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GRADE/*KEREITE* 12

SEPTEMBER 2021

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

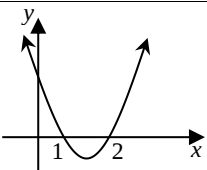
MARKS/*MATSHWAO*: 150

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 mohlalubuwa 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 mohlalubuwa 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.

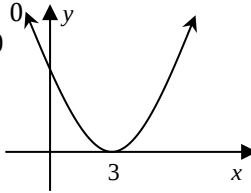
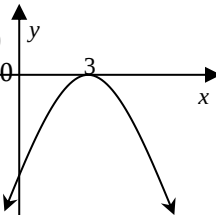
QUESTION 1/POTSO 1

1.1.1	$x^2 + 2x - 15 = 0$ $(x-3)(x+5) = 0$ $\therefore x = 3 \quad \text{or / of} \quad x = -5$ OR/KAPA $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $= \frac{-2 \pm \sqrt{2^2 - 4(1)(-15)}}{2(1)}$ $= \frac{-2 \pm \sqrt{64}}{2}$ $= 3 \quad \text{or / of} \quad -5$	$\checkmark$ factors / <i>fekethas</i> $\checkmark x = 3 \quad \checkmark x = -5$ OR/KAPA $\checkmark$ substitution / <i>sabusithitshushini</i> $\checkmark x = 3 \quad \checkmark x = -5$ (3)
1.1.2	$3x^2 + x - 1 = 0$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $= \frac{-1 \pm \sqrt{1^2 - 4(3)(-1)}}{2(3)}$ $= \frac{-1 \pm \sqrt{13}}{6}$ $= 0,43 \quad \text{or / of} \quad -0,77$ Penalise 1 mark for incorrect rounding <i>Penaliseer 1 punt vir verkeerde afronding</i>	$\checkmark$ substitution / <i>sabosititshushini</i> $\checkmark x = 0,43 \quad \checkmark x = -0,77$ (3)
1.1.3	$x(x-3) \geq -2$ $x^2 - 3x + 2 \geq 0$ $(x-1)(x-2) \geq 0$ $\therefore x \leq 1 \quad \text{or / of} \quad x \geq 2$ 	$\checkmark$ standard form <i>Formo etlwaelehileng</i> $\checkmark$ factorisation <i>fekethoreseishini</i> $\checkmark x \leq 1 \quad \text{or / of} \quad x \geq 2$ (4)

1.1.4	$\sqrt{43-x} - x + 1 = 0$ $\sqrt{43-x} = x - 1$ $(\sqrt{43-x})^2 = (x-1)^2$ $43-x = x^2 - 2x + 1$ $x^2 - x - 42 = 0$ $(x-7)(x+6) = 0$ $\therefore x = 7 \text{ or } x \neq -6$	✓ isolating the surd <i>Ho itlhaola sede</i> ✓ squaring both sides <i>Ho sekwera mahlakori ka bobedi</i> ✓ standard form / <i>foromo etlwaelehilengg</i> ✓ factorisation / <i>fekithorisashini</i> ✓ selection / <i>kgetho e nepahetseng</i> (5)
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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 $2y - x = 3(1)$ $y^2 + 3x = 2xy(2)$ $y = \frac{x}{2} + \frac{3}{2}(3)$ Substitute(3) into (2) $\left(\frac{x}{2} + \frac{3}{2}\right)^2 + 3x = 2x\left(\frac{x}{2} + \frac{3}{2}\right)$ $\frac{x^2}{4} + \frac{6x}{4} + \frac{9}{4} + 3x = x^2 + 3x$ $-\frac{3x^2}{4} + \frac{6x}{4} + \frac{9}{4} = 0$ $-3x^2 + 6x + 9 = 0$ $x^2 - 2x - 3 = 0$ $(x - 3)(x + 1) = 0$ $\therefore x = 3 \text{ or } x = -1$ $y = \left(\frac{3}{2} + \frac{3}{2}\right) \text{ or } y = \left(-\frac{1}{2} + \frac{3}{2}\right)$ $= 3 = 1$	$\checkmark x = 2y - 3$ $\checkmark$ substitution /sabusithikhushini $\checkmark$ standard form / <i>foromo etlwaelehleng</i> $\checkmark$ factorisation / <i>fekhuthoriseshini</i> $\checkmark$ y-values / di y-velu $\checkmark$ x-values /di x-velu OR/KAPA $\checkmark y = \frac{x}{2} + \frac{3}{2}$ $\checkmark$ substitution /sabosititshushini $\checkmark$ standard form / <i>foromo etlwaelehleng</i> $\checkmark$ factorisation / <i>fekithorisashini</i> $\checkmark$ x-values / di x-velu $\checkmark$ y-values / di y-velu
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(5)

