**Province of the
EASTERN CAPE
EDUCATION**

**NATIONAL
SENIOR CERTIFICATE/
*ISATIFIKETI SEBANGA
LESHUMI***

GRADE/*GREYIDI 12*

SEPTEMBA 2021

ÉcoleBooks

**MATHEMATICS P1/*MATHEMATIKA P1*
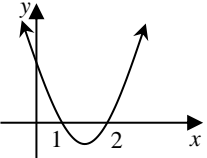MARKING GUIDELINE/*MAKHING GAYIDILAYINI***

MARKS/*AMANQAKU*: 150

This marking guideline consists of 22 pages./
Le makhing gayidilayini inamaphepha angama 22.

NOTE/*QAPHELA*:

- If a candidate answers a question TWICE, mark the FIRST attempt ONLY.
  Ukuba umfundi uphendule umbuzo KABINI, makhisha OWOKUQALA KUPHELA.
- Consistent accuracy applies in ALL aspects of the marking guideline.
  Ukuphendula ngendlela eyiyo kusebenza KUZO zonke iinkalo zemakhing gayidilayini.
- If a candidate crossed out an attempt of a question and did not redo the question, mark the crossed-out attempt.
  Ukuba umfundi uhlabile umbuzo waze wangawuphindi ,makhisha lo awuhlabileyo.
- The mark for substitution is awarded for substitution into the correct formula.
- *Imakhi yesaphstityushini iyanikezwa kwi khorekhthi fomyula.*

QUESTION 1/*UMBUZO 1*

1.1.1	$x^2 + 2x - 15 = 0$ $(x-3)(x+5) = 0$ $\therefore x = 3 \quad$ or / *of* $\quad x = -5$ **OR/*OKANYE*** $x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $= \dfrac{-2 \pm \sqrt{2^2 - 4(1)(-15)}}{2(1)}$ $= \dfrac{-2 \pm \sqrt{64}}{2}$ $= 3 \ $ or / *of* $\ -5$	✓ factors / *fekhthaza* ✓ $x = 3$ ✓ $x = -5$ **OR/*OKANYE*** ✓ substitution / *saphstityushini* ✓ $x = 3$ ✓ $x = -5$ (3)
1.1.2	$3x^2 + x - 1 = 0$ $x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $= \dfrac{-1 \pm \sqrt{1^2 - 4(3)(-1)}}{2(3)}$ $= \dfrac{-1 \pm \sqrt{13}}{6}$ $= 0,43 \ $ or / *of* $\ -0,77$ Penalise 1 mark for incorrect rounding *Yohlwaya -1- ngempendulo engeyiyo*	✓ substitution / *saphstityushini* ✓ $x = 0,43$ ✓ $x = -0,77$ (3)

1.1.3	$x(x-3) \geq -2$
	 $x^2 - 3x + 2 \geq 0$
	 $(x-1)(x-2) \geq 0$
	 $\therefore x \leq 1 \quad$ or / *of* $\quad x \geq 2$
		✓ standard form
		   Standad fom
		 ✓ factorisation
		   fekhthorizeyishini
		 ✓ $x \leq 1$ or/*okanye* ✓ $x \geq 2$
		 (4)

