ isolating surd ✓ squaring both sides ✓ standard form ✓ answers with rejection (4)

1.2	$\frac{2^x.2^y}{4}=1$ $2^x.2^y=2^2$ $2^{x+y}=2^2$ $\therefore x+y=2$ $y=2-x \quad \ldots.(1)$ $-2x^2+3xy=y^2 \quad \ldots(2)$ $-2x^2+3x(2-x)=(2-x)^2$ $-2x^2+6x-3x^2=4-4x+x^2$ $-6x^2+10x-4=0$ $3x^2-5x+2=0$ $(3x-2)(x-1)=0$ $x=\frac{2}{3}$ or $x=1$ $y=\frac{4}{3}$ or/of $y=1$ **OR/*OF*** $\frac{2^x.2^y}{4}=1$ $2^x.2^y=2^2$ $2^{x+y}=2^2$ $\therefore x+y=2$ $x=2-y \quad \ldots.(1)$ $-2x^2+3xy=y^2 \quad \ldots(2)$ $-2(2-y)^2+3(2-y)y=y^2$ $-8+8y-2y^2+6y-3y^2=y^2$ $-6y^2+14y-8=0$ $3y^2-7y+4=0$ $(3y-4)(y-1)=0$ $y=\frac{4}{3}$ or/of $y=1$ $x=\frac{2}{3}$ or/of $x=1$	✓ exponential law ✓ isolating y ✓ substitution ✓ standard form ✓ both x-values ✓ both y-values (6) **OR/*OF*** ✓ exponential law ✓ isolating x ✓ substitution ✓ standard form ✓ both y-values ✓ both x-values (6)
1.3	$\left(\sqrt{6p}+\sqrt[4]{128}\right)\left(\sqrt{6p}-\sqrt[4]{128}\right)=54+a\sqrt{2}$ $6p-\sqrt{128}=54+a\sqrt{2}$ $6p-8\sqrt{2}=54+a\sqrt{2}$ $\therefore 6p=54$ and $a=-8$ $p=9$ and $a=-8$ $a-p=-8-9$ $\therefore a-p=-17$	✓ expansion ✓ equating parts ✓ values ✓ answer (4)
		[23]

QUESTION/*VRAAG* 2

2.1.1	$6+(n-1)(4)=602$ $4n+2=602$ $4n=600$ $\therefore n=150$	✓ equating ✓ answer (2)
2.1.2	$S_n=\frac{n}{2}[2(6)+(n-1)(4)]$ $S_n=\frac{n}{2}[12+4n-4]$ $S_n=\frac{n}{2}[4n+8]$ $S_n=2n^2+4n$	✓ substitution ✓ simplification (2)
2.1.3	$S_{150}-S_{99}$ $=2(150)^2+4(150)-2(99)^2-4(99)$ $=25\ 602$ **OR/*OF*** $402+406+\ldots+602$ $S_{51}=\frac{51}{2}[402+602]$ or $S_{51}=\frac{51}{2}[2(402)+(51-1)(4)]$ $S_{51}=25\ 602$	✓ substitution ✓ answer (2) **OR/*OF*** ✓ substitution ✓ answer (2)
2.2.1	QP: -1 ; $-4x$; 11 ; $2x+12$; … FD: $-4x+1$ $11+4x$ $2x+1$ SD: $10+8x$ $-2x-10$ $10+8x=-2x-10$ $10x=-20$ $\therefore x=-2$	✓ first differences ✓ second differences ✓ equating ✓ answer (4)
2.2.2	-1 ; 8 ; 11 ; 8 ; … 9 3 -3 -6 -6 $2a=-6$ $3(-3)+b=9$ $-3+18+c=-1$ $a=-3$ $b=18$ $c=-16$ $\therefore T_n=-3n^2+18n-16$	✓ $2a=-6$ ✓ $3(-3)+b=9$ ✓ $-3+18+c=-1$ (3)