1.3	$x = \frac{5 \pm \sqrt{p(6-p)-9}}{2}$ For non-real roots: $\Delta < 0$ $p(6-p) - 9 < 0$ $-p^2 + 6p - 9 < 0$ $p^2 - 6p + 9 > 0$ $(p-3)^2 > 0$ $\therefore p \in \mathbb{R}$ but $p \neq 3$ OR/KAPA  $x = \frac{5 \pm \sqrt{p(6-p)-9}}{2}$ For non-real roots: $\Delta < 0$ $p(6-p) - 9 < 0$ $-p^2 + 6p - 9 < 0$ $(3-p)(p-3) < 0$ $\therefore p \in \mathbb{R}$ but $p \neq 3$ 	✓ $\Delta < 0$ ✓ standard form / <i>foromo etlwaelehileng</i> ✓ factorisation / <i>fekithorisashini</i> ✓ answer / <i>karabo</i> OR/KAPA ✓ $\Delta < 0$ ✓ standard form / <i>foromo etlwaelehileng</i> ✓ factorisation / <i>fekethorisaeshini</i> ✓ answer / <i>karabo</i> (4) [24]
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QUESTION 2/ POTOSO 2

2.1.1		✓ 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	$T_{38} = 2(38)^2 - 6(38) - 12$ $= 2648$	✓ substitution / <i>sabosetitshushini</i> ✓ answer / <i>karabo</i> (2)

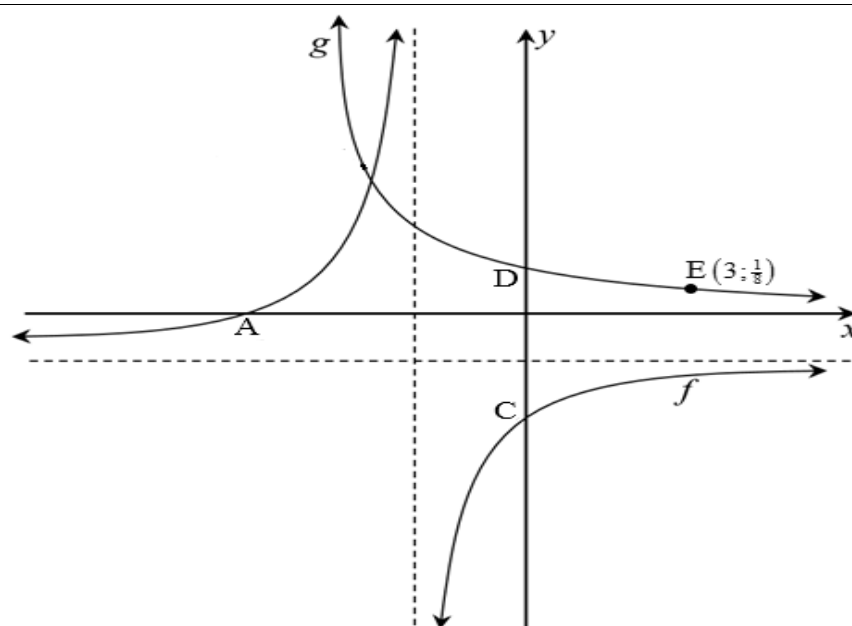
2.1.4	General term for first differences: <i>Themo ya kakaretso ya phapang ya pele</i> $T_n = 4n - 4$ $400 = 4n - 4$ $\therefore n = 101$ $T_{n(\text{linear})} = (T_{n+1} - T_n)_{(\text{quadratic})}$ $\therefore n = 101 \text{ and } +1 = 102$ The terms are: 101 and 102 OR/KAPA $2(n+1)^2 - 6(n+1) - 12 - (2n^2 - 6n - 12) = 400$ $2n^2 + 4n + 2 - 6n - 6 - 12 - 2n^2 + 6n + 12 = 400$ $4n - 4 = 400$ $4n = 404$ $\therefore n = 101$ $\therefore \text{Between } T_{101} \text{ and } T_{102}$	✓ $T_n = 4n - 4$ ✓ $T_n = 400$ ✓ 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 $\therefore \text{Between } T_{101} \text{ and } T_{102}$	OR/KAPA ✓ subst. for T_{101} and T_{102} <i>Ka T_{101} le T_{102}</i> ✓ 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	<i>k is the sum to 30 terms.</i> $S_n = \frac{n}{2}[a + l]$ $= \frac{30}{2}[2 + 89]$ $= 1365$ OR / KAPA $S_n = \frac{n}{2}[2a + (n-1)d]$ $= \frac{30}{2}[2(2) + (30-1)(3)]$ $= 1365$	✓ Sum formula / moralo wa samo ✓ substitution / <i>sabositikhushini</i> ✓ answer / <i>karabo</i> OR / KAPA ✓ Sum formula / moralo wa samo ✓ substitution / <i>sabositikhushini</i> ✓ answer / <i>karabo</i> (3)
		[15]

