Province of the
EASTERN CAPE
EDUCATION

NATIONAL SENIOR CERTIFICATE/ *ISATIFIKETI SEBANGA LESHUMI*

GRADE/*GREYIDI 12*

SEPTEMBA 2021

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

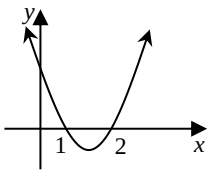
MARKS/*AMANQAKU*: **150**

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.*

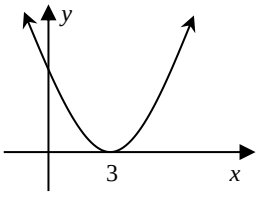
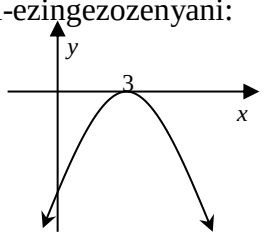
QUESTION 1/*UMBUZO 1*

1.1.1	$x^2+2x-15=0$ $(x-3)(x+5)=0$ $\therefore x=3$ or / *of* $x=-5$ **OR/*OKANYE*** $x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$ $=\frac{-2\pm\sqrt{2^2-4(1)(-15)}}{2(1)}$ $=\frac{-2\pm\sqrt{64}}{2}$ $=3$ or / *of* -5	✓ factors / *fekhthaza* ✓ $x=3$ ✓ $x=-5$ **OR/*OKANYE*** ✓ substitution / *saphstityushini* ✓ $x=3$ ✓ $x=-5$ (3)
1.1.2	$3x^2+x-1=0$ $x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$ $=\frac{-1\pm\sqrt{1^2-4(3)(-1)}}{2(3)}$ $=\frac{-1\pm\sqrt{13}}{6}$ $=0,43$ 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	$x(x-3)\geq -2$ $x^2-3x+2\geq 0$ $(x-1)(x-2)\geq 0$ $\therefore x\leq 1$ or / *of* $x\geq 2$  	✓ standard form *Standad fom* ✓ factorisation *fekhthorizeyishini* ✓ $x\leq 1$ or/*okanye* ✓ $x\geq 2$ (4)

1.1.4	$\sqrt{43-x}-x+1=0$ $\sqrt{43-x}=x-1$ $\left(\sqrt{43-x}\right)^2=(x-1)^2$ $43-x=x^2-2x+1$ $x^2-x-42=0$ $(x-7)(x+6)=0$ $\therefore x=7$ or / *of* $x\neq -6$	✓ isolating the surd *Asoyileyithing i sed* ✓ squaring both sides *Sikwering amacala omabini* ✓ standard form / *standad fom* ✓ factorisation / *fekhthorizeyshini* ✓ selection / *ngokukhetha* (5)

1.2	$2y-x=3$ (1) $y^2+3x=2xy$ (2) $x=2y-3$ (3) Substitute (3) into (2) / *Saphstityuthi* (3) *ku* (2) $y^2+3(2y-3)=2y(2y-3)$ $y^2+6y-9-4y^2+6y=0$ $-3y^2+12y-9=0$ $y^2-4y+3=0$ $(y-3)(y-1)=0$ $\therefore y=3$ or / *of* $y=1$ $x=2(3)-3$ or / *of* $x=2(1)-3$ $=3$ $=-1$ **OR/*OKANYE*** $2y-x=3$ (1) $y^2+3x=2xy$ (2) $y=\frac{x}{2}+\frac{3}{2}$ (3) Substitute (3) into (2) / *Saphstutyuthi* (3) *ku* (2) $\left(\frac{x}{2}+\frac{3}{2}\right)^2+3x=2x\left(\frac{x}{2}+\frac{3}{2}\right)$ $\frac{x^2}{4}+\frac{6x}{4}+\frac{9}{4}+3x=x^2+3x$ $-\frac{3x^2}{4}+\frac{6x}{4}+\frac{9}{4}=0$ $-3x^2+6x+9=0$ $x^2-2x-3=0$ $(x-3)(x+1)=0$ $\therefore x=3$ or / *of* $x=-1$ $y=\left(\frac{3}{2}+\frac{3}{2}\right)$ or / *of* $y=\left(-\frac{1}{2}+\frac{3}{2}\right)$ $=3$ $=1$	✓ $x=2y-3$ ✓ substitution / *saphstityushini* ✓ standard form / *standad fom* ✓ factorisation / *fekhthorizeyshini* ✓ *y*-values / *y-velyus* ✓ *x*-values / *x-velyus* **OR/*OKANYE*** ✓ $y=\frac{x}{2}+\frac{3}{2}$ ✓ substitution / *saphstityushini*