1.1.4	$\sqrt{43-x}-x+1=0$	✓ isolating the surd
	$\sqrt{43-x}=x-1$	*Asoyileyithing i sed*
	$\left(\sqrt{43-x}\right)^2=(x-1)^2$	✓ squaring both sides
	$43-x=x^2-2x+1$	*Sikwering amacala omabini*
	$x^2-x-42=0$	✓ standard form / *standad fom*
	$(x-7)(x+6)=0$	✓ factorisation / *fekhthorizeyshini*
	$\therefore x=7 \quad$ or / *of* $\quad x \neq -6$	✓ selection / *ngokukhetha*
		(5)
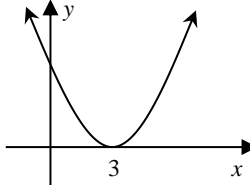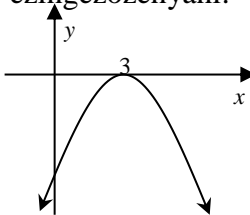
1.2	$2y - x = 3 \qquad (1)$	
	$y^2 + 3x = 2xy \qquad (2)$	
	$x = 2y - 3 \qquad (3)$	
	Substitute (3) into (2) / *Saphstityuthi* (3) *ku* (2)	✓ $x = 2y - 3$
	$y^2 + 3(2y - 3) = 2y(2y - 3)$	
	$y^2 + 6y - 9 - 4y^2 + 6y = 0$	✓ substitution / *saphstityushini*
	$-3y^2 + 12y - 9 = 0$	
	$y^2 - 4y + 3 = 0$	✓ standard form / *standad fom*
	$(y - 3)(y - 1) = 0$	
	$\therefore y = 3$ or / *of* $y = 1$	✓ factorisation / *fekhthorizeyshini*
	$x = 2(3) - 3 \quad$ or / *of* $\quad x = 2(1) - 3$	✓ y-values / *y-velyus*
	$\quad = 3 \qquad\qquad\qquad = -1$	✓ x-values / *x-velyus*
	OR/*OKANYE*	**OR/*OKANYE***
	$2y - x = 3 \qquad (1)$	✓ $y = \dfrac{x}{2} + \dfrac{3}{2}$
	$y^2 + 3x = 2xy \qquad (2)$	
	$y = \dfrac{x}{2} + \dfrac{3}{2} \qquad (3)$	
	Substitute (3) into (2) / *Saphstutyuthi* (3) *ku* (2)	✓ substitution / *saphstityushini*
	$\left(\dfrac{x}{2} + \dfrac{3}{2}\right)^2 + 3x = 2x\left(\dfrac{x}{2} + \dfrac{3}{2}\right)$	
	$\dfrac{x^2}{4} + \dfrac{6x}{4} + \dfrac{9}{4} + 3x = x^2 + 3x$	
	$-\dfrac{3x^2}{4} + \dfrac{6x}{4} + \dfrac{9}{4} = 0$	
	$-3x^2 + 6x + 9 = 0$	
	$x^2 - 2x - 3 = 0$	
	$(x - 3)(x + 1) = 0$	
	$\therefore x = 3$ or / *of* $x = -1$	
	$y = \left(\dfrac{3}{2} + \dfrac{3}{2}\right) \quad$ or / *of* $\quad y = \left(-\dfrac{1}{2} + \dfrac{3}{2}\right)$	
	$\quad = 3 \qquad\qquad\qquad = 1$	

Please turn over/*Nceda thyila*

		✓ standard form / *standad fom*
		✓ factorisation / *fekhthorizeyshini* ✓ x-values / *x-velyus*
		(5)

1.3	$x = \dfrac{5 \pm \sqrt{p(6-p)-9}}{2}$ For non-real roots: / *Ngeeruthi − ezingezozenyani* : $\Delta < 0$ $p(6-p)-9 < 0$ $-p^2 + 6p - 9 < 0$ $p^2 - 6p + 9 > 0$ $(p-3)^2 > 0$ $\therefore p \in \square$ but/*kodwa* $p \neq 3$ **OR/*OKANYE*** $x = \dfrac{5 \pm \sqrt{p(6-p)-9}}{2}$ For non-real roots:/ Ngeeruthi-ezingezozenyani: $\Delta < 0$ $p(6-p)-9 < 0$ $-p^2 + 6p - 9 < 0$ $(3-p)(p-3) < 0$ $\therefore p \in \square$ but / *kodwa* $p \neq 3$ 	✓ $\Delta < 0$ ✓ standard form / *standad fom* ✓ factorisation / *fekhthorizeyshini* ✓ answer / *impendulo* **OR/*OKANYE*** ✓ $\Delta < 0$ ✓ standard form / *standad fom* ✓ factorisation / *fekhthorizeyshini* ✓ answer / *impendulo* (4)
		[24]

QUESTION 2/*UMBUZO 2*

2.1.1	-16 ; -16 ; -12 ; -4 0 4 8 4 4 8	$\checkmark$ 8 (1)
2.1.2	$2a = 4$ $\therefore a = 2$ $3a + b = 4$ $3(2) + b = 0$ $\therefore b = -6$ $a + b + c = -16$ $2 - 6 + c = -16$ $\therefore c = -12$ $T_n = 2n^2 - 6n - 12$	$\checkmark$ $a = 2$ $\checkmark$ $b = -6$ $\checkmark$ $c = -12$ $\checkmark$ $T_n = 2n^2 - 6n - 12$ (4)
2.1.3	$T_{38} = 2(38)^2 - 6(38) - 12$ $= 2\,648$	$\checkmark$ substitution / *saphstityushini* $\checkmark$ answer / *impendulo* (2)

| 2.1.4 | General term for first differences:
Ijeneral them kumahluko wokuqala
$T_n = 4n - 4$
$400 = 4n - 4$
$\therefore n = 101$
$T_{n(linear)} = (T_{n+1} - T_n)_{(quadratic)}$
$\therefore n = 101 \text{ and } + 1 = 102$
The terms are: 101 and 102

