MEMORANDUM

Name: ..... Class: .....

Date: .....

MARK ____ / 34

Answer all questions. Show all your working — marks are awarded for method as well as the final answer. **Teacher copy: accept any correct equivalent method.**

1 R1 500 is deposited monthly for 20 years at 9% p.a. compounded monthly. Determine the future value. (3)

$i = 0{,}0075,\ n = 240 \rightarrow \text{F} = \mathbf{R1\ 001\ 830{,}30}$ ✓✓✓ (3)

2 How much was actually deposited in total in that annuity? (2)

$240 \times 1\ 500 = \mathbf{R360\ 000}$ ✓✓ (2)

3 A bond of R800 000 is repaid monthly over 20 years at 9% p.a. compounded monthly. Determine the monthly instalment. (4)

$$x = \frac{800\ 000 \times 0{,}0075}{1 - (1{,}0075)^{-240}} = \mathbf{R7\ 197{,}81}$$ ✓✓✓✓ (4)

4 Determine the outstanding balance on that bond after 5 years. (4)

$240 - 60 = 180$ payments remain ✓; Balance $= \frac{7\ 197{,}81[1 - (1{,}0075)^{-180}]}{0{,}0075}$ ✓✓ $= \mathbf{R709\ 656{,}62}$ ✓ (R709 656,39 with the unrounded instalment) (4)

5 Write down the value of i for 9% p.a. compounded monthly. (1)

$\frac{0{,}09}{12} = \mathbf{0{,}0075}$ ✓ (1)

6 Which formula do you use when saving towards a future amount? (1)

Future value, $\text{F} = \frac{x[(1+i)^n - 1]}{i}$ ✓ (1)

7 Which formula do you use for a loan taken out today? (1)

Present value, $\text{P} = \frac{x[1 - (1+i)^{-n}]}{i}$ ✓ (1)

8 How is the outstanding balance on a loan calculated? (2)

> As the **present value of the payments still outstanding**. ✓✓ (2)

9 How long will it take R20 000 to double at 8% p.a. compounded annually? Give your answer in whole years. (4)

> $40\,000 = 20\,000(1{,}08)^n$ ✓; $(1{,}08)^n = 2$ ✓; $n = \frac{\log 2}{\log 1{,}08} = 9{,}006$ ✓; so 10 years (interest is only added at year end) ✓ (4)

10 A vehicle costing R450 000 depreciates at 15% p.a. on a reducing balance. Calculate its scrap value after 4 years. (3)

> $450\,000(1 - 0{,}15)^4$ ✓✓ = **R234 902,81** ✓ (3)

11 In a sinking-fund question, state the THREE amounts you must calculate before working out the monthly payment. (3)

> The scrap value of the old asset ✓; the inflated cost of the new one ✓; and the difference between them, which is what the fund must produce ✓ (3)

12 Option A pays 9,6% p.a. compounded monthly; Option B pays 9,9% p.a. compounded annually. Which is better? Show your reasoning. (4)

> A effective $= (1 + \frac{0{,}096}{12})^{12} - 1$ ✓ $= 0{,}10034 = 10{,}03\%$ ✓; B $= 9{,}9\%$ ✓; Option A is better because its effective annual rate is higher ✓ (4)

13 Why can a loan with a lower monthly instalment cost you more overall? (2)

> A lower instalment usually means a longer term ✓, so interest is charged for more months and the total repaid is larger ✓ (2)

TOTAL: 34 marks

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