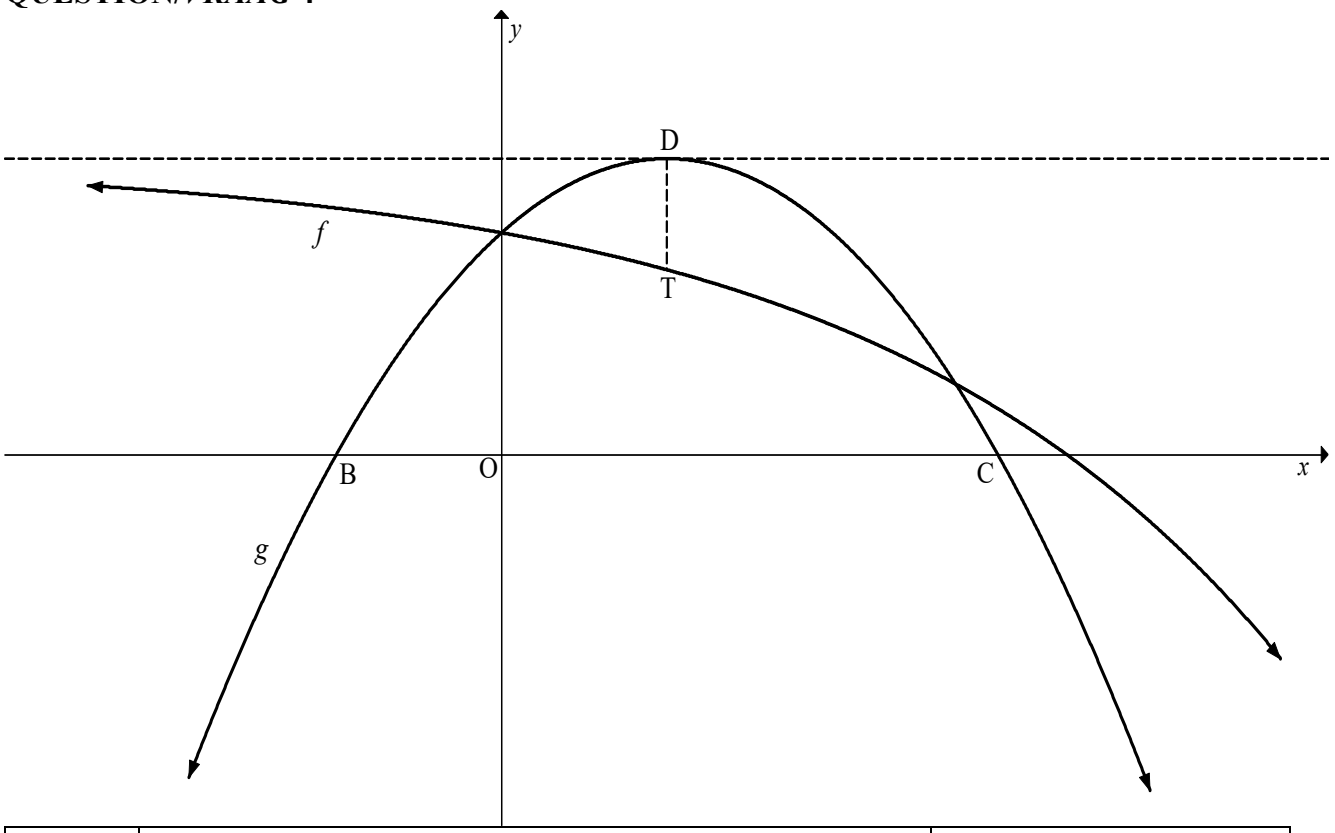
 Please turn over/Blaai om asseblief

2.2.3	$S_n = \frac{n}{2}\left[2a + (n-1)d\right]$ $\frac{n}{2}\left[2(9) + (n-1)(-6)\right] < -1\,380$ $n\left[18 - 6n + 6\right] < -2\,760$ $-6n^2 + 24n < -2\,760$ $-6n^2 + 24n + 2\,760 < 0$ $6n^2 - 24n - 2\,760 > 0$ $n^2 - 4n - 460 > 0$ $n > 23{,}54 \quad$ or $\quad n < -19{,}54$ n.a From n = 24, the sum of the first differences will be smaller than – 1 380	✓ substitution in S_n ✓ standard form ✓ answer with selection ✓ answer (4)
		[17]

