Province of the
EASTERN CAPE
EDUCATION

NATIONAL SENIOR CERTIFICATE

GRADE 10

NOVEMBER 2019

MATHEMATICS P1 (EXEMPLAR)

MARKS: **100**

TIME: **2 hours**

This question paper consists of 8 pages.

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. This paper consists of SEVEN questions.
2. Answer ALL the questions.
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 answers off to TWO decimal places, unless stated otherwise.
7. Diagrams are NOT necessarily drawn to scale.
8. Write neatly and legibly.

QUESTION 1

1.1 Given the expression: $P = \sqrt{\frac{-5}{x-2}}$. For which values of x will P be:

1.1.1 Undefined (1)

1.1.2 Real (2)

1.2 Simplify the following expressions fully. Leave your answers with a positive exponent where necessary.

1.2.1 $(a-2)(a^2+2a+4)$ (2)

1.2.2 $\left(\frac{a}{2}+1\right)\left(\frac{a}{2}-1\right)$ (2)

1.3 Factorise the following expressions fully:

1.3.1 $2x^2 - x - 6$ (2)

1.3.2 $a^2 - 2ab + b^2 - 100c^2$ (3)

[12]

QUESTION 2

2.1 Solve for x:

$x^2 = -5x$ (3)

2.2 Given: $V = \frac{4}{3}\pi(R^3 - r^3)$

Make r the subject of the formula. (5)

2.3 Solve for x if $2(4-3x) \geq 20$ (3)

2.4 Solve the following equations simultaneously for a and b:

$a + b = 12$ and $4a + 2b = 44$ (5)

2.5 Sipho is 7 times older than his son. In 25 years' time, he will be twice as old as his son. By formulating and solving an equation in x, calculate his son's present age. (5)

[21]

QUESTION 3

3.1 Consider the pattern: – 1; 2; 5; 8; …….. ;116

3.1.1 Write down T_4 and T_5 of the number pattern. (2)

3.1.2 Write down the general formula for the n^{th} term of the sequence. (2)

3.1.3 Determine the value of the 33rd term of the sequence. (2)

3.1.4 How many terms are there in the sequence if the last term is equal to 116? (3)

3.2 A linear number pattern with a constant difference can be represented by the terms: $x+3;\ 3x+2;\ 6x-1$. Determine the numerical value x AND the numerical value of the 3rd term. (5)

[14]

QUESTION 4

4.1 In June 2019, the pound to rand exchange rate was £1 = R18,18. Zola, travelled to the United Kingdom to watch some WWE wrestling matches. The total cost needed for the trip was £3 569. Convert this amount into rands. (1)

4.2 Sipho bought a brand-new Ford Ranger in April 2015 on hire purchase at a cost of R379 000. He agreed on paying 15% deposit and took out a loan for the remaining balance at an interest rate of 22,5%.

4.2.1 How much deposit did Sipho pay? (1)

4.2.2 Hence, calculate the initial value of the loan. (1)

4.2.3 Calculate the value of the loan with interest in April 2019. (3)

4.2.4 Calculate the monthly instalments if he paid off the loan after the four-year period. (2)

4.3 A sum of money was invested 6 years ago, earning interest at a rate of 6,7% p.a. compounded annually. The investment is currently worth R 96 714,02. Calculate how much was originally invested 6 years ago. (3)

[11]

QUESTION 5

5.1 Given: $f(x)=\frac{1}{2}x+2$ en $g(x)=2^x-1$

5.1.1 Write down the equation of the asymptote of *g*. (1)

5.1.2 Sketch the graph of f and g on the same set of axes, using the diagram sheet on the last page. Label all relevant points (4)