QUESTION 3/ POTSO 3

3.1	$T_9 = ar^8 = 768$ $T_{13} = ar^{12} = 12\,288$ $\frac{ar^{12}}{ar^8} = \frac{12\,288}{768}$ $\therefore r^4 = 16$ $r = \pm 2$ $a = \frac{768}{(\pm 2)^8}$ $= 3$	$\checkmark \frac{ar^{12}}{ar^8} = \frac{12\,288}{768}$ $\checkmark r = \pm 2$ $\checkmark$ value of a / <i>velu ya a</i> (3)
3.2.1	$S_2 = \frac{54}{19} - \frac{24}{19}$ $= \frac{30}{19}$	$\checkmark$ answer / <i>karabo</i> (1)
3.2.2	$T_1 + T_2 = \frac{30}{19}$ $a + ar = \frac{30}{19}$ $a(1+r) = \frac{30}{19}$ $a = \frac{30}{19(1+r)}$	$\checkmark a + ar = \frac{30}{19}$ (1)
3.2.3	$S_\infty = \frac{a}{1-r} = \frac{54}{19}$ $\therefore a = \frac{54(1-r)}{19}$ $a = \frac{30}{19(1+r)} \dots \dots \dots \text{from (3.2.2)}$ $\therefore \frac{30}{19(1+r)} = \frac{54(1-r)}{19}$ $(1-r)(1+r) = \frac{30}{54}$ $1-r^2 = \frac{5}{9}$ $r^2 = \frac{4}{9}$ $\therefore r = \frac{2}{3}$	$\checkmark a = \frac{54(1-r)}{19}$ $\checkmark$ equating / <i>ho le kanntsha</i> $\checkmark r^2 = \frac{4}{9}$ $\checkmark$ answer / <i>karabo</i> (4)
		[9]

