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NATIONAL SENIOR CERTIFICATE/ *SETIFIKEITI SE PHAHAMENG SA NAHA*

GRADE/*KEREITE 12*

SEPTEMBER 2021

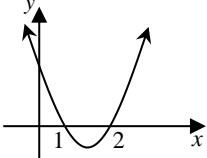## MATHEMATICS P1/*DIPALO P1* MARKING GUIDELINE/*DITATAISO TSA HO TSHWAYA*

MARKS/*MATSHWAO*: 150

This marking guideline consists of 22 pages./
Tataiso ena ya ma tshwao ena le maqephe a 22.
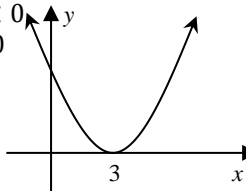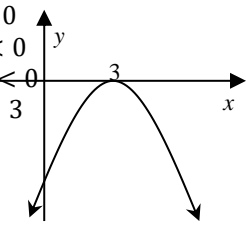
NOTE/*NEHA HLOKO*:

- If a candidate answers a question TWICE, mark the FIRST attempt ONLY.
  Haeba mohlahlubuwa o arabile ha bedi tshwaya leko ya PELE FEELA.
- Consistent accuracy applies in ALL aspects of the marking guideline.
  Tumellano e nepahetseng e sebetsa ho di karolo KAOFELA ho tshwayo.
- If a candidate crossed out an attempt of a question and did not redo the question, mark the crossed-out attempt.
  Haeba mohlahlubuwa o hlabile teko ya potso a seka bela a araba potso, tshwaya tefo e hlajiweng.
- The mark for substitution is awarded for substitution into the correct formula.
  Le tshwao la sabustitshushini le fowa ho sabusitikhushini e nepahetseng ya meralo.
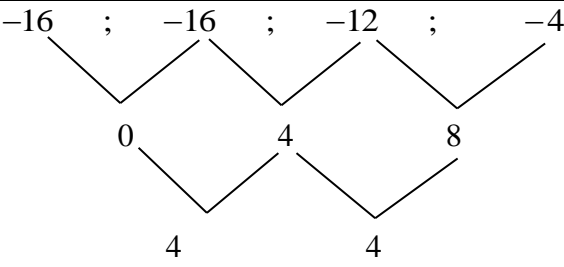
QUESTION 1/*POTSO 1*

1.1.1	$x^2 + 2x - 15 = 0$
	 $(x-3)(x+5) = 0$
	 $\therefore x = 3 \quad$ or / *of* $\quad x = -5$
	
	          OR/*KAPA*
	
	 $x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
	 $= \dfrac{-2 \pm \sqrt{2^2 - 4(1)(-15)}}{2(1)}$
	 $= \dfrac{-2 \pm \sqrt{64}}{2}$
	 $= 3 \ $ or / *of* $\ -5$
		✓ factors / *fekethas*
		 ✓ $x = 3$ ✓ $x = -5$
		
		        OR/*KAPA*
		
		 ✓ substitution / *sabusithitshushini*
		
		 ✓ $x = 3$ ✓ $x = -5$
		                  (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* $\ -0,77$ <table><tr><td>Penalise 1 mark for incorrect rounding *Penaliseer 1 punt vir verkeerde afronding*</td></tr></table>	✓ substitution / *sabosititshushini* ✓ $x = 0,43$ ✓ $x = -0,77$ (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
		    Formo etlwaelehileng
		 ✓ factorisation
		    fekethoreseishini
		 ✓ $x \leq 1$ or/*of* ✓ $x \geq 2$
		                  (4)

1.1.4	$\sqrt{43 - x} - x + 1 = 0$	$\checkmark$ isolating the surd
	$\sqrt{43 - x} = x - 1$	*Ho itlhaola sede*
	$\left(\sqrt{43 - x}\right)^2 = (x - 1)^2$	
	$43 - x = x^2 - 2x + 1$	$\checkmark$ squaring both sides
	$x^2 - x - 42 = 0$	*Ho sekwera mahlakori ka bobedi*
	$(x - 7)(x + 6) = 0$	
	$\therefore x = 7 \text{ or } x \neq -6$	$\checkmark$ standard form / *foromo etlwaelehilengg*
		$\checkmark$ factorisation / *fekithorisashini*
		$\checkmark$ selection / *kgetho e nepahetseng*
		(5)