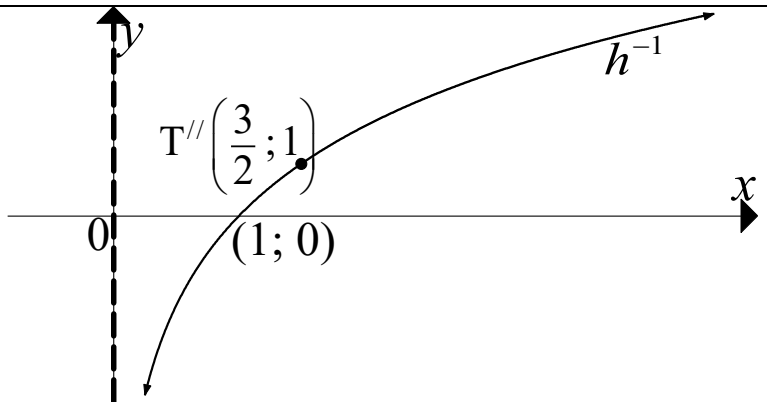
QUESTION/*VRAAG* 3

3.1	**Clock A:** 9:00 ; 9:05 ; 9:10 ; 9:15 **Clock B:** $9{:}00 \;;\; 9{:}00 + (2{,}5) \;;\; 9{:}00 + \left(\frac{1}{2}\right)(2{,}5) \;;\; 9{:}00 + \left(\frac{1}{2}\right)^2 (2{,}5)$ $S_{12} = \frac{\frac{5}{2}\left[\left(\frac{1}{2}\right)^{12} - 1\right]}{\frac{1}{2} - 1}$ $S_{12} = 4{,}998....$ $\therefore$ time on clock B will read 9:05	✓ $n = 12$ ✓ $a = 2{,}5 = \frac{5}{2}$ ✓ $r = 0{,}5 = \frac{1}{2}$ in S_n ✓ answer ✓ time on clock B (5)
3.2	$S_\infty = \frac{a}{1-r}$ $S_\infty = \frac{2{,}5}{1 - 0{,}5}$ $S_\infty = 5$ Clock B will never reach the time of 9:06 because the sum to infinity is 5.	✓ $S_\infty = 5$ ✓ Never reach 9:06 (2)
		[7]