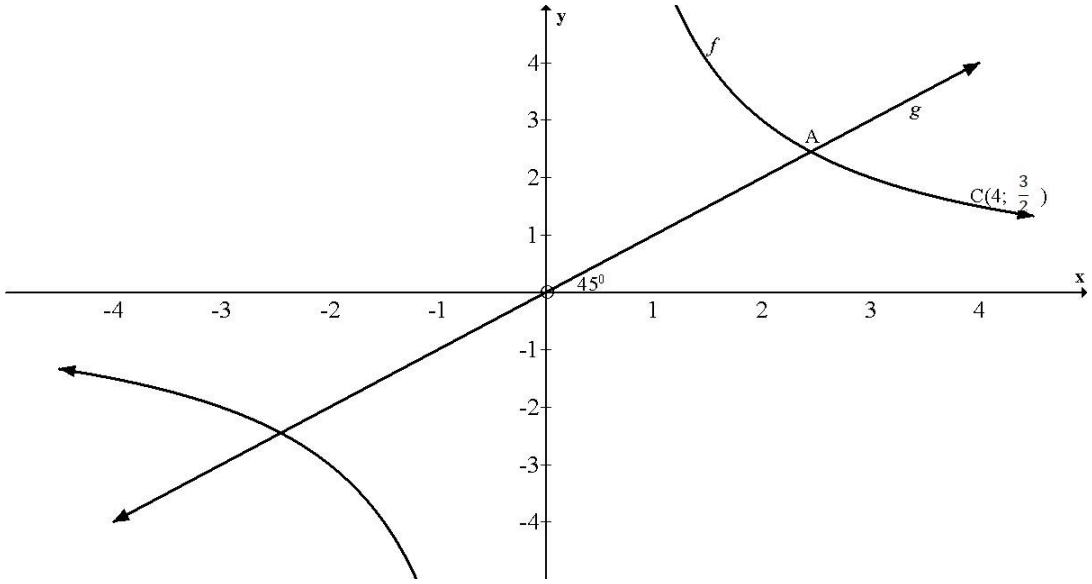
5.1.3 Using your graph, write down the coordinates of ONE point of intersection of f en g in the first quadrant. (2)

5.1.4 Write down the equation of *h(x)* if *h(x)* is a reflection of *g(x)* along the *y*-axis. (1)

5.1.5 What is the range of *f(x)*? (1)

5.1.6 Determine the value(s) of *x* for which $f(x).g(x) \geq 0$ (2)

5.2 In the figure below, the sketch graphs of *f* and *g* are given. $C\left(4;\frac{3}{2}\right)$ is a point on the graph of f and A is a point where *f* and *g* intersect. The angle between line *g* and the *x*-axis is 45º.



5.2.1 Write down the gradient of g. (1)

5.2.2 What is the equation of g? (1)

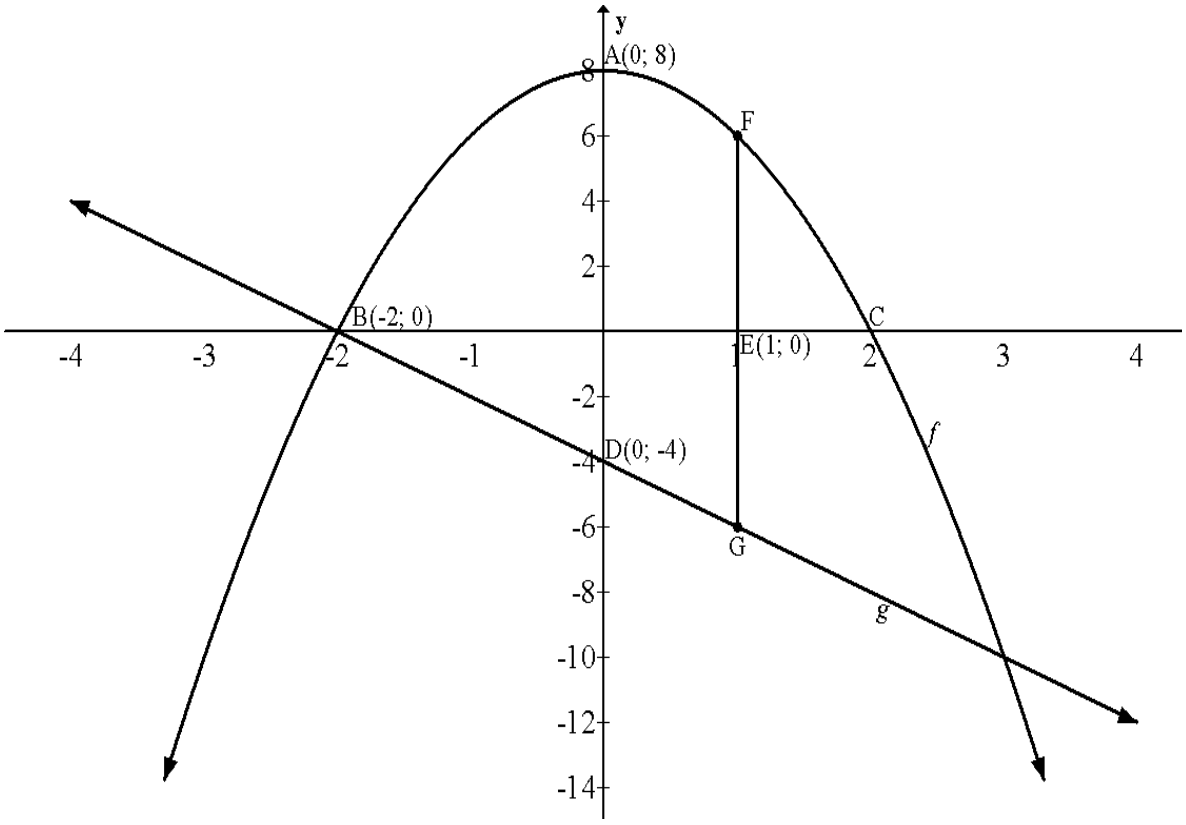
5.2.3 Determine the equation of f. (2)