| 1.2 | $2y - x = 3(1)$
 $y^2 + 3x = 2xy(2)$

 $x = 2y - 3(3)$
 Substitute (3) into (2)
 $y^2 + 3(2y - 3) = 2y(2y - 3)$
 $y^2 + 6y - 9 - 4y^2 + 6y = 0$
 $-3y^2 + 12y - 9 = 0$
 $y^2 - 4y + 3 = 0$
 $(y - 3)(y - 1) = 0$
 $\therefore y = 3 \text{ or } y = 1$
 $x = 2(3) - 3 \text{ or } x = 2(1) - 3$
 $= 3 = -1$

 OR/KAPA
 $2y - x = 3(1)$
 $y^2 + 3x = 2xy(2)$

 $y = \dfrac{x}{2} + \dfrac{3}{2}(3)$
 Substitute(3) into (2)
 $\left(\dfrac{x}{2} + \dfrac{3}{2}\right)^2 + 3x = 2x\left(\dfrac{x}{2} + \dfrac{3}{2}\right)$
 $\dfrac{x^2}{4} + \dfrac{6x}{4} + \dfrac{9}{4} + 3x = x^2 + 3x$
 $-\dfrac{3x^2}{4} + \dfrac{6x}{4} + \dfrac{9}{4} = 0$
 $-3x^2 + 6x + 9 = 0$
 $x^2 - 2x - 3 = 0$
 $(x - 3)(x + 1) = 0$
 $\therefore x = 3 \text{ or } x = -1$
 $y = \left(\dfrac{3}{2} + \dfrac{3}{2}\right) \text{ or } y = \left(-\dfrac{1}{2} + \dfrac{3}{2}\right)$
 $= 3 = 1$ | ✓ $x = 2y - 3$

 ✓ substitution /*sabusithikhushini*

 ✓ standard form / *foromo etlwaelehileng*

 ✓ factorisation / *fekhuthoriseshini*
 ✓ y-values / di *y-velu*

 ✓ x-values /di *x-velu*

 OR/*KAPA*

 ✓ $y = \dfrac{x}{2} + \dfrac{3}{2}$

 ✓ substitution /*sabosititshushini*

 ✓ standard form / *foromo etlwaelehileng*

 ✓ factorisation / *fekithorisashini*
 ✓ x-values / di *x-velu*
 ✓ y-values / di *y-velu*

 (5) |

| 1.3 | $x = \frac{5 \pm \sqrt{p(6-p)-9}}{2}$

 For non-real roots:
 $\Delta < 0$
 $p(6 - p) - 9 < 0$
 $-p^2 + 6p - 9 < 0$
 $p^2 - 6p + 9 > 0$
 $(p - 3)^2 > 0$
 $\therefore p \in \mathbb{R} \text{ but } p \neq 3$

 OR/KAPA

 $x = \frac{5 \pm \sqrt{p(6-p)-9}}{2}$

 For non-real roots:
 $\Delta < 0$
 $p(6 - p) - 9 < 0$
 $-p^2 + 6p - 9 < 0$
 $(3 - p)(p - 3) < 0$
 $\therefore p \in \mathbb{R} \text{ but } p \neq 3$ | ✓ $\Delta < 0$