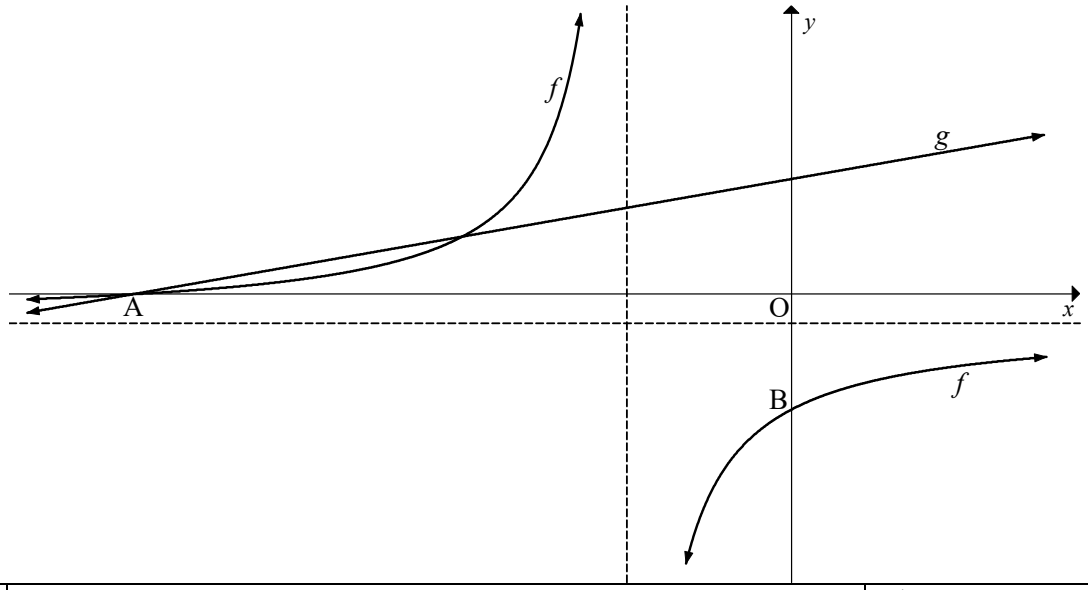
QUESTION/*VRAAG* 4



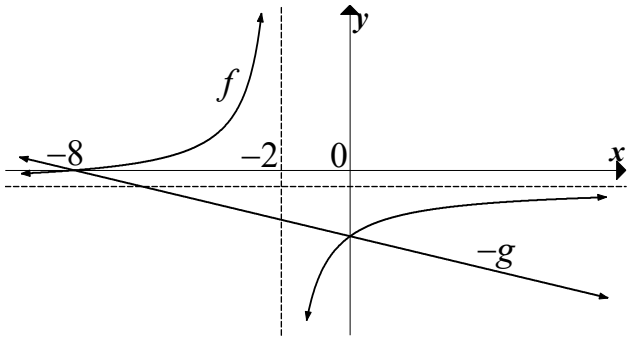
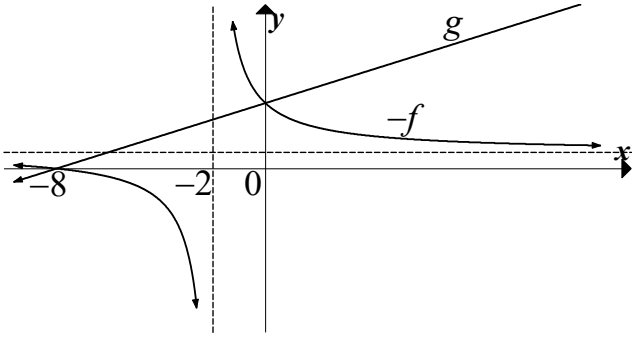
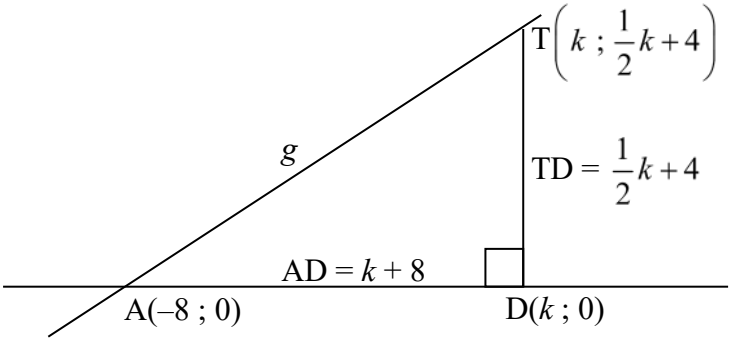
4.1	$g(x)=-x^2+2x+3$ $x=\frac{-b}{2a}=\frac{-2}{2(-1)}=1$ or $g(x)=-\left(x^2-2x\right)+3$ $g(x)=-\left(x^2-2x+1\right)+3+1$ $g(1)=-1^2+2(1)+3=4$ $g(x)=-(x-1)^2+4$ D(1 ; 4) **OR/*OF*** $g'(x)=-2x+2=0$ $2x=2$ $x=1$ $g(1)=-1^2+2(1)+3=4$ D(1 ; 4)	✓ method ✓ x-value ✓ y-value (3) **OR/*OF*** ✓ method ✓ x-value ✓ y-value (3)
4.2	$x<1$ **OR/*OF*** $x\in(-\infty;1)$	✓ answer (1)
4.3	$-x^2+2x+3=0$ $x^2-2x-3=0$ $(x-3)(x+1)=0$ $x=3$ or $x=-1$	✓ $=0$ ✓ $x=3$ ✓ $x=-1$ (3)
4.4	$3<k<4$ **OR/*OF*** $k\in(3;4)$	✓✓answer (2)
4.5	$y<4$ **OR/*OF*** $y\in(-\infty;4)$	✓answer (1)