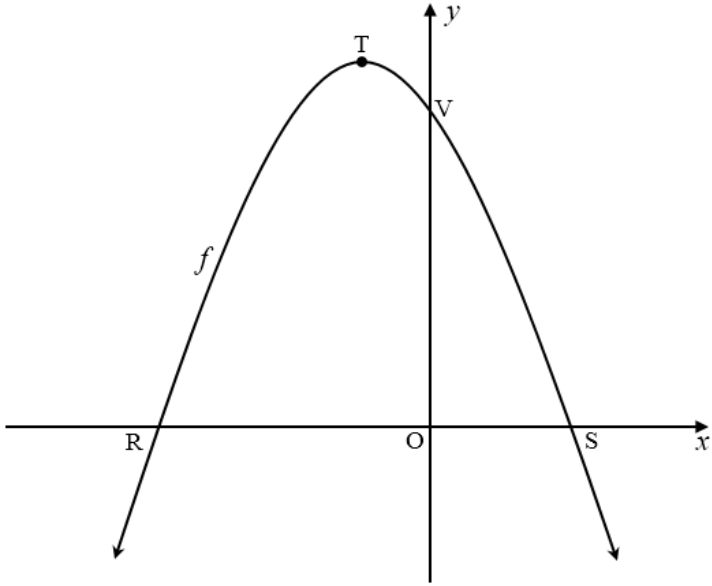
QUESTION 4/ POTOSO 4



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	$g(x) = b^x$ $8 = b^{-3}$ $8 = \frac{1}{b^3}$ $b^3 = \frac{1}{8}$ $\therefore b = \frac{1}{2}$	✓ substitution / <i>sabusitikhushini</i> ✓ answer / <i>karabo</i>	(2)
4.5	$y = \frac{-3}{x+2} - 1$ $0 = \frac{-3}{x+2} - 1$ $1 = \frac{-3}{x+2}$ $x+2 = -3$ $x = -5$ $\therefore A(-5; 0)$ $y = \frac{-3}{0+2} - 1$ $= -\frac{5}{2}$ $\therefore C(0; -\frac{5}{2})$	✓ substitution $y = 0$ / <i>sabusitikhushini</i> $y = 0$ ✓ $x = -5$ ✓ $y = -\frac{5}{2}$	(3)

4.6	$x = \left(\frac{1}{2}\right)^y$ $\therefore y = \log_{\frac{1}{2}} x$ OR/KAPA $y = 2^{-x}$ $\therefore x = 2^{-y}$ $y = -\log_2 x$	$\checkmark x = \left(\frac{1}{2}\right)^y$ $\checkmark y = \log_{\frac{1}{2}} x$ OR/ KAPA $\checkmark x = 2^{-y}$ $\checkmark y = -\log_2 x$ (2)
4.7.1	$-5 < x < -2$ OR/KAPA $x \in (-5 ; -2)$	$\checkmark\checkmark$ answer / karabo (A) (2)
4.7.2	$0 < x \leq \frac{1}{8}$ OR/KAPA $x \in (0 ; \frac{1}{8}]$	$\checkmark\checkmark$ answer / karabo (A) (2)
		[16]

QUESTION 5/POTSO 5

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

(4)

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

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

QUESTION 6/ POTSO 6

6.1	$A = P(1-i)^n$ $5510 = 9670(1-i)^4$ $\therefore i = 1 - \sqrt[4]{\frac{5510}{9670}}$ $= 0,131177$ $\therefore r = 13,12\%$	$\checkmark$ subst. into correct formula <i>Sabosit ho moralo o nepahetseng</i> $\checkmark$ simplification <i>Ho nolo fatsa</i> $\checkmark$ answer / <i>karabo</i> (3)
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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 <i>Sabust ho moralo o nepahetseng</i> ✓ adding final month's interest <i>Aketsa tswala ya kgwedi ya ho qetela</i> ✓ answer / karabo OR/KAPA ✓ $n = 144$ ✓ subst. into correct formula <i>Sabost. ho moralo o nepahetseng</i> ✓ adding final month's interest <i>Aketsa tswala ya kgwedi ya ho qetela</i> ✓ 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 <i>Sabusititshushini ho moralo o nepahetseng</i> ✓ answer /karabo (3)