 ✓ standard form / *foromo etlwaelehileng*

 ✓ factorisation / *fekithorisashini*

 ✓ answer / *karabo*

 OR/KAPA

 ✓ $\Delta < 0$

 ✓ standard form / *foromo etlwaelehilengng*

 ✓ factorisation / *fekethorisaeshini*

 ✓ answer / *karabo*

 (4) |
| | | **[24]** |

QUESTION 2/ _POTSO 2_

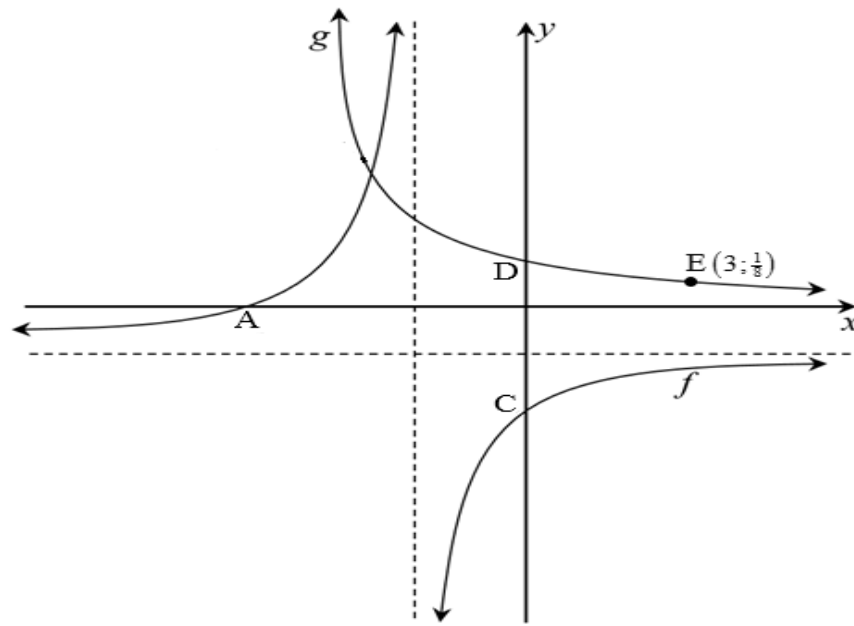| 2.1.1	-16 ; -16 ; -12 ; -4 0 4 8 4 4 8	✓ 8 (1)
2.1.2	$2a = 4$ $\therefore a = 2$ $3a + b = 4$ $3(2) + b = 0$ $\therefore b = -6$ $a + b + c = -16$ $2 - 6 + c = -16$ $\therefore c = -12$ $T_n = 2n^2 - 6n - 12$	✓ $a = 2$ ✓ $b = -6$ ✓ $c = -12$ ✓ $T_n = 2n^2 - 6n - 12$ (4)
2.1.3	$T_{38} = 2(38)^2 - 6(38)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

2.1.4	General term for first differences: *Themo ya kakaretso ya phapang ya pele* $T_n = 4n - 4$ $400 = 4n - 4$ $\therefore n = 101$ $T_{n(\text{linear})} = (T_{n+1} - T_n)_{(\text{quadratic})}$ $\therefore n = 101$ and $+ 1 = 102$ The terms are: 101 and 102 **OR/*KAPA*** $2(n+1)^2 - 6(n+1) - 12 - (2n^2 - 6n - 12) = 400$ $2n^2 + 4n + 2 - 6n - 6 - 12 - 2n^2 + 6n + 12 = 400$ $4n - 4 = 400$ $4n = 404$ $\therefore n = 101$ $\therefore$ Between T_{101} and T_{102}	✓ $T_n = 4n - 4$ ✓ $T_n = 400$ ✓ answer / *karabo* (3) **OR/*KAPA*** ✓ $4n - 4 = 400$ ✓ ✓ answer / *karabo* (3)

	OR/*KAPA*
	 Trial and error
	 $T_{102} = 2(102)^2 - 6(102) - 12 = 20184$
	 $T_{101} = 2(101)^2 - 6(101) - 12 = 19784$
	 Difference : 400
	 $\therefore$ Between T_{101} and T_{102}
		OR/*KAPA*
		
		 ✓ subst. for T_{101} and T_{102}
		     Ka T_{101} le T_{102}
		
		 ✓ 400
		 ✓ answer / *karabo*
		                   (3)

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

2.2.2	*k is the sum to 30 terms.* $S_n = \frac{n}{2}[a + l]$ $= \frac{30}{2}[2 + 89]$ $= 1365$ **OR / KAPA** $S_n = \frac{n}{2}\left[2a + (n-1)d\right]$ $= \frac{30}{2}\left[2(2) + (30-1)(3)\right]$ $= 1365$	✓ Sum formula / moralo wa samo ✓ substitution / *sabositikhushini* ✓ answer / *karabo* **OR / KAPA** ✓ Sum formula / moralo wa samo ✓ substitution / *sabositikhushini* ✓ answer / *karabo* (3)
		[15]