4.6	DT $= \frac{3}{2}$ units T $= \left(1;\frac{5}{2}\right)$ $y = -a^x + 4$ $\frac{5}{2} = -a^1 + 4$ $5 = -2a + 8$ $\frac{3}{2} = a$ $\therefore f(x) = -\left(\frac{3}{2}\right)^x + 4$ **OR/*OF*** $y_g - y_f = \frac{3}{2}$ $4 - (-a + 4) = \frac{3}{2}$ $\therefore a = \frac{3}{2}$	✓ $\left(1;\frac{5}{2}\right)$ ✓ q ✓ substitute $\left(1;\frac{5}{2}\right)$ ✓ a (4) **OR/*OF*** ✓ $y_g - y_f = \frac{3}{2}$ ✓ q ✓ substitute: $4-(-a+4)$ ✓ a (4)
4.7	for every x-value there is a unique corresponding y – value **OR/*OF*** f is one to one relation	✓ answer (1) **OR/*OF*** ✓ answer (1)
4.8	$h(x) = -f(x) + 4$ $h(x) = \left(\frac{3}{2}\right)^x$ $x = \left(\frac{3}{2}\right)^y$ $h^{-1}(x) = \log_{\frac{3}{2}} x$	✓ $h(x) = \left(\frac{3}{2}\right)^x$ ✓ swopping of x and y ✓ answer (3)
4.9		✓ x -intercept ✓ T// ✓ increasing log graph (3)
		[21]

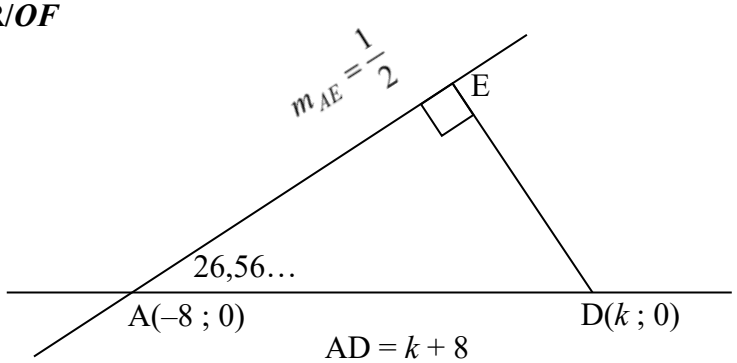
QUESTION/*VRAAG* 5



5.1	$x \neq -2\ ;\ x \in R$	✓ answer (1)
5.2.1	$\frac{-6}{0+2}-1=y$ $y=-4$ B(0 ; –4)	✓ answer (1)
5.2.2	$\frac{-6}{x+2}-1=0$ $-6=1(x+2)$ $\therefore x=-8$ A(–8 ; 0) **OR/*OF*** $\frac{1}{2}x+4=0$ $x=-8$ A(–8 ; 0)	✓ $y=0$ ✓ answer (2) **OR/*OF*** ✓ $y=0$ ✓ answer (2)
5.3	$y=x+c$ $-1=(-2)+c$ $c=1$ $\therefore y=x+1$	✓substitute ✓ answer (2)
5.4	$x+1=\frac{1}{2}x+4$ $\frac{1}{2}x=3$ $x=6$ The point is (6 ; 7)	✓equating ✓ x - value ✓ y - value (3)

5.5	Graphs of f and $-g$  Graphs of $-f$ and g  $f(x) \geq -g(x)$ $-8 \leq x < -2$ or $x \geq 0$ **OR/*OF*** $[-8\,;-2)$ or $[0\,;\infty)$	✓✓ first interval ✓ second interval (3)
5.6	 Area $= \frac{1}{2}$base × height $64 = \frac{1}{2}(k+8)\left(\frac{1}{2}k+4\right)$ $\left(\frac{1}{2}k+4\right)^2 = 64$ or $k^2+6k-192=0$ $\frac{1}{2}k+4 = \pm 8$ or $(k-8)(k+24)=0$ $k=8$ or $k=-24$	✓ base $(k+8)$ ✓ height $\left(\frac{1}{2}k+4\right)$ ✓ substitution into area formula ✓ answer (4)

OR/*OF*



$AD = k + 8$

$\tan E\hat{A}D = \frac{1}{2}$ $\quad E\hat{A}D = 26,56...°$

$\frac{AE}{AD} = \cos 26,57...°$ $\quad AE = (k+8)\cos 26,56...°$

$\text{area} = \frac{1}{2}AD.AE.\sin 26,56...°$

$64 = \frac{1}{2}(k+8).(k+8)\cos 26,56...°.\sin 26,56...°$

$(k+8)^2 = 320$

$k + 8 = \pm 8\sqrt{5}$

$k = -8 \pm 8\sqrt{5}$

✓ base $(k+8)$

✓ $AE = (k+8)\cos 26,56...°$

✓ substitution into area formula

✓ answer

(4)