5.2.4 Determine the coordinates of A, if A is the closest point to the origin. (2)

[17]

QUESTION 6

Given the following diagram.



6.1 Determine the equations of the graphs of f and g shown above. (5)

6.2 FG is parallel to the y-axis. Determine the length of the vertical line FG. (3)

6.3 Write down the range of f. (2)

6.4 Determine the value(s) of x for which $f(x) > 0$. (2)

[12]

QUESTION 7

7.1 A letter is chosen at random from the word ALGEBRA. What is the probability that the chosen letter is:

7.1.1 The letter A? (1)

7.1.2 A consonant? (1)

7.2 In a class of 30 learners in Grade 10, the following information is given:

- 5 learners are right-handed.
- 12 learners play soccer
- 3 learners play soccer and are right-handed

Let R be the set of all right-handed learners and S be the set of all learners who play soccer.

7.2.1 Draw a Venn diagram to represent the above information. (5)

7.2.2 Are the events 'Plays soccer' and 'Right-handed' mutually exclusive? Give a reason for your answer. (2)

7.2.3 How many learners in the class are left-handed and do not play soccer? (2)

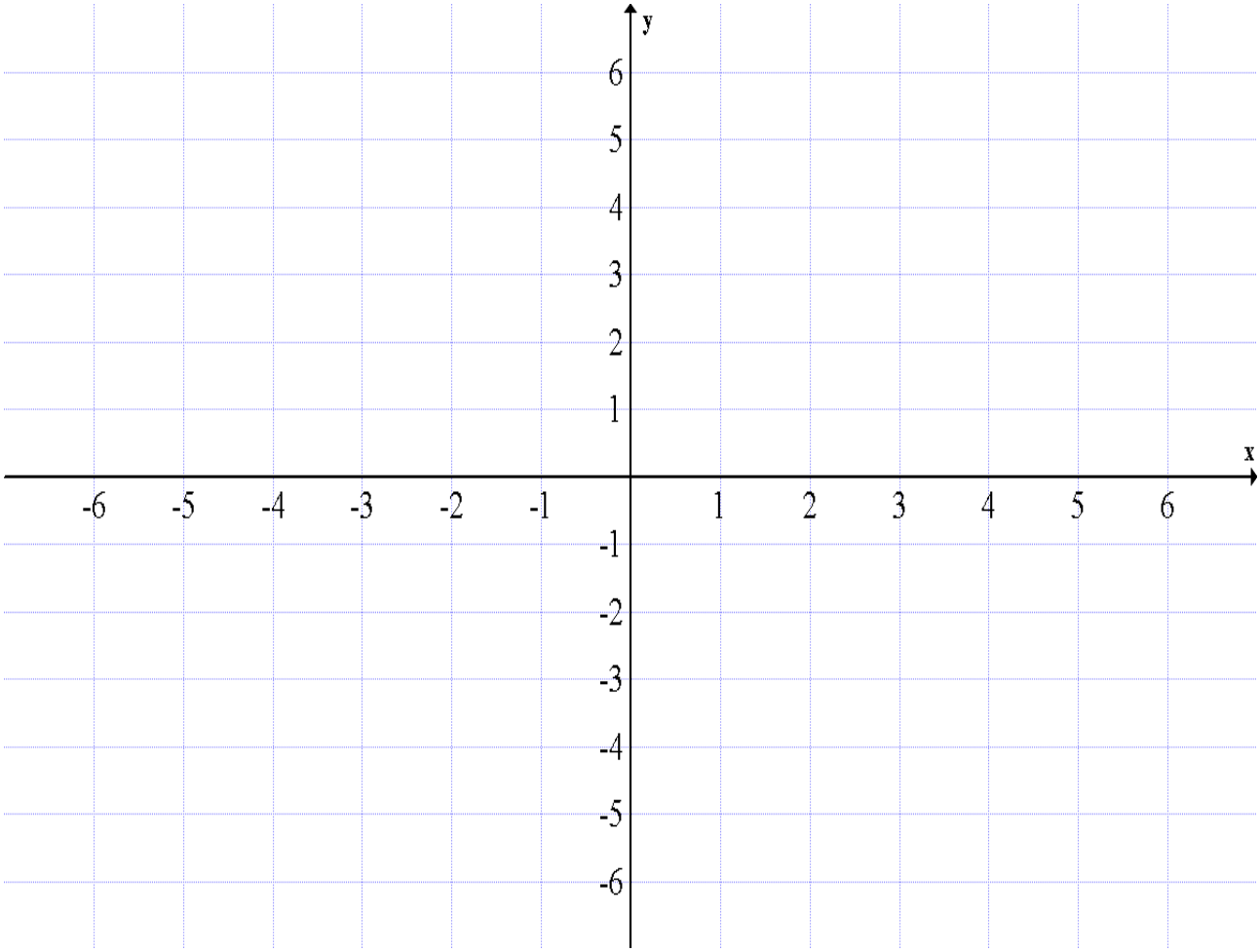
7.2.4 Determine the probability that a learner is left-handed and plays soccer. (2)