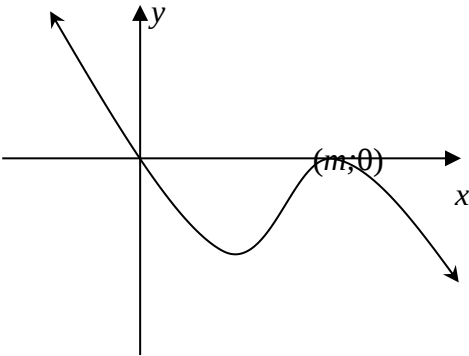
6.3.2	Outstanding balance = $P = \frac{x[1 - (1 + i)^{-n}]}{i}$ $\therefore P = \frac{6\,361,18 \left[1 - \left(1 + \frac{0,093}{12} \right)^{-32} \right]}{\frac{0,093}{12}}$ $= R179\,667,32$ OR/KAPA Outstanding balance = $A - F$ $= 350\,000 \left(1 + \frac{0,093}{12} \right)^{40} - \frac{6\,361,18 \left[\left(1 + \frac{0,093}{12} \right)^{40} - 1 \right]}{\frac{0,093}{12}}$ $= R476\,628,84 - R296\,961,79$ $= R179\,667,05$	✓ $i = \frac{0,093}{12}$ and = 32 ✓ subst. into correct formula <i>sabosit ho moralo o nepahetseng</i> ✓ $P = 179\,667,32$ (3) OR/KAPA ✓ $i = \frac{0,093}{12}$ and = 40 ✓ subst. Into correct formula <i>Sabosit. Ho moralo o nepahetseng</i> ✓ $P = 179\,667,32$ (3)
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6.3.3	$\therefore 179\,667,32 = \frac{7\,000 \left[1 - \left(1 + \frac{0,093}{12} \right)^{-n} \right]}{\frac{0,093}{12}}$$\frac{179\,667,32 \times \frac{0,093}{12}}{7\,000} - 1 = - \left(1 + \frac{0,093}{12} \right)^{-n}$$-0,80108... = - \left(\frac{4\,031}{4\,000} \right)^{-n}$$\therefore 0,80108... = \frac{4\,031^{-n}}{4\,000}$$\therefore -n = \frac{\log 0,80\,108...}{\log \frac{4\,031}{4\,000}}$$-n \approx -28,73$$\therefore n \approx 28,73$ $\therefore$ The number of months is 29. <i>Le nani la dikgwedi ke 29.</i> OR/KAPA $179\,667,32 = \frac{7\,000 \left[1 - \left(1 + \frac{0,093}{12} \right)^{-n} \right]}{\frac{0,093}{12}}$$\frac{179\,667,32 \times \frac{0,093}{12}}{7\,000} - 1 = - \left(1 + \frac{0,093}{12} \right)^{-n}$$-0,80108... = - \left(\frac{4\,031}{4\,000} \right)^{-n}$$\therefore 0,80108... = \frac{4\,031^{-n}}{4\,000}$$\therefore -n = \frac{\log 0,80\,108...}{\log \frac{4\,031}{4\,000}}$$-n \approx -28,73$$\therefore n \approx 28,73$ $\therefore$ The number of months is 29. <i>Le nani la dikgwedi 29</i>	✓ subst. into correct formula <i>Sabositi. Ho moralo o nepahetseng</i> ✓ correct use of logs <i>Tsela e nepahetseng ya ho sebedisa dilogo</i> ✓ = 28,73 ✓ <i>n</i> = 29 months /dikgwedi OR/KAPA ✓ subst. into correct formula <i>Sabosit. Ho moralo o nepahetseng</i> ✓ correct use of logs <i>Tsela e nepahetseng ya ho sebedisa di logo</i> ✓ = 28,73 ✓ <i>n</i> = 29 months / kgwedi
		(4) [17]

QUESTION 7/ POTSO 7

7.1	$f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ $= \lim_{h \rightarrow 0} \frac{5 - 2(x+h)^2 - (5 - 2x^2)}{h}$ $= \lim_{h \rightarrow 0} \frac{5 - 2x^2 - 4xh - 2h^2 - 5 + 2x^2}{h}$ $= \lim_{h \rightarrow 0} \frac{-4xh - 2h^2}{h}$ $= \lim_{h \rightarrow 0} \frac{h(-4x - 2h)}{h}$ $= \lim_{h \rightarrow 0} (-4x - 2h)$ $= -4x$	✓ substitution / <i>sabosititshushini</i> ✓ expansion / <i>ho oketsa</i> ✓ simplification / <i>ho nolofatsha</i> ✓ notation and $\lim_{h \rightarrow 0} (-4x - 2h)$ ✓ answer / <i>karabo</i> (5)
7.2.1	$y = 7x^4 + \frac{2x^2}{\sqrt{x}}$ $= 7x^4 + 2x^{\frac{3}{2}}$ $\therefore \frac{dy}{dx} = 28x^3 + 3x^{\frac{1}{2}}$	✓ $2x^{\frac{3}{2}}$ ✓ $28x^3$ ✓ $3x^{\frac{1}{2}}$ (3)
7.2.2	$= D_x \left[\frac{3x^2 - 7x - 6}{x} \right]$ $= D_x [3x - 7 - 6x^{-1}]$ $= 3 + 6x^{-2}$	✓ $3x - 7$ ✓ $-6x^{-1}$ ✓ 3 and differentiating constant 3 le difarensiething konstant ✓ $+6x^{-2}$ (4)
		[12]