OR/OKANYE

$2(n+1)^2 - 6(n+1) - 12 - (2n^2 - 6n - 12) = 400$
$2n^2 + 4n + 2 - 6n - 6 - 12 - 2n^2 + 6n + 12 = 400$
$4n - 4 = 400$
$4n = 404$
$\therefore n = 101$
$\therefore$ Between/*Phakathi* T_{101} and / *no* T_{102} | ✓ $T_n = 4n - 4$
✓ $T_n = 400$

✓ answer / *impendulo*

OR/OKANYE

✓ $4n - 4 = 400$ ✓

✓ answer / *impendulo*
(3) |
| | **OR/OKANYE**
Trial and error / *Trayali no era*
$T_{102} = 2(102)^2 - 6(102) - 12 = 20184$
$T_{101} = 2(101)^2 - 6(101) - 12 = 19784$
Difference/*Umahluko* : 400
$\therefore$ Between/*Phakathi* T_{101} and / *no* T_{102} | **OR/OKANYE**

✓ subst. for T_{101} and T_{102}
　saphst. u T_{101} *no* T_{102}

✓ 400
✓ answer / *impendulo*
(3) |

| 2.2.1 | $T_n = a + (n-1)d$
$89 = 2 + (n-1)(3)$
$3n - 1 = 89$
$3n = 90$
$n = 30$ | ✓ substitution / *saphstityushini*

✓ answer / *impendulo*
(2) |

2.2.2		
	k *is the sum to* 30 *terms* / uyi sam kwi 30 them. $$S_n = \frac{n}{2}[a+l]$$ $$= \frac{30}{2}[2+89]$$ $$= 1365$$ **OR / OKANYE** $$S_n = \frac{n}{2}[2a+(n-1)d]$$ $$= \frac{30}{2}[2(2)+(30-1)(3)]$$ $$= 1365$$	✓ Sum formula / Sam fomyula ✓ substitution / *saphstityushini* ✓ answer /impendulo **OR / OKANYE** ✓ Sum formula / *Sam fomyula* ✓ substitution / *saphstityushini* ✓ answer / *impendulo* (3)
		[15]

2.2.2

QUESTION 3/*UMBUZO 3*

3.1	$T_9 = ar^8 = 768$	
	$T_{13} = ar^{12} = 12\,288$	
	$\dfrac{ar^{12}}{ar^8} = \dfrac{12\,288}{768}$	$\checkmark$ $\dfrac{ar^{12}}{ar^8} = \dfrac{12\,288}{768}$
	$\therefore r^4 = 16$	
	$r = \pm 2$	$\checkmark$ $r = \pm 2$
	$a = \dfrac{768}{(\pm 2)^8}$	
	$= 3$	$\checkmark$ value of a / *ivelyu ka a*
		(3)
3.2.1	$S_2 = \dfrac{54}{19} - \dfrac{24}{19}$	
	$= \dfrac{30}{19}$	$\checkmark$ answer / *impendulo*
		(1)
3.2.2	$T_1 + T_2 = \dfrac{30}{19}$	
	$a + ar = \dfrac{30}{19}$	
	$a(1+r) = \dfrac{30}{19}$	$\checkmark$ $a + ar = \dfrac{30}{19}$
	$a = \dfrac{30}{19(1+r)}$	
		(1)
3.2.3	$S_\infty = \dfrac{a}{1-r} = \dfrac{54}{19}$	
	$\therefore a = \dfrac{54(1-r)}{19}$	$\checkmark$ $a = \dfrac{54(1-r)}{19}$
	$a = \dfrac{30}{19(1+r)}$ ....*from / ukusuka*(3.2.2)	
	$\therefore \dfrac{30}{19(1+r)} = \dfrac{54(1-r)}{19}$	$\checkmark$ equating / *ikhweything*
	$(1-r)(1+r) = \dfrac{30}{54}$	
	$1 - r^2 = \tfrac{5}{9}$	
	$r^2 = \tfrac{4}{9}$	$\checkmark$ $r^2 = \dfrac{4}{9}$
	$\therefore r = \dfrac{2}{3}$	
		$\checkmark$ answer / *impendulo*
		(4)
		[9]