[16]

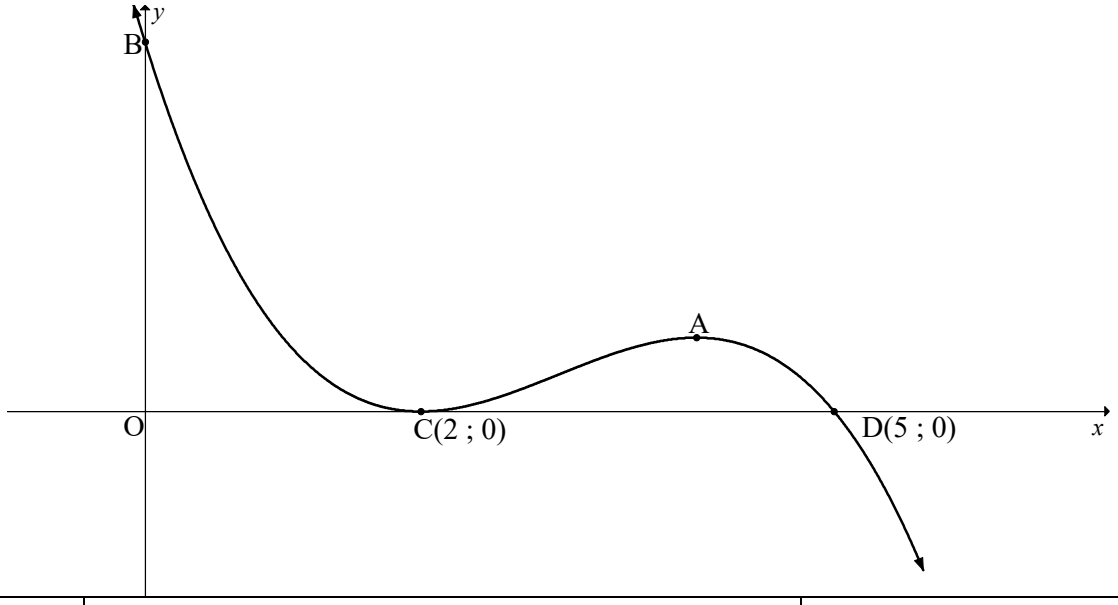
QUESTION/*VRAAG* 6

6.1	$A = P(1+i)^n$ $85\,000 = 75\,000\left(1+\frac{r}{200}\right)^{2\times 2}$ or $85\,000 = 75\,000\left(1+\frac{i}{2}\right)^{2\times 2}$ $\frac{17}{15} = \left(1+\frac{r}{200}\right)^4$ $\frac{17}{15} = \left(1+\frac{i}{2}\right)^4$ $\sqrt[4]{\frac{17}{15}} = 1+\frac{r}{200}$ $\sqrt[4]{\frac{17}{15}} = 1+\frac{i}{2}$ $0,03178... = \frac{r}{200}$ $0,03178... = \frac{i}{2}$ $r = 6,36\%$	✓ exponent = 4 ✓ substitution of A and P into the correct formula ✓answer (3)
6.2.1	$P = \frac{x\left[1-(1+i)^{-n}\right]}{i}$ $P = \frac{10\,665\left[1-\left(1+\frac{0,115}{12}\right)^{-240}\right]}{\frac{0,115}{12}}$ $P = \text{R}1\,000\,065,985$ Deposit $= \frac{1\,000\,065,985}{9} = \text{R}111\,118,44$	✓ $i = \frac{0,115}{12}$ ✓ $n = 240$ ✓substitute into correct formula ✓answer ✓answer (5)
6.2.2 (a)	$P_v = \text{House Price} - \text{deposit}$ $P_v = \text{R}1\,100\,000 - \text{R}120\,000 = \text{R}\,980\,000$ $P_v = \frac{x\left[1-(1+i)^{-n}\right]}{i}$ $980\,000 = \frac{11\,000\left[1-\left(1+\frac{0,115}{12}\right)^{-n}\right]}{\frac{0,115}{12}}$ $\frac{-193}{1320} = -\left(1+\frac{0,115}{12}\right)^{-n}$ $-n = \log_{\left(1+\frac{0,115}{12}\right)}\left(\frac{193}{1320}\right)$ $\therefore n = 201,59$ months $\therefore n = 16,80$ years (16 years and 10 months)	✓ Loan value ✓ substitute into correct formula ✓ simplification ✓ correct use of logs ✓ answer in years (5)
6.2.2 (b)	Amount paid = R 11 000 × 16 × 12 + R120 000 = R 2 232 000	✓ instalment × years × 12 ✓+ deposit ✓answer (3)
		[16]