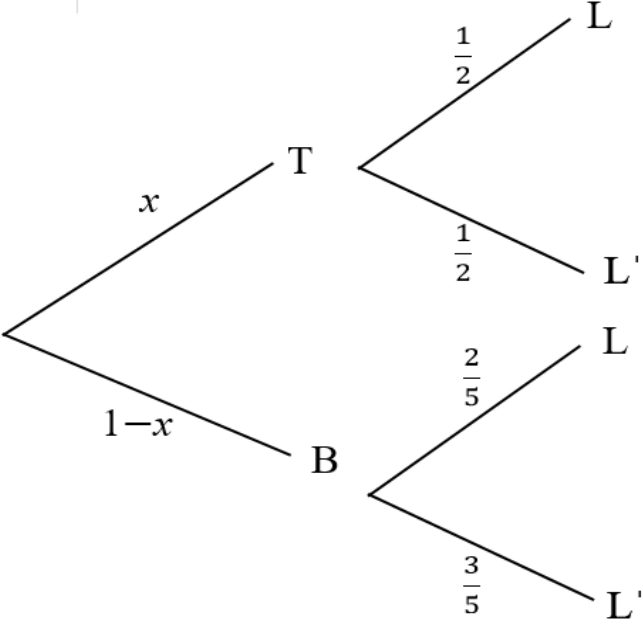
QUESTION 8/ POTSO 8

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

QUESTION 9/VRAAG 9

9.1	$A = \left(\frac{1}{2} \times 15x \times 8x \times 2\right) + (15xy) + (8xy) + (17xy)$ $5760 = 120x^2 + 40xy$ $\therefore y = \frac{5760 - 120x^2}{40x}$	✓ total surface area / <i>Totale safeisi eria</i> ✓ $5760 = 120x^2 + 40xy$ (2)
9.2	$V = \left(\frac{1}{2} b \cdot h\right) \times H$ $V = \frac{1}{2} \times 15x \times 8x \times y$ $= \frac{1}{2} \times 15x \times 8x \times \frac{5760 - 120x^2}{40x}$ $= 60x(144 - 3x^2)$ $= 8640x - 180x^3$	✓ substitution into V <i>Sabosititshushioni ho V</i> ✓ substituing for y <i>Sabositikhushini ya y</i> (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 / <i>Ho nolofatsa</i> ✓ answer / <i>karabo</i> (4)
		[8]

QUESTION 10/POTSO 10

10.1.1	$P(B) = 1 - P(\text{not } B)$ $= 1 - 0,45$ $= 0,55$	$\checkmark$ 0,55 (1)
10.1.2	$P(A \text{ and } B) = P(A) \times P(B)$ $= 0,2 \times 0,55$ $= 0,11$ $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$ $= 0,2 + 0,55 - 0,11$ $= 0,64 \text{ or } \frac{16}{25}$	$\checkmark$ $P(A) \times P(B)$ $\checkmark$ substitution / sabosititshushini $\checkmark$ answer / karabo (3)
10.2	 $P(\text{late/laat}) = \frac{1}{2}x + \frac{3}{5}(1-x)$ $\frac{1}{2}x + \frac{3}{5}(1-x) = \frac{8}{15}$ $15x + 18(1-x) = 16$ $15x + 18 - 18x = 16$ $-3x = -2$ $x = \frac{2}{3}$	$\checkmark$ $\frac{1}{2}x + \frac{3}{5}(1-x)$ $\checkmark$ equating / ho le kantsha $\checkmark$ substitution / sabosititshushini $\checkmark$ 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	$\frac{\boxed{20} \times \boxed{19} \times \boxed{3} \times \boxed{10} \times \boxed{10} \times \boxed{5} + \boxed{20} \times \boxed{3} \times \boxed{19} \times \boxed{10} \times \boxed{10} \times \boxed{5}}{9\,240\,000}$ $= \frac{1140\,000}{9\,240\,000}$ $= \frac{19}{154} \quad \text{or / of} \quad 0,12 \quad \text{or / of} \quad 12,34\%$	✓ $\boxed{20} \times \boxed{19} \times \boxed{3} \times \boxed{10} \times \boxed{10} \times \boxed{5}$ ✓ $\boxed{20} \times \boxed{3} \times \boxed{19} \times \boxed{10} \times \boxed{10} \times \boxed{5}$ ✓ adding / ho aketsa ✓ 9 240 000 ✓ answer / karabo (5)
		[8]

TOTAL/KAOFELA: 150