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

1.3	$x = \frac{5 \pm \sqrt{p(6-p)-9}}{2}$ For non-real roots: / *Ngeeruthi – ezingezozenyani* : $\Delta < 0$ $p(6-p)-9<0$ $-p^2+6p-9<0$ $p^2-6p+9>0$ $(p-3)^2>0$ $\therefore p \in \mathbb{R}$ but/*kodwa* $p \neq 3$  **OR/*OKANYE*** $x = \frac{5 \pm \sqrt{p(6-p)-9}}{2}$ For non-real roots:/ Ngeeruthi-ezingezozenyani: $\Delta < 0$ $p(6-p)-9<0$ $-p^2+6p-9<0$ $(3-p)(p-3)<0$ $\therefore p \in \mathbb{R}$ 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	$-16 \quad ; \quad -16 \quad ; \quad -12 \quad ; \quad -4$ $0 \qquad 4 \qquad 8$ $4 \qquad 4$ 8	✓ 8 (1)
2.1.2	$2a = 4$ $\therefore a = 2$ $3a + b = 4$ $3(2) + b = 0$ $\therefore b = -6$ $a + b + c = -16$ $2 - 6 + c = -16$ $\therefore c = -12$ $T_n = 2n^2 - 6n - 12$	✓ $a = 2$ ✓ $b = -6$ ✓ $c = -12$ ✓ $T_n = 2n^2 - 6n - 12$ (4)
2.1.3	$T_{38} = 2(38)^2 - 6(38) - 12$ $= 2\,648$	✓ substitution / *saphstityushini* ✓ answer / *impendulo* (2)

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

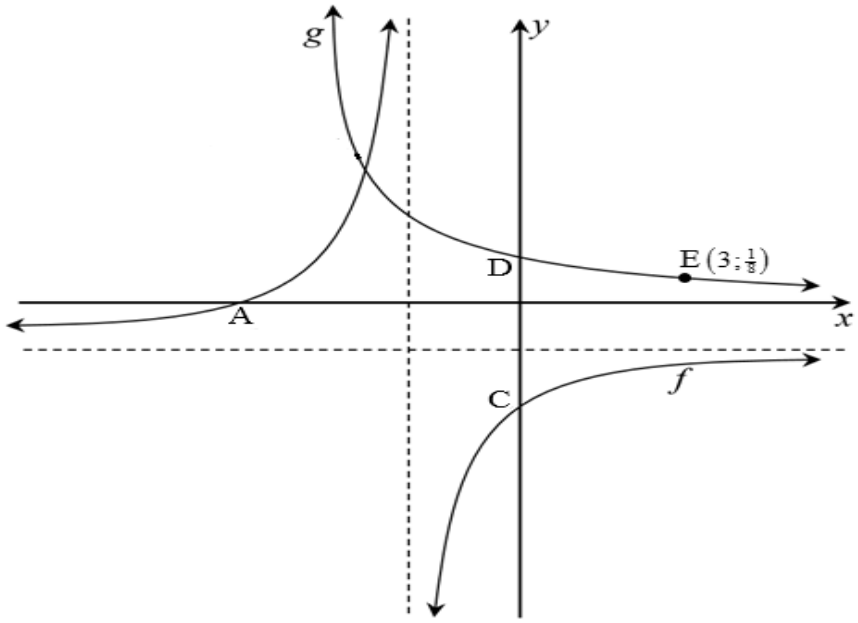
2.2.1	$T_n = a + (n-1)d$ $89 = 2 + (n-1)(3)$ $3n - 1 = 89$ $3n = 90$ $n = 30$	✓ substitution / *saphstityushini* ✓ answer / *impendulo* (2)

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]