QUESTION 3/ *POTSO 3*

3.1	$T_9 = ar^8 = 768$	
	$T_{13} = ar^{12} = 12\,288$	
	$\dfrac{ar^{12}}{ar^8} = \dfrac{12\,288}{768}$	$\checkmark$ $\dfrac{ar^{12}}{ar^8} = \dfrac{12\,288}{768}$
	$\therefore r^4 = 16$	
	$r = \pm 2$	$\checkmark$ $r = \pm 2$
	$a = \dfrac{768}{\left(\pm 2\right)^8}$	
	$= 3$	$\checkmark$ value of a / *velu ya a* (3)
3.2.1	$S_2 = \dfrac{54}{19} - \dfrac{24}{19}$	
	$= \dfrac{30}{19}$	$\checkmark$ answer / *karabo* (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	$S_\infty = \dfrac{a}{1-r} = \dfrac{54}{19}$	
	$\therefore a = \dfrac{54(1-r)}{19}$	$\checkmark$ $a = \dfrac{54(1-r)}{19}$
	$a = \dfrac{30}{19(1+r)} \ldots\ldots\ldots from$ (3.2.2)	
	$\therefore \dfrac{30}{19(1+r)} = \dfrac{54(1-r)}{19}$	
	$(1-r)(1+r) = \dfrac{30}{54}$	$\checkmark$ equating / *ho le kanntsha*
	$1 - r^2 = \dfrac{5}{9}$	
	$r^2 = \dfrac{4}{9}$	
	$\therefore r = \dfrac{2}{3}$	$\checkmark$ $r^2 = \dfrac{4}{9}$
		$\checkmark$ answer / *karabo* (4)
		[9]
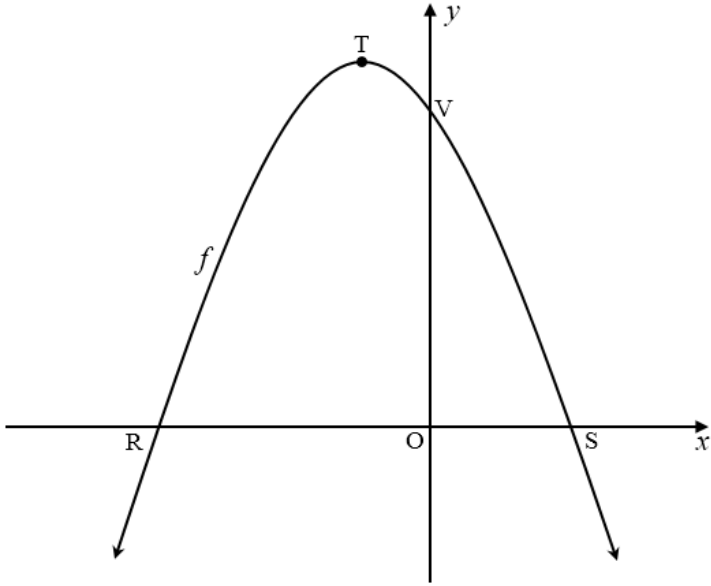
QUESTION 4/ *POTSO 4*

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 $x \neq -2$	✓ $x \in \mathbb{R}$ ✓ $x \neq -2$ (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 / *sabusitikhushini* ✓ answer / *karabo* (2)
4.5	$y = \dfrac{-3}{x+2} - 1$ $0 = \dfrac{-3}{x+2} - 1$ $1 = \dfrac{-3}{x+2}$ $x + 2 = -3$ $x = -5$ $\therefore A(-5 ; 0)$ $y = \dfrac{-3}{0+2} - 1$ $= -\dfrac{5}{2}$ $\therefore C\left(0 ; -\tfrac{5}{2}\right)$	✓ substitution y = 0 / 　*sabusitikhushini y = 0* ✓ $x = -5$ ✓ $y = -\dfrac{5}{2}$ (3)

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

QUESTION 5/*POTSO 5*

5.1	$-x^2 - 2x + 8 = 0$ $x^2 + 2x - 8 = 0$ $(x + 4)(x - 2) = 0$ $\therefore x = -4 \text{ or } x = 2$ $\therefore R(-4; 0) \text{ and } S(2; 0)$ $\therefore \text{RS} = 6 \text{ units}$	✓ $f(x) = 0$ ✓ factorisation /*fekithorisashini* ✓ values of x / *velu tsa x* ✓ answer / *karabo* (4)