QUESTION 4/*UMBUZO 4*
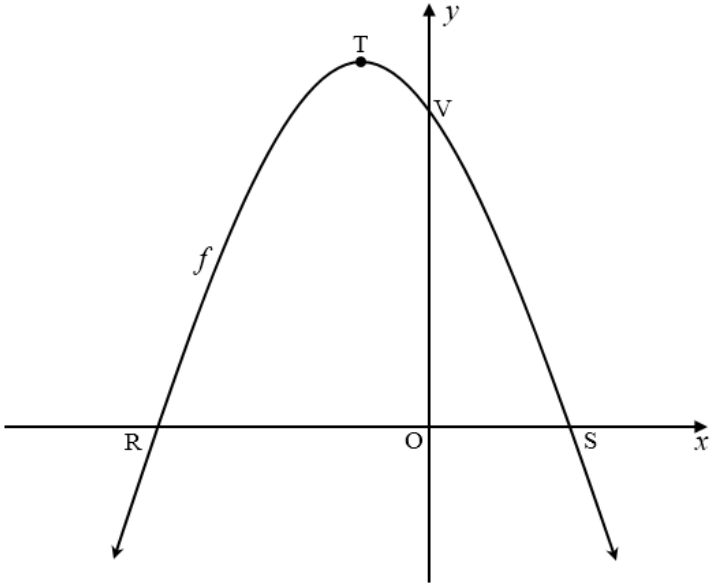
4.1	D(0 ; 1)	✓ (0 ; 1) (1)
4.2	$x = -2$; $y = -1$	✓ $x = -2$ ✓ $y = -1$ (2)
4.3	$x \in \mathbb{R}$ but/*kodwa* $x \neq -2$	✓ $x \in \mathbb{R}$ ✓ $x \neq -2$ (2)
4.4	$g(x) = b^x$ $8 = b^{-3}$ $8 = \dfrac{1}{b^3}$ $b^3 = \dfrac{1}{8}$ $\therefore b = \dfrac{1}{2}$	✓ substitution / *saphstityushini* ✓ answer / *impendulo* (2)
4.5	$y = \dfrac{-3}{x+2} - 1$ $0 = \dfrac{-3}{x+2} - 1$ $1 = \dfrac{-3}{x+2}$ $x + 2 = -3$ $x = -5$ $\therefore A(-5;0)$ $y = \dfrac{-3}{0+2} - 1$ $= -\dfrac{5}{2}$ $\therefore C\left(0; -\dfrac{5}{2}\right)$	✓ substitution y = 0 / *saphstityushini y = 0* ✓ $x = -5$ ✓ $y = -\dfrac{5}{2}$ (3)

4.6	$x = \left(\dfrac{1}{2}\right)^y$ $\therefore y = \log_{\frac{1}{2}} x$ **OR/OKANYE** $y = 2^{-x}$ $\therefore x = 2^{-y}$ $y = -\log_2 x$	$\checkmark \ x = \left(\dfrac{1}{2}\right)^y$ $\checkmark \ y = \log_{\frac{1}{2}} x$ **OR/OKANYE** $\checkmark \ x = 2^{-y}$ $\checkmark \ y = -\log_2 x$ (2)
4.7.1	$-5 < x < -2$ **OR/OKANYE** $x \in (-5\,;\,-2)$	$\checkmark\checkmark$ answer / *impendulo*(A) (2)
4.7.2	$0 < x \le \dfrac{1}{8}$ **OR/OKANYE** $x \in (0\,;\,\tfrac{1}{8}]$	$\checkmark\checkmark$ answer / *impendulo* (A) (2)
		[16]

QUESTION 5/*UMBUZO 5*

5.1	$-x^2 - 2x + 8 = 0$ $x^2 + 2x - 8 = 0$ $(x+4)(x-2) = 0$ $\therefore x = -4$ or / *of* $x = 2$ $\therefore$ R$(-4;0)$ and / *no* S$(2;0)$ $\therefore$ RS $= 6$ units / *yunithi*	✓ $f(x) = 0$ ✓ factorisation / *fekhthorizeyshini* ✓ values of x / *ivelyu ka x* ✓ answer / *impendulo* 　　　　　　　　　(4)

5.2	$x = \dfrac{-4+2}{2}$	$\checkmark$ method / *indlela*
	$\quad = -1$	$\checkmark$ $x = -1$
	$y = -(-1)^2 - 2(-1) + 8$	
	$\quad = 9$	$\checkmark$ $y = 9$
	$\therefore \text{T}(-1;9)$	
	OR/OKANYE	**OR/OKANYE**
	$f(x) = -x^2 - 2x + 8$	
	$x = -\dfrac{b}{2a}$	$\checkmark$ $-\dfrac{b}{2a}$
	$\quad = -\left(\dfrac{-2}{2(-1)}\right)$	
	$\quad = -1$	$\checkmark$ $x = -1$
	$y = -(-1)^2 - 2(-1) + 8$	
	$\quad = 9$	$\checkmark$ $y = 9$
	$\therefore \text{T}(-1;9)$	
	OR/OKANYE	**OR/OKANYE**
		$\checkmark$ $-2x - 2 = 0$
	$f'(x) = -2x - 2 = 0$	
	$\quad\quad -2x = 2$	
	$\quad\quad\quad x = -1$	
	$y = -(-1)^2 - 2(-1) + 8$	
	$\quad = 9$	
	$\therefore \text{T}(-1;9)$	$\checkmark$ $x = -1$ $\checkmark$ $y = 9$ (3)