QUESTION 3/*UMBUZO 3*

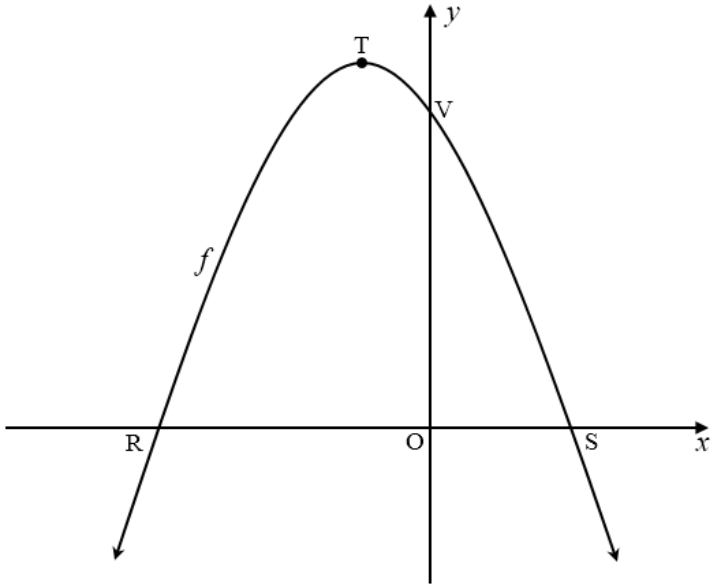
3.1	$T_9 = ar^8 = 768$ $T_{13} = ar^{12} = 12\,288$ $\frac{ar^{12}}{ar^8} = \frac{12\,288}{768}$ $\therefore r^4 = 16$ $r = \pm 2$ $a = \frac{768}{(\pm 2)^8}$ $= 3$	✓ $\frac{ar^{12}}{ar^8} = \frac{12\,288}{768}$ ✓ $r = \pm 2$ ✓ value of a / *ivelyu ka a* (3)
3.2.1	$S_2 = \frac{54}{19} - \frac{24}{19}$ $= \frac{30}{19}$	✓ answer / *impendulo* (1)
3.2.2	$T_1 + T_2 = \frac{30}{19}$ $a + ar = \frac{30}{19}$ $a(1+r) = \frac{30}{19}$ $a = \frac{30}{19(1+r)}$	✓ $a + ar = \frac{30}{19}$ (1)
3.2.3	$S_\infty = \frac{a}{1-r} = \frac{54}{19}$ $\therefore a = \frac{54(1-r)}{19}$ $a = \frac{30}{19(1+r)}$ ..... *from / ukusuka*(3.2.2) $\therefore \frac{30}{19(1+r)} = \frac{54(1-r)}{19}$ $(1-r)(1+r) = \frac{30}{54}$ $1 - r^2 = \frac{5}{9}$ $r^2 = \frac{4}{9}$ $\therefore r = \frac{2}{3}$	✓ $a = \frac{54(1-r)}{19}$ ✓ equating / *ikhweything* ✓ $r^2 = \frac{4}{9}$ ✓ 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	$g(x)=b^x$ $8=b^{-3}$ $8=\frac{1}{b^3}$ $b^3=\frac{1}{8}$ $\therefore b=\frac{1}{2}$	✓ substitution / *saphstityushini* ✓ answer / *impendulo* (2)
4.5	$y=\frac{-3}{x+2}-1$ $0=\frac{-3}{x+2}-1$ $1=\frac{-3}{x+2}$ $x+2=-3$ $x=-5$ $\therefore A(-5;0)$ $y=\frac{-3}{0+2}-1$ $=-\frac{5}{2}$ $\therefore C\left(0;-\frac{5}{2}\right)$	✓ substitution y = 0 / *saphstityushini y = 0* ✓ $x=-5$ ✓ $y=-\frac{5}{2}$ (3)