QUESTION/*VRAAG* 7

7.1	$f'(x)=\lim\limits_{h\to 0}\dfrac{f(x+h)-f(x)}{h}$ $f'(x)=\lim\limits_{h\to 0}\dfrac{(x+h)^2+2(x+h)-(x^2+2x)}{h}$ $f'(x)=\lim\limits_{h\to 0}\dfrac{x^2+2xh+h^2+2x+2h-x^2-2x}{h}$ $f'(x)=\lim\limits_{h\to 0}\dfrac{2xh+h^2+2h}{h}$ $f'(x)=\lim\limits_{h\to 0}\dfrac{h(2x+h+2)}{h}$ $f'(x)=\lim\limits_{h\to 0}(2x+h+2)$ $f'(x)=2x+2$ **OR/*OF*** $f(x+h)=x^2+2xh+h^2+2x+2h$ $f(x+h)-f(x)=x^2+2xh+h^2+2x+2h-x^2-2x$ $=2xh+h^2+2h$ $f'(x)=\lim\limits_{h\to 0}\dfrac{f(x+h)-f(x)}{h}$ $f'(x)=\lim\limits_{h\to 0}\dfrac{2xh+h^2+2h}{h}$ $f'(x)=\lim\limits_{h\to 0}\dfrac{h(2x+h+2)}{h}$ $f'(x)=\lim\limits_{h\to 0}(2x+h+2)$ $f'(x)=2x+2$	✓$f(x+h)$ ✓substitution ✓simplification ✓common factor ✓answer (5) **OR/*OF*** ✓$f(x+h)$ ✓simplification ✓substitution ✓common factor ✓answer (5)
7.2.1	$f(x)=x^2-x-6$ $f'(x)=2x-1$	✓$2x$ ✓-1 (2)
7.2.2	$\dfrac{d}{dx}\left(\sqrt[3]{27x^4}+\dfrac{2}{x^3}\right)$ $\dfrac{d}{dx}\left(3x^{\frac{4}{3}}+2x^{-3}\right)$ $=4x^{\frac{1}{3}}-6x^{-4}$	✓$3x^{\frac{4}{3}}$ ✓$2x^{-3}$ ✓$4x^{\frac{1}{3}}$ ✓$-6x^{-4}$ (4)
7.3.1	$x=-2$ or $x=0$	✓ answers (1)
7.3.2	$x<-1$ **OR/*OF*** $x\in(-\infty;-1)$	✓-1 ✓$x<-1$ (2)
7.3.3	$x<1$ or $x>3$ **OR/*OF*** $x\in(-\infty;1)$ or $x\in(3;\infty)$	✓ answer ✓ answer (2)
		[16]