5.3.1	$f(x) = -x^2 - 2x + 8$	
	$f'(x) = -2x - 2$	$\checkmark$ $f'(x)$
	$\therefore -2x - 2 = 2$	$\checkmark$ $f'(x) = 2$
	$\therefore \quad\quad x = -2$	$\checkmark$ $x = -2$
	$\therefore y = -(-2)^2 - 2(-2) + 8$	
	$\quad\quad = 8$	
	$\therefore \text{W}(-2;8)$	$\checkmark$ $y = 8$
		(4)
5.3.2	$g(x) = mx + c$	
	$m = -\dfrac{1}{2}$ ($\perp$ lines / *layini*)	$\checkmark$ gradient / *grediyenti*
	$c = 8$	
	$\therefore y = -\dfrac{1}{2}x + 8$	$\checkmark$ equation / *ekhweyzhini*
		(2)

| 5.4 | $f(x) = -x^2 - 2x + 8$

 $h(x) = -f(x-1)$

 $\quad = -\left[-(x-1)^2 - 2(x-1) + 8 \right]$

 $\quad = -\left[-(x^2 - 2x + 1) - 2x + 2 + 8 \right]$

 $\quad = -\left[-x^2 + 2x - 1 - 2x + 2 + 8 \right]$

 $\quad = x^2 - 9$

 OR/OKANYE

 $h(x) = (x+3)(x-3)$

 $\quad = x^2 - 9$

 OR/OKANYE

 New turning point /*Ithening poyinti entsha* = $(0 ; -9)$
 $y = x^2 - 9$ | $\checkmark$ $-f(x-1)$

 $\checkmark$ substitution / *saphstityushini*

 $\checkmark$ simplifying /
   Ukwenza lula

 $\checkmark$ equation / *ikhweyzhini*

 OR/OKANYE

 $\checkmark\checkmark$ roots/*ruthi* 3 and/*no* –3
 $\checkmark$ +$(x + 3)(x - 3)$
 $\checkmark$ equation / *ikhweyzhini*

 OR/OKANYE

 $\checkmark$ $(0 ;$ $\checkmark\checkmark$ –9$)$
 $\checkmark$ equation / *ikhweyzhini*

 (4) |
| | | **[17]** |

QUESTION 6/UMBUZO 6

| 6.1 | $A = P(1-i)^n$

 $5510 = 9\,670(1-i)^4$

 $\therefore i = 1 - \sqrt[4]{\dfrac{5510}{9\,670}}$

 $\quad = 0,131177$

 $\therefore r = 13,12\%$ | $\checkmark$ subst. into correct formula
   Ukusaphstityutha kwi fomyula
   eyiyo

 $\checkmark$ simplification
   simplifikheyshini

 $\checkmark$ answer / *impendulo*

 (3) |

| 6.2 | End of December/*Ekupheleni kuka Disemba* $$F = \frac{x[(1 + i)^n - 1]}{i}$$ $$\therefore F = \frac{600\left[\left(1 + \frac{0,087}{12}\right)^{144} - 1\right]}{\frac{0,087}{12}}$$ $$= R151\ 438,20$$ End of January/*Ekupheleni kukaJanuwari* $$A = P(1 + i)^n$$ $$= 151\ 438,20\left(1 + \frac{0,087}{12}\right)$$ $$= R152\ 536,13$$ **OR/OKANYE** $$F = \frac{x[(1 + i)^n - 1](1 + i)}{i}$$ $$\therefore F = \frac{600\left[\left(1 + \frac{0,087}{12}\right)^{144} - 1\right]\left(1 + \frac{0,087}{12}\right)}{\frac{0,087}{12}}$$ $$= \mathbf{R}152\ 536,13$$ | ✓ $n = 144$ ✓ subst. into correct formula *Ukusaphstutyutha kwi fomyula eyiyo* ✓ adding final month's interest *Ukongena inzala yenyanga yokugqibela* ✓ answer / *impendulo* (4) **OR/OKANYE** ✓ $n = 144$ ✓ subst. into correct formula *Ukusaphstityuta kwi fomyula eyiyo* ✓ adding final month's interest *Ukongeza inzala yenyanga yokugqibela* ✓ answer / *impendulo* (4) |
| 6.3.1 | $$P = \frac{x\left[1 - (1 + i)^{-n}\right]}{i}$$ $$350000 = \frac{x\left[1 - \left(1 + \frac{0,093}{12}\right)^{-72}\right]}{\frac{0,093}{12}}$$ $$\therefore x = \frac{350000 \times \frac{0,093}{12}}{\left[1 - \left(1 + \frac{0,093}{12}\right)^{-72}\right]}$$ $$\therefore x \approx R6361,18$$ | ✓ $i = \frac{0,093}{12}$ and $n = 72$ ✓ substitution into correct formula *Isaphstityushini kwi fomyula eyiyo* ✓ answer / *impendulo* (3) |