4.6	$x=\left(\frac{1}{2}\right)^y$ $\therefore y=\log_{\frac{1}{2}} x$ **OR/*OKANYE*** $y=2^{-x}$ $\therefore x=2^{-y}$ $y=-\log_2 x$	✓ $x=\left(\frac{1}{2}\right)^y$ ✓ $y=\log_{\frac{1}{2}} x$ **OR/*OKANYE*** ✓ $x=2^{-y}$ ✓ $y=-\log_2 x$ (2)
4.7.1	$-5<x<-2$ **OR/*OKANYE*** $x\in(-5\,;-2)$	✓✓ answer / *impendulo*(A) (2)
4.7.2	$0<x\leq\frac{1}{8}$ **OR/*OKANYE*** $x\in(0\,;\frac{1}{8}]$	✓✓ 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* $x=2$ $\therefore \text{R}(-4;0)$ and / *no* S(2 ; 0) $\therefore \text{RS}=6$ units / *yunithi*	✓ $f(x)=0$ ✓ factorisation / *fekhthorizeyshini* ✓ values of x / *ivelyu ka x* ✓ answer / *impendulo* (4)

5.2	$x=\frac{-4+2}{2}$ $=-1$ $y=-(-1)^2-2(-1)+8$ $=9$ $\therefore \mathrm{T}(-1;9)$ **OR/*OKANYE*** $f(x)=-x^2-2x+8$ $x=-\frac{b}{2a}$ $=-\left(\frac{-2}{2(-1)}\right)$ $=-1$ $y=-(-1)^2-2(-1)+8$ $=9$ $\therefore \mathrm{T}(-1;9)$ **OR/*OKANYE*** $f'(x)=-2x-2=0$ $-2x=2$ $x=-1$ $y=-(-1)^2-2(-1)+8$ $=9$ $\therefore \mathrm{T}(-1;9)$	✓ method / *indlela* ✓ $x=-1$ ✓ $y=9$ **OR/*OKANYE*** ✓ $-\frac{b}{2a}$ ✓ $x=-1$ ✓ $y=9$ **OR/*OKANYE*** ✓ $-2x-2=0$ ✓ $x=-1$ ✓ $y=9$ (3)
5.3.1	$f(x)=-x^2-2x+8$ $f'(x)=-2x-2$ $\therefore -2x-2=2$ $\therefore \quad x=-2$ $\therefore y=-(-2)^2-2(-2)+8$ $=8$ $\therefore \mathrm{W}(-2;8)$	✓ $f'(x)$ ✓ $f'(x)=2$ ✓ $x=-2$ ✓ $y=8$ (4)
5.3.2	$g(x)=mx+c$ $m=-\frac{1}{2}$ ($\perp$ lines / *layini*) $c=8$ $\therefore y=-\frac{1}{2}x+8$	✓ gradient / *grediyenti* ✓ equation / *ekhweyzhini* (2)

5.4	$f(x) = -x^2 - 2x + 8$ $h(x) = -f(x-1)$ $= -\left[-(x-1)^2 - 2(x-1) + 8\right]$ $= -\left[-(x^2 - 2x + 1) - 2x + 2 + 8\right]$ $= -\left[-x^2 + 2x - 1 - 2x + 2 + 8\right]$ $= x^2 - 9$ **OR/*OKANYE*** $h(x) = (x+3)(x-3)$ $= x^2 - 9$ **OR/*OKANYE*** New turning point /*Ithening poyinti entsha* = (0 ; –9) $y = x^2 - 9$	✓ $-f(x-1)$ ✓ substitution / *saphstityushini* ✓ simplifying / *Ukwenza lula* ✓ equation / *ikhweyzhini* **OR/*OKANYE*** ✓✓ roots/*ruthi* 3 and/*no* –3 ✓ +(x + 3)(x – 3) ✓ equation / *ikhweyzhini* **OR/*OKANYE*** ✓ (0 ; ✓✓–9) ✓ equation / *ikhweyzhini* (4)
		[17]

QUESTION 6/*UMBUZO 6*

6.1	$A = P(1-i)^n$ $5510 = 9670(1-i)^4$ $\therefore i = 1 - \sqrt[4]{\frac{5510}{9670}}$ $= 0{,}131177$ $\therefore r = 13{,}12\%$	✓ subst. into correct formula *Ukusaphstityutha kwi fomyula eyiyo* ✓ simplification *simplifikheyshini* ✓ answer / *impendulo* (3)