5.2	$x = \dfrac{-4+2}{2}$	✓ method / *method*
	$= -1$	✓ $x = -1$
	$y = -(-1)^2 - 2(-1) + 8$	
	$= 9$	✓ $y = 9$
	$\therefore \text{T}(-1;9)$	
	OR/KAPA	**OR/KAPA**
	$f(x) = -x^2 - 2x + 8$	
	$x = -\dfrac{b}{2a}$	✓ $-\dfrac{b}{2a}$
	$= -\left(\dfrac{-2}{2(-1)}\right)$	
	$= -1$	✓ $x = -1$
	$y = -(-1)^2 - 2(-1) + 8$	
	$= 9$	✓ $y = 9$
	$\therefore \text{T}(-1;9)$	
		OR/KAPA
	OR/KAPA	✓ $-2x - 2 = 0$
	$f'(x) = -2x - 2 = 0$	
	$-2x = 2$	
	$x = -1$	
	$y = -(-1)^2 - 2(-1) + 8$	
	$= 9$	✓ $x = -1$ ✓ $y = 9$
	$\therefore \text{T}(-1;9)$	(3)
5.3.1	$f(x) = -x^2 - 2x + 8$	✓ $f'(x)$
	$f'(x) = -2x - 2$	✓ $f'(x) = 2$
	$\therefore -2x - 2 = 2$	
	$\therefore \qquad x = -2$	✓ $x = -2$
	$\therefore y = -(-2)^2 - 2(-2) + 8$	
	$= 8$	✓ $y = 8$
	$\therefore \text{W}(-2;8)$	(4)
5.3.2	$g(x) = mx + c$	
	$m = -\dfrac{1}{2}(\perp \text{ lines})$	✓ gradient / *keratiente*
	$c = 8$	
	$\therefore y = -\dfrac{1}{2}x + 8$	
		✓ equation / *ekweishini*
		(2)

5.4	$f(x) = -x^2 - 2x + 8$	
	$h(x) = -f(x-1)$	✓ $-f(x-1)$
	$\quad = -\left[-(x-1)^2 - 2(x-1) + 8\right]$	✓ substitution / *sabosititshushini*
	$\quad = -\left[-(x^2 - 2x + 1) - 2x + 2 + 8\right]$	
	$\quad = -\left[-x^2 + 2x - 1 - 2x + 2 + 8\right]$	✓ simplifying /
	$\quad = x^2 - 9$	
		✓ equation / *ekweshini*
	OR/KAPA	**OR/KAPA**
	$h(x) = (x+3)(x-3)$	✓✓ roots/ *di ruthi* 3 and/*le*–3
	$\quad = x^2 - 9$	✓ $+(x+3)(x-3)$
		✓ equation / *ekweshini*
	OR/KAPA	**OR/KAPA**
	New turning point / *theneng pointe entjha* = (0 ; –9)	
	$y = x^2 - 9$	✓ (0 ; ✓✓–9)
		✓ equation / *ekweshini*
		(4)
		[17]

QUESTION 6/ *POTSO 6*

6.1	$A = P(1-i)^n$	
	$5510 = 9\,670(1-i)^4$	✓ subst. into correct formula *Sabosit ho moralo o nepahetseng*
	$\therefore i = 1 - \sqrt[4]{\dfrac{5510}{9\,670}}$	
	$\quad = 0,131177$	✓ simplification *Ho nolofatsa*
	$\therefore r = 13,12\%$	
		✓ answer / *karabo*
		(3)