QUESTION/*VRAAG* 8

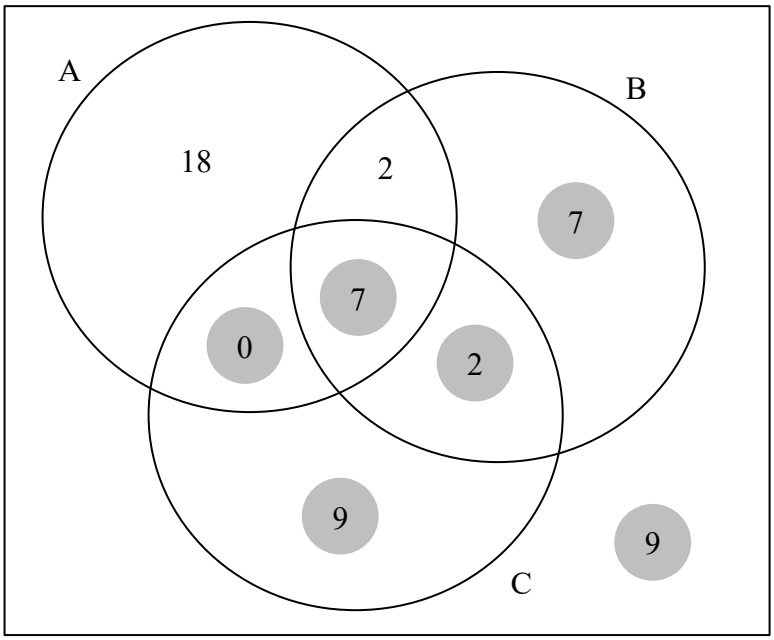


8.1	$h(x)=-1(x-2)^2(x-5)$ $h(x)=(-x^2+4x-4)(x-5)$ $h(x)=-x^3+9x^2-24x+20$ $\therefore p=9\ ;\ q=-24\ ;\ r=20$	✓ $(x-2)^2$ ✓ $(x-5)$ ✓ expansion (3)
8.2	B (0 ; 20) OB = 20 units	✓ OB = 20 (1)
8.3	$h'(x)=-3x^2+18x-24$ $h''(x)=-6x+18$ $-6x+18=0$ $-6x=-18$ $x=3$ $\therefore$ point of inflection is (3;2)	✓ $-3x^2+18x-24$ ✓ $h''(x)$ ✓ value of x ✓ value of y (4)
8.4	$m=\tan 96{,}34°$ $m=-9$ $-9=-3x^2+18x-24$ $x^2-6x+5=0$ $(x-5)(x-1)=0$ $x=5$ or $x=1$ point of contact: (1 ; 4) $(4)=-9(1)+c$ **OR/*OF*** $y-4=-9(x-1)$ $c=13$ $\therefore y=-9x+13$ $\therefore y=-9x+13$	✓ $m=-9$ ✓ equating gradients ✓ answer for x ✓ $f(1)=4$ ✓ answer (5)
		[13]

QUESTION/*VRAAG* 9

9.1	$C(0)=\frac{1}{1200}\left((0)^3-15(0)^2+1\,200\right)$ $C(0)=1$	✓ $t=0$ ✓ answer (2)
9.2	$C(t)=\frac{1}{1200}t^3-\frac{1}{80}t^2+1$ $C'(t)=\frac{1}{400}t^2-\frac{1}{40}t=0$ $t^2-10t=0$ $t(t-10)=0$ $t=0$ or/of $t=10$ $\therefore$ minimum is at $t=10$ days	✓ $C'(t)$ ✓ $=0$ ✓ answer (3)
9.3	$C''(t)=\frac{1}{200}t-\frac{1}{40}=0$ $t-5=0$ $\therefore t=5$ days **OR/*OF*** $t=\frac{10+0}{2}$ $t=5$ **OR/*OF*** Rate of change at the endpoint $t=15$ is the actual maximum on the domain $t\in[0\,;15]$	✓ $C''(t)$ ✓ answer (2) **OR/*OF*** ✓ method ✓ answer (2) **OR/*OF*** ✓✓ answer (2)
		[7]

QUESTION/*VRAAG* 10

10.1.1	$15 \times 4 \times 16 = 960$	✓$15 \times 4 \times 16$ (1)
10.1.2	$960 - 4 \times 4 \times 2 = 928$ **OR/*OF*** $(15)(4)(14)+(11)(4)(2)$ $=840+88$ $=928$	✓$4 \times 4 \times 2$ ✓answer (2) **OR/*OF*** ✓$(15)(4)(14)+(11)(4)(2)$ ✓answer (2)
10.1.3	P(only blue and black) $= \frac{6\times2\times3}{960} = \frac{3}{80} = 0,0375$	✓$6 \times 2 \times 3$ ✓ ÷ by n(s) (2)
10.2.1	P(A and B) = P(A) × P(B) $\frac{9}{54} = \frac{x}{54} \times \frac{18}{54}$ Number of people who drink tea A = 27	✓ rule for independence ✓$\frac{9}{54}$ ✓ answer (3)
10.2.2		✓ only A and C = 0 ✓ A and B and C ✓ only B and C ✓ only B ✓ only C ✓ complement of A or B or C (6)
		[14]

TOTAL/*TOTAAL*: 150