[13]

TOTAL: 100

DIAGRAM SHEET FOR QUESTION 5.1.2

NAME: _____ CLASS: _____



Province of the
EASTERN CAPE
EDUCATION

NATIONAL SENIOR CERTIFICATE/ *NASIONALE SENIOR SERTIFIKAAT*

NOVEMBER 2019

GRADE 10/*GRAAD* 10

MATHEMATICS P1/*WISKUNDE V1* MARKING GUIDELINE/*NASIENRIGLYN* EXEMPLAR/*EKSEMPLAAR*

MARKS/PUNTE: 100

This marking guideline consists of 8 pages./
Hierdie nasienriglyn bestaan uit 8 bladsye.

QUESTION 1/*VRAAG 1*

1.1	1.1.1	$x = 2$	✓ $x = 2$	(1)
	1.1.2	$x - 2 < 0$ $x < 2$	✓ $x - 2 < 0$ ✓ $x < 2$ **Answer only: Full marks** **Slegs antwoord: Volpunte**	(2)
1.2	1.2.1	$(a-2)(a^2+2a+4)$ $= a^3 - 8$	✓ a^3 ✓ -8	(2)
	1.2.2	$\left(\frac{a}{2}+1\right)\left(\frac{a}{2}-1\right)$ $= \frac{a^2}{4} - 1$	✓ $\frac{a^2}{4}$ ✓ -1	(2)
1.3	1.3.1	$2x^2 - x - 6$ $= (2x+3)(x-2)$	✓ $(2x+3)$ ✓ $(x-2)$	(2)
	1.3.2	$(a-b)^2 - 100c^2$ $= (a-b-10c)(a-c+10c)$	✓ $(a-b-10c)$ ✓ $(a-c+10c)$	(2)
				[11]

QUESTION 2/*VRAAG 2*

2.1	2.1.1	$x(x+5)=0$ $x=0$ or $x=-5$	✓ $x=0$ ✓ $x=-5$	(2)
	2.1.2	$\frac{2x+1}{3}=\frac{3x+1}{4}$ $4(2x+1)=3(3x+1)$ $8x+4=9x+3$ $x=1$	✓ $4(2x+1)=3(3x+1)$ ✓ $8x+4$ ✓ $9x+3$ ✓ $x=1$	(4)
2.2	$2(4-3x)\geq 20$ $8-6x\geq 20$ $-6x\geq 12$ $x\leq -2$		✓ $8-6x$ ✓ $-6x\geq 12$ ✓ $x\leq -2$	(3)
2.3	$a+b=12$ …….(1) $4a+2b=44$…….(2) From (1)….. $a=12-b$ $4(12-b)+2b=44$ $48-4b+2b=44$ $-2b=-4$ $b=2$ $a=10$ **OR** From (1)….. $b=12-a$ $4a+2(12-a)=44$ $4a+24-2a=44$ $2a=20$ $a=10$ $b=2$ **OR** $4a+4b=48$…….(3) (3) – (2) $2b=4$ $b=2$ $a=10$ **OR** $2a+2b=24$ …….(3) (2) – (3) $2a=20$ $a=10$ $b=2$	✓ $a=12-b$ ✓ $4(12-b)+2b=44$ ✓ $48-4b+2b=44$ ✓ $b=2$ ✓ $a=10$ ✓ $b=12-a$ ✓ $4a+2(12-a)=44$ ✓ $4a+24-2a=44$ ✓ $a=10$ ✓ $b=2$ ✓ ✓ $4a+4b=48$ ✓ $2b=4$ ✓ $b=2$ ✓ $a=10$ ✓ ✓ $2a+2b=24$ ✓ $2a=20$ ✓ $a=10$ ✓ $b=2$	(5)