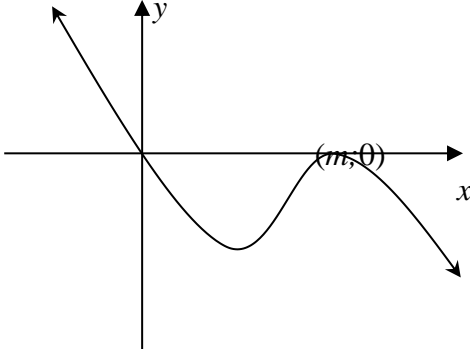|		
6.2	End of December $$F = \frac{x[(1+i)^n - 1]}{i}$$ $$\therefore F = \frac{600\left[\left(1+\frac{0,087}{12}\right)^{144} - 1\right]}{\frac{0,087}{12}}$$ $= R151\,438,20$ End of January $$A = P(1+i)^n$$ $$= 151\,438,20\left(1+\frac{0,087}{12}\right)$$ $$= R152\,536,13$$ **OR/KAPA** $$F = \frac{x[(1+i)^n - 1](1+i)}{i}$$ $$\therefore F = \frac{600\left[\left(1+\frac{0,087}{12}\right)^{144} - 1\right]\left(1+\frac{0,087}{12}\right)}{\frac{0,087}{12}}$$ $$= R152\,536,13$$	✓ $n = 144$ ✓ subst. into correct formula *Sabust ho moralo o nepahetseng* ✓ adding final month's interest *Aketsa tswala ya kgwedi ya ho qetela* ✓ answer / *karabo* **OR/KAPA** ✓ $n = 144$ ✓ subst. into correct formula *Sabost. ho moralo o nepahetseng* ✓ adding final month's interest *Aketsa tswala ya kgwedi ya ho qetela* ✓ answer / *karabo* (4)
6.3.1	$$P = \frac{x[1-(1+i)^{-n}]}{i}$$ $$350\,000 = \frac{x\left[1-\left(1+\frac{0,093}{12}\right)^{-72}\right]}{\frac{0,093}{12}}$$ $$\therefore x = \frac{350\,000 \times \frac{0,093}{12}}{\left[1-\left(1+\frac{0,093}{12}\right)^{-72}\right]}$$ $$\therefore x \approx R6\,361,18$$	✓ $i = \frac{0,093}{12}$ and $n = 72$ ✓ substitution into correct formula *Sabusititshushini ho moralo o nepahetseng* ✓ answer /*karabo* (3)

| 6.3.2 | Outstanding balance = $P = \dfrac{x[1-(1+i)^{-n}]}{i}$ $\therefore P = \dfrac{6\,361{,}18\left[1-\left(1+\dfrac{0{,}093}{12}\right)^{-32}\right]}{\dfrac{0{,}093}{12}}$ $= R179\,667{,}32$

 OR/KAPA

 Outstanding balance $= A - F$ $= 350\,000\left(1+\dfrac{0{,}093}{100}\right)^{40} - \dfrac{6\,361{,}18\left[\left(1+\dfrac{0{,}093}{12}\right)^{40}-1\right]}{\dfrac{0{,}093}{12}}$ $= R476\,628{,}84 - R296\,961{,}79$ $= R179\,667{,}05$ | ✓ $i = \dfrac{0{,}093}{12}$ and $= 32$
 ✓ subst. into correct formula *sabosit ho moralo o nepahetseng*

 ✓ $P = 179\,667,32$ (3)

 OR/KAPA

 ✓ $i = \dfrac{0{,}093}{12}$ and $= 40$
 ✓ subst. Into correct formula *Sabosit. Ho moralo o nepahetseng*

 ✓ $P = 179\,667,32$ (3) |

6.3.3	$\therefore 179\,667,32 = \dfrac{7\,000\left[1-\left(1+\frac{0,093}{12}\right)^{-n}\right]}{\frac{0,093}{12}}$	✓ subst. into correct formula *Sabositi. Ho moralo o nepahetseng*
	$\dfrac{179\,667,32 \times \frac{0,093}{12}}{7000} - 1 = -\left(1+\frac{0,093}{12}\right)^{-n}$	
	$-0,80108\ldots = -\left(\dfrac{4\,031}{4\,000}\right)^{-n}$	
	$\therefore 0,80108\ldots = \dfrac{4\,031}{4\,000}^{-n}$	
	$\therefore -n = \dfrac{\log 0,80\,108\ldots}{\log \frac{4\,031}{4\,000}}$	
	$-n \approx -28,73$	
	$\therefore n \approx 28,73$	
	$\therefore$ The number of months is 29. *Le nani la dikgwedi ke 29.*	✓ correct use of logs *Tsela e nepahetseng ya ho sebedisa dilogo*
	OR/KAPA	
	$179\,667,32 = \dfrac{7\,000\left[1-\left(1+\frac{0,093}{12}\right)^{-n}\right]}{\frac{0,093}{12}}$	✓ = 28,73
	$\dfrac{179\,667,32 \times \frac{0,093}{12}}{7\,000} - 1 = -\left(1+\frac{0,093}{12}\right)^{-n}$	
	$-0,80108\ldots = -\left(\dfrac{4\,031}{4\,000}\right)^{-n}$	✓ $n = 29$ months /*dikgwedi*
	$\therefore 0,80108\ldots = \dfrac{4\,031}{4\,000}^{-n}$	**OR/KAPA**
	$\therefore -n = \dfrac{\log 0,80\,108\ldots}{\log \frac{4\,031}{4\,000}}$	
	$-n \approx -28,73$	
	$\therefore n \approx 28,73$	
	$\therefore$ The number of months is 29. *Le nani la dikgwedi* 29	✓ subst. into correct formula *Sabosit. Ho moralo o nepahetseng*
		✓ correct use of logs
		Tsela e nepahetseng ya ho sebedisa di logo
		✓ = 28,73
		✓ $n = 29$ months / *kgwedi*
		(4)
		[17]