6.2	End of December/*Ekupheleni kuka Disemba* $F = \frac{x[(1+i)^n - 1]}{i}$ $\therefore F = \frac{600\left[\left(1+\frac{0,087}{12}\right)^{144} - 1\right]}{\frac{0,087}{12}}$ $= R151\ 438,20$ EndofJanuary/*Ekupheleni kukaJanuwari* $A = P(1+i)^n$ $= 151\ 438,20\left(1+\frac{0,087}{12}\right)$ $= R152\ 536,13$ **OR/*OKANYE*** $F = \frac{x[(1+i)^n - 1](1+i)}{i}$ $\therefore F = \frac{600\left[\left(1+\frac{0,087}{12}\right)^{144} - 1\right]\left(1+\frac{0,087}{12}\right)}{\frac{0,087}{12}}$ $= \boldsymbol{R}152\ 536,13$	✓ $n = 144$ ✓ 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	$P = \frac{x\left[1-(1+i)^{-n}\right]}{i}$ $350\,000 = \frac{x\left[1-\left(1+\frac{0,093}{12}\right)^{-72}\right]}{\frac{0,093}{12}}$ $\therefore x = \frac{350\,000 \times \frac{0,093}{12}}{\left[1-\left(1+\frac{0,093}{12}\right)^{-72}\right]}$ $\therefore x \approx \text{R}6\,361,18$	✓ $i = \frac{0,093}{12}$ and $n = 72$ ✓ substitution into correct formula *Isaphstityushini kwi fomyula eyiyo* ✓ answer / *impendulo* (3)

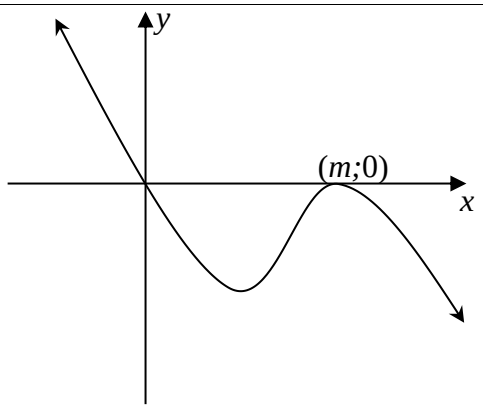
6.3.2	Outstanding balance = / Ibhalansi eshiyekileyo = $P = \frac{x\left[1-(1+i)^{-n}\right]}{i}$ $\therefore P = \frac{6\,361{,}18\left[1-\left(1+\frac{0{,}093}{12}\right)^{-32}\right]}{\frac{0{,}093}{12}}$ $= R179\,667{,}32$ **OR/*OKANYE*** Outstandingbalance / Ibhalansi eshiyekileyo $= A - F$ $= 350\,000\left(1+\frac{0{,}093}{100}\right)^{40} - \frac{6\,361{,}18\left[\left(1+\frac{0{,}093}{12}\right)^{40}-1\right]}{\frac{0{,}093}{12}}$ $= R476\,628{,}84 - R296\,961{,}79$ $= R179\,667{,}05$	✓ $i = \frac{0{,}093}{12}$ and $= 32$ ✓ subst. into correct formula *Isaphstityushini kwi fomyula eyiyo* ✓ P = 179 667, 32 **OR/*OKANYE*** ✓ $i = \frac{0{,}093}{12}$ and $= 40$ ✓ subst. Into correct formula *Ukusaphstityutha kwi fomyula eyiyo* ✓ 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
	∴The number of months is 29. *Inani leenyanga ngu* 29	✓ n = 29 months / *iinyanga* (4)
		[17]