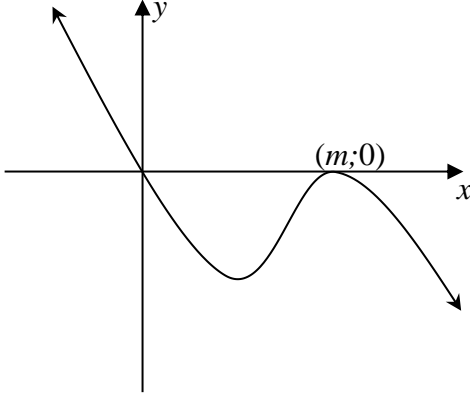| 6.3.2	Outstanding balance = / Ibhalansi eshiyekileyo =	
	$P = \dfrac{x\left[1-\left(1+i\right)^{-n}\right]}{i}$	
	$\therefore P = \dfrac{6\,361{,}18\left[1-\left(1+\dfrac{0{,}093}{12}\right)^{-32}\right]}{\dfrac{0{,}093}{12}}$	✓ $i = \frac{0{,}093}{12}$ and $= 32$ ✓ subst. into correct formula *Isaphstityushini kwi fomyula eyiyo*
	$= R179\,667{,}32$	✓ $P = 179\,667,32$
	OR/*OKANYE*	**OR/*OKANYE***
	Outstandingbalance / Ibhalansi eshiyekileyo $= A - F$	
	$= 350\,000\left(1+\dfrac{0{,}093}{100}\right)^{40} - \dfrac{6\,361{,}18\left[\left(1+\dfrac{0{,}093}{12}\right)^{40}-1\right]}{\dfrac{0{,}093}{12}}$	✓ $i = \frac{0{,}093}{12}$ and $= 40$ ✓ subst. Into correct formula *Ukusaphstityutha kwi fomyula eyiyo*
	$= R476\,628{,}84 - R296\,961{,}79$ $= R179\,667{,}05$	
		✓ $P = 179\,667,32$
		(3)

6.3.3	$\therefore 179\,667,32 = \dfrac{7\,000\left[1-\left(1+\dfrac{0,093}{12}\right)^{-n}\right]}{\dfrac{0,093}{12}}$	✓ subst. into correct formula *Ukusaphsthityutha kwi fomyula eyiyo*
	$\dfrac{179\,667,32 \times \dfrac{0,093}{12}}{7\,000} - 1 = -\left(1+\dfrac{0,093}{12}\right)^{-n}$	
	$-0,80108... = -\left(\dfrac{4\,031}{4\,000}\right)^{-n}$	
	$\therefore 0,80108... = \dfrac{4\,031^{-n}}{4\,000}$	
	$\therefore -n = \dfrac{\log 0,80108...}{\log \dfrac{4\,031}{4\,000}}$	✓ correct use of logs *Ukusebenzisa ii logs ngendlela eyiyo*
	$-n \approx -28,73$ $\therefore n \approx 28,73$	✓ = 28,73
	$\therefore$ The number of months is 29. *Iinani leenyanga ngu 29*	✓ $n = 29$ months / *iinyanga*
	OR/OKANYE	**OR/OKANYE**
	$179\,667,32 = \dfrac{7\,000\left[1-\left(1+\dfrac{0,093}{12}\right)^{-n}\right]}{\dfrac{0,093}{12}}$	✓ subst. into correct formula *Ukusaphstityutha kwifomyula eyiyo*
	$\dfrac{179\,667,32 \times \dfrac{0,093}{12}}{7\,000} - 1 = -\left(1+\dfrac{0,093}{12}\right)^{-n}$	
	$-0,80108... = -\left(\dfrac{4\,031}{4\,000}\right)^{-n}$	
	$\therefore 0,80108... = \dfrac{4\,031^{-n}}{4\,000}$	
	$\therefore -n = \dfrac{\log 0,80108...}{\log \dfrac{4\,031}{4\,000}}$	✓ correct use of logs *Ukusebenzisa ii logs ngendlela eyiyo*
	$-n \approx -28,73$ $\therefore n \approx 28,73$	✓ = 28,73
	$\therefore$ The number of months is 29. *Inani leenyanga ngu 29*	✓ $n = 29$ months / *iinyanga* (4)
		[17]