QUESTION 7/ *POTSO 7*

7.1	$f'(x) = \lim\limits_{h \to 0} \dfrac{f(x+h) - f(x)}{h}$	
	$= \lim\limits_{h \to 0} \dfrac{5 - 2(x+h)^2 - (5 - 2x^2)}{h}$	✓ substitution / *sabosititshushini*
	$= \lim\limits_{h \to 0} \dfrac{5 - 2x^2 - 4xh - 2h^2 - 5 + 2x^2}{h}$	✓ expansion / *ho oketsa*
	$= \lim\limits_{h \to 0} \dfrac{-4xh - 2h^2}{h}$	✓ simplification / *ho nolofatsha*
	$= \lim\limits_{h \to 0} \dfrac{h(-4x - 2h)}{h}$	
	$= \lim\limits_{h \to 0} (-4x - 2h)$	✓ notation and $\lim\limits_{h \to 0}(-4x - 2h)$
	$= -4x$	✓ answer / *karabo*
		(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 *le difarenshiething konstent*
		✓ $+6x^{-2}$
		(4)
		[12]
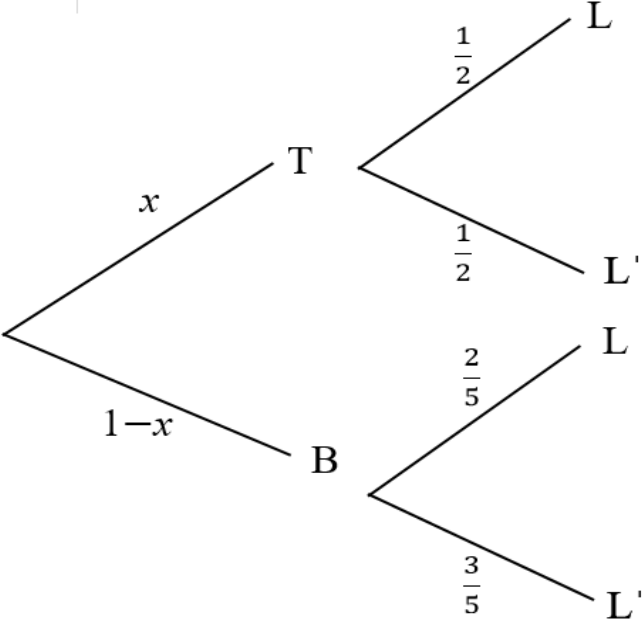
QUESTION 8/ *POTSO 8*