2.4	Son/Seun Sipho Now/Tans x $7x$ In 25 years $x+25$ $7x+25$ Equation: Oor 25jaar $7x+25=2(x+25)$ vergelyking $7x+25=2x+50$ $5x=25$ $x=5$ His son is 5 years old/*Sy seun is 5 jaar oud.*	✓ $7x+25$ ✓ $2(x+25)$ ✓ $2x+50$ ✓ $5x=25$ $x=5$ ✓His son is 5 years old/Sy seun is 5 jaar oud	(5)
			[19]

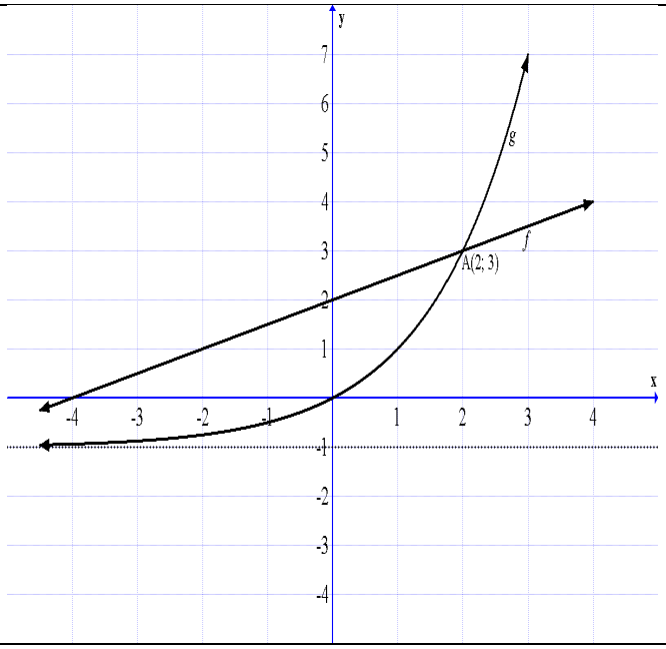
QUESTION 3/*VRAAG 3*

3.1	3.1.1	11 and/en14	✓ for both 11 and 14	(1)
	3.1.2	$T_n=3n-4$	✓ $3n$ ✓ -4	(2)
	3.1.3	$T_{33}=3(33)-4=95$	✓ $3(33)-4$ ✓ 95	(2)
	3.1.4	$3n-4=83$ $3n=87$ $n=29$	✓ $3n-4=83$ ✓ $n=29$	(2)
	3.1.5	$3n-4=116$ $3n=120$ $n=40$	✓ $3n-4=116$ ✓ $3n=120$ ✓ $n=40$	(3)
3.2	$3x+2-(x+3)=6x-1-(3x+2)$ $2x-1=3x-3$ $x=2$		✓ $3x+2-(x+3)$ ✓ $6x-1-(3x+2)$ ✓ $2x-1=3x-3$ ✓ $x=2$	(4)
				[14]

QUESTION 4/*VRAAG 4*

4.1	Amount/*Bedrag* = 18, 18 x 3569 = R64 884, 42		✓R64 884, 42	(1)
4.2	4.2.1	Loan/*Lening* = 0, 85 x 379 000 = R322 150 **OR/OF** Loan/*Lening* = 379 000 – 0,15 x 379 000 = R322 150	✓0, 85 x 379 000 ✓R322 150 **OR/OF** ✓379 000 – 0,15 x 379 000 ✓R322 150	(2) (2)
	4.2.2	$A = P(1+in)$ $A = 322150(1+0{,}225\times 4)$ $A = R612\ 085$	✓ $A = P(1+in)$ ✓ $A = 322150(1+0{,}225\times 4)$ ✓ $A = R612\ 085$	(3)
	4.2.3	Instalment/*Paaiement* $= \frac{612085}{48} = R12751{,}77$	✓ 48 ✓ $R12751{,}77$	(2)
4.3		$A = P(1+i)^n$ $96714{,}02 = P(1+0{,}067)^6$ $P = \frac{96714{,}02}{(1{,}067)^6}$ $P = R65539{,}47$	✓ $A = P(1+i)^n$ ✓ $96714{,}02 = P(1+0{,}067)^6$ ✓ $P = R65539{,}47$	(3)
				[11]