QUESTION 7/*UMBUZO 7*

7.1	$f\,'(x) = \lim_{h \to 0} \dfrac{f(x+h) - f(x)}{h}$	
	$= \lim_{h \to 0} \dfrac{5 - 2(x+h)^2 - \left(5 - 2x^2\right)}{h}$	✓ substitution / *isaphstityushini*
	$= \lim_{h \to 0} \dfrac{5 - 2x^2 - 4xh - 2h^2 - 5 + 2x^2}{h}$	✓ expansion / *iexpazhini*
	$= \lim_{h \to 0} \dfrac{-4xh - 2h^2}{h}$	✓ simplification / *isimplikheyshini*
	$= \lim_{h \to 0} \dfrac{h(-4x - 2h)}{h}$	
	$= \lim_{h \to 0} \left(-4x - 2h\right)$	✓ notation and $\displaystyle\lim_{h \to 0} (-4x - 2h)$
	$= -4x$	✓ answer / *impendulo*
		(5)
7.2.1	$y = 7x^4 + \dfrac{2x^2}{\sqrt{x}}$	
	$= 7x^4 + 2x^{\frac{3}{2}}$	✓ $2x^{\frac{3}{2}}$
	$\therefore \dfrac{dy}{dx} = 28x^3 + 3x^{\frac{1}{2}}$	✓ $28x^3$ ✓ $3x^{\frac{1}{2}}$
		(3)
7.2.2	$= D_x \left[\dfrac{3x^2 - 7x - 6}{x} \right]$	
	$= D_x \left[3x - 7 - 6x^{-1} \right]$	✓ $3x - 7$ ✓ $-6x^{-1}$
	$= 3 + 6x^{-2}$	✓ 3 and differentiating constant 3 *ne difarenshiyething khonstent* ✓ $+6x^{-2}$
		(4)
		[12]

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QUESTION 8/*UMBUZO 8*

8.1.1	$f(x) = 2(x - x_1)(x - x_2)(x - x_3)$ $\quad = 2(x+1)\left(x - \frac{1}{2}\right)(x-3)$ $\quad = (x+1)(2x-1)(x-3)$ $\quad = (x+1)(2x^2 - 7x + 3)$ $\quad = 2x^3 - 7x^2 + 3x + 2x^2 - 7x + 3$ $\quad = 2x^3 - 5x^2 - 4x + 3$ $f(x) = 2x^3 + bx^2 + cx + d$ $\quad \therefore b = -5, \; c = -4, \; d = 3$	✓✓ $f(x) = 2(x+1)\left(x - \frac{1}{2}\right)(x-3)$ **OR/*OKANYE*** ✓✓ $f(x) = (x+1)(2x-1)(x-3)$ ✓ exapansion / *expanzhini* ✓ simplifying / *simplifayingi* (4)
8.1.2	$f'(x) = 6x^2 - 10x - 4$ $\quad 0 = 6x^2 - 10x - 4$ $\quad \therefore 3x^2 - 5x - 2 = 0$ $\quad (3x+1)(x-2) = 0$ $\quad \therefore x = -\frac{1}{3} \; \text{or} / of \; \; x = 2$ $\quad \therefore \text{N is at } f(2)$ $f(2) = 2(2)^3 - 5(2)^2 - 4(2) + 3$ $\quad = -9$ $\therefore N(2 \,; -9)$	✓ $f'(x) = 6x^2 - 10x - 4 = 0$ ✓ factorisation / *fekhthorizeyshini* ✓ chosing/*ngokukhetha* : $x = 2$ ✓ $y = -9$ (4)
8.1.3 (a)	$-\frac{1}{3} < x < 2$	✓✓ answer / *impendulo* (2)
8.1.3 (b)	$f''(x) = 12x - 10$ $12x - 10 < 0$ $\quad 12x < 10$ $\quad \therefore x < \frac{5}{6}$ **OR/*OKANYE*** $x = \frac{-\frac{1}{3} + 2}{2} = \frac{5}{6}$ $\therefore x < \frac{5}{6}$	✓ $f''(x) = 12x - 10$ ✓ $f''(x) < 0$ ✓ answer / *impendulo* **OR/*OKANYE*** ✓ $x = \frac{5}{6}$ ✓✓ $x < \frac{5}{6}$ **OR/*OKANYE*** interval notation /*intaval notheyshini* (3)
8.2		✓ $f(0) = 0$ ✓ $(m \,; 0)$ ✓ shape / *sheyiphi* (3)
		[16]

