Saturday X-tra   X-Sheet: 6

Grade 12 Finance

Key Concepts
In this session we will focus on summarising what you need to know about:
- Annuities
- Loans
- Calculating time periods (use of logarithms)

Terminology & definitions
Annuity- Investment made at regular intervals over a period of time.
Loan- when money is borrowed usually from an institution and repaid over usually a fixed interval in regular instalments

Laws
The interest period must be the same as the repayment intervals. In other words if the interest is quoted as quarterly, and the repayments of investments are monthly, the interest rate must be converted to a monthly interest rate. You can use the formula

$$(1 + \frac{i^{(m)}}{m})^m = (1 + \frac{i^{(n)}}{n})^n$$

Symbols, Units & Equations

$$F_v = \frac{x[(1+i)^n - 1]}{i} \quad \text{for annuities}$$

$$P_v = \frac{x[1 - (1+i)^{-n}]}{i} \quad \text{for loans}$$

$$\log_a b = c \iff a^c = b$$

X-planation
- Remember always to round off money to two decimal places (the examiner will not necessarily tell you to do this)

X-ample Questions
1. Farmer Brown purchased a tractor for R441 000. The tractor depreciates at the rate of 20 % p.a. on a reducing balance. The cost of a new tractor increases by 16% compound interest p.a.

(a) Find the value of the tractor in 6 years time. (2)

(b) If the old tractor is traded in, calculate how much extra Farmer Brown will have to pay in to buy a new tractor in 6 years time. (3)

(c) Farmer Brown decides to deposit a fixed amount into a sinking fund at the end of each month for the purchase of a new tractor in six years time. The first payment will be made immediately, and the last payment will be made at the end of the 6 year period. Assuming that he needs R958 845,28, calculate the monthly payment if interest is earned at the rate of 9,2 % p.a. compounded monthly. (5)

2. You take out a loan of R 500 000 and the bank charges you an interest rate of 12% p.a. compounded monthly. You plan to pay off the loan over 10 years, in fixed monthly payments, to be paid at the end of each month.

(a) Calculate the monthly payments you must make if you intend to pay off the loan in exactly 10 years. Give your answer rounded off correctly to the nearest cent. (5)

(b) Calculate the interest you will pay on the loan. Give your answer rounded off correctly to the nearest cent. (2)

3. You wish to purchase your first home (a flat). The bank will only allow bond repayments that are no greater than 30% of your net monthly salary. Your gross salary is R8 250 per month and you have deduction of 25% per month from your salary.

(a) What is your net salary? I.e. how much do you take home after deductions?(1)

(b) What is the maximum bond repayment you can afford? (1)

(c) The bank offers a fixed bond rate of 13,5% per annum compounded monthly over a 20 year period. The flat you are interested in costs R150 000. Can you afford to buy it? (6)

4. A bank is offering a savings account with an interest rate of 10% per annum compounded monthly. You can afford to save R300 per month. How long will it take you to save up to R20 000 (to the nearest month)? (5)

$$\log_a b = c \iff a^c = b$$

$$\log_{10} 100 = 2 \iff 10^2 = 100$$

$$\log_{base} number = \exp onent \iff base^{\exp onent} = number$$

5. A person invests R20000 at 9.5% p.a. interest compounded yearly. After how many years should R55000 be available. (Answer to the nearest year) (5)
   • Note this is not an annuity.

6. How much money can be borrowed from a bank if the borrower repays the loan by means of 30 equal payments of R1250, starting in one month's time, if the interest is 14% compounded monthly. (5)

7. Bob, Sandy's fiancé, applies for a bond of R 650 000 in order to purchase a townhouse. The bank charges interest at 11,5% per annum compounded monthly. What will his monthly repayment be if he pays the bond off in equal monthly instalments over a period of 15 years? (7)

X-ercise

1. Mr Matoba has just purchased a new car for R159 000. He plans to replace the car in 4 years time with a new one. The inflation rate on cars is 5,5% per annum. The trade-in value for the car will be R83 979,77 in 4 years time.

a) What is the annual depreciation rate on a reducing balance which was use to calculate the trade-in value? (give answer to two decimal places) (4)

b) What is the expected cost of a new car in 4 years time? (4)

c) Mr Matoba decides to buy a car for R275 000 in 4 years time. He sets up a sinking fund to make provision for the purchase price of the car. The account used offers 9,6% interest p.a., compounded monthly.

   i. Calculate the effective yearly interest rate as a percentage and correct to 2 decimal places. (3)

   ii. Calculate the monthly payment into the sinking fund. Payments are made at the end of each month. (5)

2. You buy a ring for R3600 and you pay for the ring by using extended credit on your card. You are required to repay the debt by means of equal monthly instalments over a period of 3 years, paid at the end of each month. The interest rate is 21% p.a. compounded monthly.

3. Sharon takes out a loan of R250 000 from the bank and she agrees to pay it back in fixed monthly instalments over a period of 5 years starting one month after taking out the loan. The bank offers her an interest rate of 15% p.a. compounded monthly.

a) Calculate the value of the monthly instalment (5)

b) Calculate the total interest she will pay (2)

4. An investor, aged 30, wishes to accumulate R10 000 000 by her 50th birthday. She will pay equal monthly payments into an account paying 15% per annum compounded monthly. Payments start on her 30th birthday and end on her 50th birthday. Find the monthly payments. (4)

5. You have just started earning a salary, and wish to put away money each month, to save for an overseas holiday in 3 years' time, starting immediately. How much should you pay each month for 36 months, if the rate of interest earned is fixed at 8% pa, compounded quarterly, and you would like to accumulate a total of R 30 000 for your holiday? (6)

6.   Tim secures a bond of R350 000 towards the cost of his new house. He pays interest at a fixed rate of 9,75% compounded monthly over a period of 20 years.
a)   What is his monthly instalment?   (5)
b)   What is the total amount that Fred will pay to the bank over the 20-year period?
                                                                          (2)

Answers
1a)   14,75%
1b)   R196973,12
1c)   (i) 10,03% (ii) R3279,99

2. R135,63

3a) R5947,48
3b) R106848,95

4. R6678.96

5. R740.68

6a) R3319.81
6b) R796754.15