



LIMPOPO

PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF EDUCATION

MEMORANDUM

1.1	$A = P(1 - i)^n$ $A = 30\,000(1 - 0.09)^7$ $A = 15\,502,83$	✓ <i>sub into correct formula</i> ✓ <i>answer</i>	(2)
1.2	$F = \frac{x[(1+i)^n - 1]}{i}$ $100\,000 = \frac{x[(1 + \frac{10,05}{1200})^{61} - 1]}{\frac{10,05}{1200}}$ $x = 100\,000 \div 79,188 \dots$ $x = R\,1\,262,80$	✓ $n = 61$ ✓ $i = \frac{10,05}{1200} / i = \frac{0,1005}{12}$ ✓ <i>sub into correct formula</i> ✓ <i>answer</i>	(4)
1.3	$P = \frac{x[1 - (1+i)^{-n}]}{i}$ $2\,500\,000 = \frac{20\,000[1 - (1 + \frac{8}{1200})^{-12n}]}{\frac{8}{1200}}$ $\frac{5}{6} = 1 - (\frac{151}{150})^{-12n}$ $-\frac{1}{6} = -(\frac{151}{150})^{-12n}$ $-12n = \log_{\frac{151}{150}} \frac{1}{6}$ $12n = 269,658808 \dots$ $n = 22,47 \text{ years}$	✓ <i>sub into correct formula</i> ✓ $i = \frac{8}{1200} / i = \frac{0,08}{12}$ ✓ <i>use of logs</i> ✓ <i>answer</i>	(4)

1.4	$P = \frac{x[1 - (1 + i)^{-n}]}{i}$ $OB = \frac{2\,000[1 - (1 + \frac{0,18}{12})^{-10}]}{\frac{0,18}{12}}$ $= R18\,444,37$	✓ sub into correct formula ✓ $n = -10$ ✓ answer	(3)
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QUESTION 2

2.1	$1 + i_{eff} = \left(1 + \frac{i_{nom}}{m}\right)^m$ $\left(1 + \frac{i_m}{12}\right)^{12} = \left(1 + \frac{0,13}{4}\right)^4$ $= 1,136475928...$ $1 + \frac{i_m}{12} = 1,010718046...$ $\frac{i_m}{12} = 0,0107180464...$ $i_m = 0,1286165568...$ $\therefore r_m = 12,86\% \text{ p.a. compounded monthly}$	✓ $\left(1 + \frac{i_m}{12}\right)^{12}$ ✓ $\left(1 + \frac{0,13}{4}\right)^4$ ✓ $1 + \frac{i_m}{12} = 1,010718046...$	(3)
2.2	$P_v = \frac{x[1 - (1 + i)^{-n}]}{i}$ $600\,000 = \frac{9\,000 \left[1 - \left(1 + \frac{0,1286165568}{12}\right)^{-n}\right]}{\frac{0,1286165568}{12}}$ $0,7145364267 = 1 - \left(1 + \frac{0,1286165568}{12}\right)^{-n}$ $\left(1 + \frac{0,1286165568}{12}\right)^{-n} = 1 - 0,7145364267$ $= 0,2854635733$ $-n = \log_{\left(1 + \frac{0,1286165568}{12}\right)} 0,2854635733$ $= -117,5911312$ $n = 117,59$ $\therefore 117 \text{ payments of } R9\,000$	✓ substitution into the correct formula ✓ simplify RH ✓ correct log $-n = \log_{1,010718...} 0,28546$ or $-n = \frac{\log 0,28546...}{\log 1,010718...}$ ✓ $n = 117,59$ ✓ 117 payments	(5)

2.3	$A = P(1 + i)^n$ $= 600\,000 \left(1 + \frac{0,1286165568}{12} \right)^{117}$ $= R2\,088\,640,059$ $F_v = \frac{x \left[(1 + i)^n - 1 \right]}{i}$ $= \frac{9\,000 \left[\left(1 + \frac{0,1286165568}{12} \right)^{117} - 1 \right]}{\frac{0,1286165568}{12}}$ $= R2\,083\,364,827$ Outstanding balance after 117 payments: $= R2\,088\,640,059 - R2\,083\,364,827$ $= R5\,275,232$ Final payment = $5\,275,232 \left(1 + \frac{0,1286165568}{12} \right)$ $= R5\,331,77$ OR $A = P(1 + i)^n$ $= 600\,000 \left(1 + \frac{0,1286165568}{12} \right)^{118}$ $= R2\,111\,026,2$ $F_v = \frac{x \left[(1 + i)^n - 1 \right]}{i}$ $= \frac{9\,000 \left[\left(1 + \frac{0,1286165568}{12} \right)^{118} - 1 \right]}{\frac{0,1286165568}{12}}$ $= R2\,114\,694,428$ Outstanding balance after 118 payments $= R2\,111\,026,2 - R2\,114\,694,428$ $= -R3\,668,228$ Final payment = $R9\,000 - R3\,668,228$ $= R5\,331,77$ OR	✓ substitution into the correct formula ✓ substitution into the correct formula ✓ subtract: $A - F$ ✓ interest of 1 month ✓ answer (5) ✓ substitution into the correct formula ✓ substitution into the correct formula ✓ subtract: $A - F$ ✓ subtract from 9 000
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	$P_v = \frac{x[1 - (1 + i)^{-n}]}{i}(1 + i)$ $= \frac{9\,000 \left[1 - \left(1 + \frac{0,1286165}{12} \right)^{-0,5911} \right]}{\frac{0,1286165568}{12}} \left(1 + \frac{0,1286165}{12} \right)$ $= R5\,331,77$	✓ answer (5) ✓✓ substitution of i and n into the correct formula ✓ one month interest ✓✓ answer (5)
2.4	$117(R\,9\,000) + R5\,331,77$ $= R1\,058\,331,77$	✓ 117(9 000) ✓ R1 058 331,77 (2) [15]

QUESTION 3

3.1	$1 + i_{eff} = \left(1 + \frac{i}{m} \right)^m$ $i_{eff} = \left(1 + \frac{i}{m} \right)^m - 1$ $= \left(1 + \frac{0,14}{12} \right)^{12} - 1 \checkmark$ $14,93\% \checkmark$	✓ Correct substitution ✓ answer (2)
3.2	$F = \frac{x[(1+i)^n - 1]}{i}$ $7000\,3007,22 \checkmark = \frac{800 \left[\left(1 + \frac{0,16}{12} \right)^n - 1 \right]}{\frac{0,16}{12}}$ $117,716787 = \left(1 + \frac{0,16}{12} \right)^n \checkmark$ $\log_{1,013333} 117,72 = n \checkmark$ $\therefore n = 360 \checkmark$	✓ Correct substitution ✓ $i \frac{0,16}{12}$ ✓ Fv x i 117,716787 ✓ introducing logarithm $n = \log_{1,013333} 117,72$ ✓ answer $n = 360$ (5)
		[7]