QUESTION 9/*UMBUZO 9*

9.1	$A = \left(\frac{1}{2} \times 15x \times 8x \times 2\right) + (15xy) + (8xy) + (17xy)$ $5760 = 120x^2 + 40xy$ $\therefore y = \dfrac{5760 - 120x^2}{40x}$	✓ total surface area / *Isafeyisi eriya epheleleyo* ✓ $5\,760 = 120x^2 + 40xy$ (2)
9.2	$V = (\frac{1}{2}b.h) \times H$ $V = \frac{1}{2} \times 15x \times 8x \times y$ $= \dfrac{1}{2} \times 15x \times 8x \times \dfrac{5760 - 120x^2}{40x}$ $= 60x\left(144 - 3x^2\right)$ $= 8640x - 180x^3$	✓ substitution into V *Isaphstityushini ku* V ✓ substituing for *y* *Isaphstityushini ka y* (2)
9.2	$V'(x) = 8640 - 540x^2$ $V'(x) = 0$ $\therefore 8640 - 540x^2 = 0$ $8640 = 540x^2$ $x^2 = 16$ $\therefore x = 4$	✓ $V'(x) = 8640 - 540x^2$ ✓ $V'(x) = 0$ ✓ simplification / *isimplifikheyshini* ✓ answer / *impendulo* (4)
		[8]

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QUESTION 10/*UMBUZO 10*

10.1.1	$P(B) = 1 - P(\text{not/hayi } B)$ $\qquad = 1 - 0,45$ $\qquad = 0,55$	✓ 0,55 (1)
10.1.2	$P(A \text{ and/no } B) = P(A) \times P(B)$ $\qquad\qquad = 0,2 \times 0,55$ $\qquad\qquad = 0,11$ $P(A \text{ or/okanye } B) = P(A) + P(B) - P(A \text{ and/no } B)$ $\qquad\qquad = 0,2 + 0,55 - 0,11$ $\qquad\qquad = 0,64 \quad \text{or } / \text{ okanye} \quad \dfrac{16}{25}$	✓ $P(A) \times P(B)$ ✓ substitution / *isaphstityushini* ✓ answer / *impendulo* (3)
10.2	 $P(\text{late/leyithi}) = \dfrac{1}{2}x + \dfrac{3}{5}(1-x)$ $\dfrac{1}{2}x + \dfrac{3}{5}(1-x) = \dfrac{8}{15}$ $15x + 18(1-x) = 16$ $15x + 18 - 18x = 16$ $\qquad\quad -3x = -2$ $\qquad\qquad x = \dfrac{2}{3}$	✓ $\frac{1}{2}x + \frac{3}{5}(1-x)$ ✓ equating /*ekhweything* ✓ substitution / *saphstithyushini* ✓ answer / *impendulo* (4)
		[8]

QUESTION 11/*UMBUZO 11*

11.1	@@@ ### $$\boxed{20} \times \boxed{22} \times \boxed{21} \times \boxed{10} \times \boxed{10} \times \boxed{10}$$ $$= 9\,240\,000$$	✓ $\boxed{20} \times \boxed{22} \times \boxed{21}$ ✓ $\boxed{10} \times \boxed{10} \times \boxed{10}$ ✓ answer / *impendulo* (3)
11.2	$$\frac{\boxed{20} \times \boxed{19} \times \boxed{3} \times \boxed{10} \times \boxed{10} \times \boxed{5} + \boxed{20} \times \boxed{3} \times \boxed{19} \times \boxed{10} \times \boxed{10} \times \boxed{5}}{9\,240\,000}$$ $$= \frac{1\,140\,000}{9\,240\,000}$$ $$= \frac{19}{154} \quad \text{or} / okanye \quad 0,12 \quad \text{or} / okanye \ 12,34\%$$	✓ $\boxed{20} \times \boxed{19} \times \boxed{3} \times \boxed{10} \times \boxed{10} \times \boxed{5}$ ✓ $\boxed{20} \times \boxed{3} \times \boxed{19} \times \boxed{10} \times \boxed{10} \times \boxed{5}$ ✓ adding / *ngokudibanisa* ✓ 9 240 000 ✓ answer / *impendulo* (5)
		[8]

TOTAL/*AMANQAKU APHELELEYO:* **150**