QUESTION 7/*UMBUZO 7*

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

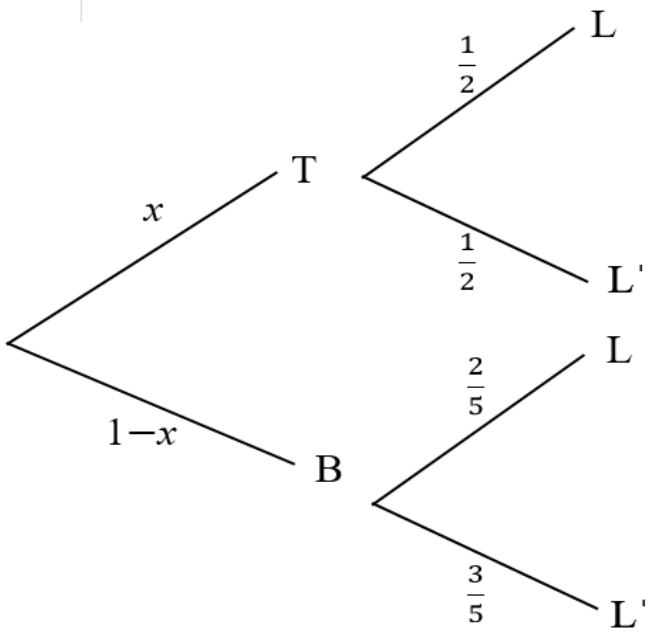
QUESTION 8/*UMBUZO 8*

8.1.1	$f(x) = 2(x-x_1)(x-x_2)(x-x_3)$ $= 2(x+1)(x-\frac{1}{2})(x-3)$ $= (x+1)(2x-1)(x-3)$ $= (x+1)(2x^2-7x+3)$ $= 2x^3-7x^2+3x+2x^2-7x+3$ $= 2x^3-5x^2-4x+3$ $f(x) = 2x^3+bx^2+cx+d$ $\therefore b=-5,\ c=-4,\ d=3$	✓✓ $f(x) = 2(x+1)(x-\frac{1}{2})(x-3)$ **OR/*OKANYE*** ✓✓ $f(x) = (x+1)(2x-1)(x-3)$ ✓ exapansion / *expanzhini* ✓ simplifying / *simplifayingi* (4)
8.1.2	$f'(x) = 6x^2-10x-4$ $0 = 6x^2-10x-4$ $\therefore 3x^2-5x-2=0$ $(3x+1)(x-2)=0$ $\therefore x = -\frac{1}{3}$ or / *of* $x=2$ ∴N is at $f(2)$ $f(2) = 2(2)^3-5(2)^2-4(2)+3$ $= -9$ $\therefore N(2;-9)$	✓ $f'(x) = 6x^2-10x-4=0$ ✓ 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)	$f''(x) = 12x-10$ $12x-10<0$ $12x<10$ $\therefore x < \frac{5}{6}$ **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	$A=\left(\frac{1}{2}\times 15x\times 8x\times 2\right)+(15xy)+(8xy)+(17xy)$ $5760=120x^2+40xy$ $\therefore y=\frac{5760-120x^2}{40x}$	✓ total surface area / *Isafeyisi eriya epheleleyo* ✓ $5\,760 = 120x^2 + 40xy$ (2)
9.2	$V=(\frac{1}{2}b.h)\times H$ $V=\frac{1}{2}\times 15x\times 8x\times y$ $=\frac{1}{2}\times 15x\times 8x\times\frac{5760-120x^2}{40x}$ $=60x\left(144-3x^2\right)$ $=8640x-180x^3$	✓ 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]

QUESTION 10/*UMBUZO 10*

10.1.1	$P(B) = 1 - P(\text{not/hayi } B)$ $= 1 - 0,45$ $= 0,55$	✓ 0,55 (1)
10.1.2	$P(A \text{ and/no } B) = P(A) \times P(B)$ $= 0,2 \times 0,55$ $= 0,11$ $P(A \text{ or/okanye } B) = P(A) + P(B) - P(A \text{ and/no } B)$ $= 0,2 + 0,55 - 0,11$ $= 0,64$ or / *okanye* $\frac{16}{25}$	✓ P(A)×P(B) ✓ substitution / *isaphstityushini* ✓ answer / *impendulo* (3)
10.2	 $P(\text{late/leyithi}) = \frac{1}{2}x + \frac{3}{5}(1-x)$ $\frac{1}{2}x + \frac{3}{5}(1-x) = \frac{8}{15}$ $15x + 18(1-x) = 16$ $15x + 18 - 18x = 16$ $-3x = -2$ $x = \frac{2}{3}$	✓ $\frac{1}{2}x + \frac{3}{5}(1-x)$ ✓ 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	$\dfrac{\boxed{20}\times\boxed{19}\times\boxed{3}\times\boxed{10}\times\boxed{10}\times\boxed{5}+\boxed{20}\times\boxed{3}\times\boxed{19}\times\boxed{10}\times\boxed{10}\times\boxed{5}}{9\,240\,000}$ $=\dfrac{1140\,000}{9\,240\,000}$ $=\dfrac{19}{154}$ or / *okanye* $0{,}12$ 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