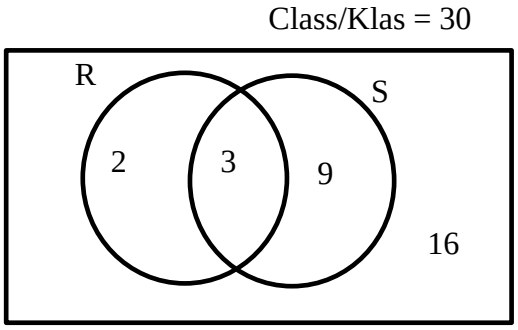
QUESTION 5/*VRAAG 5*

5.1	5.1.1	$y=-1$	✓ $y=-1$	(1)
	5.1.2		f: ✓ x – intercept/afsnit ✓ y – intercept/afsnit g: ✓asymptote/asimptoot ✓origin ✓shape/vorm and intersection	(5)
	5.1.3	$(2;3)$	✓ 2 ✓ 3	
	5.1.4	$g(-1)=-\frac{1}{2}$ $g(1)=1$ $m_{ave}=\frac{1-\left(-\frac{1}{2}\right)}{1-(-1)}=\frac{3}{4}$	✓ $g(-1)=-\frac{1}{2}$ ✓ $g(1)=1$ ✓ $m_{ave}=\frac{1-\left(-\frac{1}{2}\right)}{1-(-1)}$ ✓ $m_{ave}=\frac{3}{4}$	(4)
5.2	5.2.1	$m=\tan 45^\circ=1$	✓ 1	(1)
	5.2.2	$y=x$	✓ $y=x$	(1)
	5.2.3	$xy=4\times\frac{3}{2}=6$ $y=\frac{6}{x}$	✓ 6 ✓ $y=\frac{6}{x}$	(2)
	5.2.4	$A\left(\sqrt{6};\sqrt{6}\right)$	✓ $\sqrt{6}$ ✓ $\sqrt{6}$	(2)
				[11]

QUESTION 6/*VRAAG 6*

6.1	*f*: $y = ax^2 + q$ $0 = a(-2)^2 + 8$ $4a = -8$ $a = -2$ $y = -2x^2 + 8$ *g*: $m = \frac{-4-0}{0-(-2)} = -2$ $y = -2x - 4$	✓ $0 = a(-2)^2 + 8$ ✓ $a = -2$ ✓ $y = -2x^2 + 8$ ✓ $m = -2$ ✓ $y = -2x - 4$	(5)
6.2	$F(1;6)$ $G(1;-6)$ FG = 12 units/eenhede	✓ $F(1;6)$ ✓ $G(1;-6)$ ✓FG = 12 units/eenhede	(3)
6.3	$\{y : y \leq 8; y \in R\}$ **OR/OF** $(-\infty;8]$	✓✓ $\{y : y \leq 8; y \in R\}$ ✓✓ $(-\infty;8]$	(2) (2)
6.4	$-2 < x < 2$	$x > -2$ ✓ and/en $x < 2$ ✓	(2)
			[12]

QUESTION 7/*VRAAG 7*

7.1	7.1.1	$P(A)=\frac{2}{7}$ or/of 0,29	✓✓ $P(A)=\frac{2}{7}$ or/of 0, 29	(2)
	7.1.2	$P(V)=\frac{3}{7}$ or/of 0,43	✓✓ $P(V)=\frac{3}{7}$ or/of 0, 43	(2)
	7.1.3	$P(C)=\frac{4}{7}$ or/of 0,57	✓ $P(C)=\frac{4}{7}$ or/of 0, 57	(1)
7.2	7.2.1		✓ 2 ✓ 3 ✓ 9 ✓ 16	(4)
	7.2.2	$\frac{16}{30}=\frac{8}{15}=0,53$	✓✓ $\frac{16}{30}=\frac{8}{15}=0,53$	(2)
	7.2.3	(a) $\frac{14}{30}=\frac{7}{15}=0,47$	✓✓ $\frac{14}{30}=\frac{7}{15}=0,47$	(2)
		(b) $\frac{9}{30}=\frac{3}{10}=0,3$	✓✓ $\frac{9}{30}=\frac{3}{10}=0,3$	(2)
				[15]
			TOTAL/*TOTAAL*:	**100**