8.1.1	$f(x) = 2(x-x_1)(x-x_2)(x-x_3)$	
	$\quad = 2(x+1)\left(x-\tfrac{1}{2}\right)(x-3)$	$\checkmark\checkmark \ f(x) = 2(x+1)\left(x-\tfrac{1}{2}\right)(x-3)$
	$\quad = (x+1)(2x-1)(x-3)$	**OR/KAPA**
	$\quad = (x+1)(2x^2-7x+3)$	$\checkmark\checkmark \ f(x) = (x+1)(2x-1)(x-3)$
	$\quad = 2x^3 - 7x^2 + 3x + 2x^2 - 7x + 3$	$\checkmark$ expansion / *ho oketsa*
	$\quad = 2x^3 - 5x^2 - 4x + 3$	$\checkmark$ simplifying / *ho etsa bobebe*
	$f(x) = 2x^3 + bx^2 + cx + d$	(4)
	$\therefore b = -5, \ c = -4, \ d = 3$	
8.1.2	$f'(x) = 6x^2 - 10x - 4$	
	$\quad 0 = 6x^2 - 10x - 4$	$\checkmark \ f'(x) = 6x^2 - 10x - 4 = 0$
	$\therefore 3x^2 - 5x - 2 = 0$	
	$\quad (3x+1)(x-2) = 0$	$\checkmark$ factorisation / *fekithorisashini*
	$\therefore x = -\tfrac{1}{3} \ $ or / *of* $ \ x = 2$	
	$\quad \therefore$N is at $f(2)$	
	$f(2) = 2(2)^3 - 5(2)^2 - 4(2) + 3$	$\checkmark$ chosing/*ho kgetha* : $x = 2$
	$\quad = -9$	
	$\therefore N(2 \ ; -9)$	$\checkmark \ y = -9$ (4)
8.1.3 (a)	$-\tfrac{1}{3} < x < 2$	$\checkmark\checkmark$ answer / *karabo*
		(2)
8.1.3 (b)	$f''(x) = 12x - 10$	$\checkmark \ f''(x) = 12x - 10$
	$12x - 10 < 0$	
	$\quad 12x < 10$	$\checkmark \ f''(x) < 0$
	$\therefore x < \dfrac{5}{6}$	$\checkmark$ answer / *karabo*
	OR/KAPA	**OR/KAPA**
	$x = \dfrac{-\tfrac{1}{3} + 2}{2} = \dfrac{5}{6}$	$\checkmark \ x = \dfrac{5}{6}$
	$\therefore x < \dfrac{5}{6}$	$\checkmark\checkmark \ x < \dfrac{5}{6}$ **OR/KAPA** $x \in \left(-\infty \ ; \dfrac{5}{6}\right)$
		(3)
8.2		$\checkmark \ f(0) = 0$
		$\checkmark \ (m \ ; 0)$
		$\checkmark$ shape / *seemo*
		(3)
		[16]

QUESTION 9/*VRAAG 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 / *Totale safeisi eria* ✓ $5760 = 120x^2 + 40xy$ (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 *Sabosititshushioni ho* V ✓ substituing for *y* *Sabositikhushini ya 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 / *Ho nolofatsa* ✓ answer / *karabo* (4)
		[8]

QUESTION 10/*POTSO 10*

10.1.1	$P(B) = 1 - P(\text{not } B)$ $= 1 - 0{,}45$ $= 0{,}55$	✓ 0,55 (1)
10.1.2	$P(A \text{ and } B) = P(A) \times P(B)$ $= 0{,}2 \times 0{,}55$ $= 0{,}11$ $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$ $= 0{,}2 + 0{,}55 - 0{,}11$ $= 0{,}64 \text{ or } \dfrac{16}{25}$	✓ $P(A) \times P(B)$ ✓ substitution / *sabosititshushini* ✓ answer / *karabo* (3)
10.2	 $P(\text{late}/laat) = \dfrac{1}{2}x + \dfrac{3}{5}(1-x)$ $\dfrac{1}{2}x + \dfrac{3}{5}(1-x) = \dfrac{8}{15}$ $15x + 18(1-x) = 16$ $15x + 18 - 18x = 16$ $-3x = -2$ $x = \dfrac{2}{3}$	✓ $\frac{1}{2}x + \frac{3}{5}(1-x)$ ✓ equating / *ho le kantsha* ✓ substitution / *sabosititshushini* ✓ answer / *karabo* (4)
		[8]

QUESTION 11/*POTSO 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 / *karabo* (3)
11.2	$$\frac{\boxed{20} \times \boxed{19} \times \boxed{3} \times \boxed{10} \times \boxed{10} \times \boxed{5} + \boxed{20} \times \boxed{3} \times \boxed{19} \times \boxed{10} \times \boxed{10} \times \boxed{5}}{9\,240\,000}$$ $$= \frac{1140\,000}{9\,240\,000}$$ $$= \frac{19}{154} \quad \text{or} / of \quad 0{,}12 \text{ or} / of \text{ } 12{,}34\%$$	✓ $\boxed{20} \times \boxed{19} \times \boxed{3} \times \boxed{10} \times \boxed{10} \times \boxed{5}$ ✓ $\boxed{20} \times \boxed{3} \times \boxed{19} \times \boxed{10} \times \boxed{10} \times \boxed{5}$ ✓ adding / *ho aketsa* ✓ 9 240 000 ✓ answer / *karabo* (5)
		[8]

                                          TOTAL/*KAOFELA:*   **150**