

- (1) SA construction buys a new crane for R750 000. Calculate the value of the crane after 7 years if the depreciation is calculated on the reducing balance at 11% pa.

$$A = ?$$

$$A = P(1 - i)^n$$

$$P = R750\,000$$

$$= 750\,000 (1 - 0,11)^7$$

$$i = 0,11$$

$$A = R331\,735,01$$

$$n = 7 \text{ years}$$

- (2) A garden service buys new equipment at present (2008) which is valued at R6 000. The depreciation of the equipment is calculated at 15% pa on the reduced balance.

(a) Complete the following table [round off to the nearest R100]:

| Year                    | 2008  | 2009  | 2010  | 2011  | 2012  | 2013  | 2014  |
|-------------------------|-------|-------|-------|-------|-------|-------|-------|
| Time lapse in years     | 0     | 1     | 2     | 3     | 4     | 5     | 6     |
| Book value of equipment | R6000 | R5100 | R4300 | R3700 | R3100 | R2700 | R2300 |

$$\text{After 1 year: } A = 6000 (1 - 0,15)^1 = R5100$$

$$\text{After 2 years: } A = 6000 (1 - 0,15)^2 = R4335 \approx R4300$$

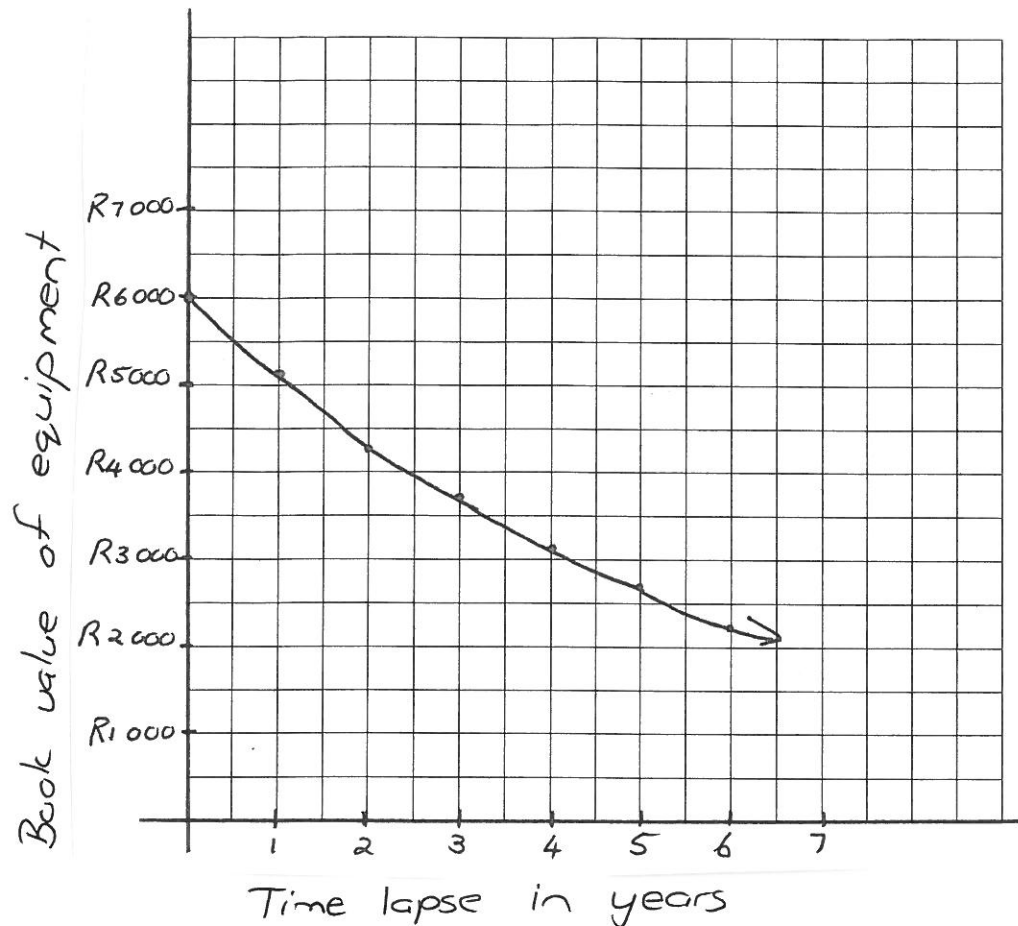
$$\text{After 3 years: } A = 6000 (1 - 0,15)^3 = R3684,75 \\ \approx R3700$$

$$\text{After 4 years: } A = 6000 (1 - 0,15)^4 = R3132,03... \\ \approx R3100$$

$$\text{After 5 years: } A = 6000 (1 - 0,15)^5 = R2662,23... \\ \approx R2700$$

$$\text{After 6 years: } A = 6000 (1 - 0,15)^6 = R2262,89... \\ \approx R2300$$

(b) Present the data in (a) graphically.



(c) Determine in which year the book value of the equipment will be halve the value of the original value.

Original value = R6 000

Halve of original value = R3 000

$\therefore$  According to (a) the value of the equipment would in the 4<sup>th</sup> year be halve the original value.

- (3) Your school needs a new school bus. The total cost for a new school bus is R654 000. They get two quotes. The first quote offer them a loan at 11,4% pa compound interest with the interest compounded semi-annually. The second quote offer them 12,3% pa yearly compounded interest. In both cases the loan will be over 54 months. The depreciation of the school bus is however 13% pa, calculated on the reduced balance. Calculate:

- (a) Which of the above loan options will be the most advantageous?  
 (b) The book value of the school bus if the bus paid off in 54 months' time.

Option 1:

$$A = ?$$

$$A = P \left( 1 + \frac{i^{(m)}}{m} \right)^{m \times n}$$

$$P = R654\,000$$

$$= 654\,000 \left( 1 + \frac{0,114}{2} \right)^{2 \times 4,5}$$

$$i = 0,114$$

$$= R1\,077\,091,59$$

$$n = 54 \text{ months} = 4,5 \text{ years}$$

$$m = 2$$

Option 2:

$$A = ?$$

$$A = P \left( 1 + \frac{i^{(m)}}{m} \right)^{m \times n}$$

$$P = R654\,000$$

$$= 654\,000 \left( 1 + \frac{0,123}{1} \right)^{1 \times 4,5}$$

$$i = 0,123$$

$$A = R1\,102\,266,61$$

$$n = 54 \text{ months} = 4,5 \text{ years}$$

$$m = 1$$

$\therefore$  Option 1 is most advantageous!

$$(b) A = ?$$

$$A = P(1 - i)^n$$

$$P = R654\,000$$

$$= 654\,000 (1 - 0,13)^{4,5}$$

$$i = 0,13$$

$$A = R349\,473,61$$

$$n = 4,5 \text{ years (54 months)}$$

(3)(a) Alternative answer:

Option 1:

Nominal interest rate = 11,4% pa semi-ann.

$$\therefore i = 0,114 \text{ and } m = 2$$

$$\therefore 1 + i = \left(1 + \frac{i^{(m)}}{m}\right)^m$$

$$1 + i = \left(1 + \frac{0,114}{2}\right)^2$$

$$1 + i = 1,117249$$

$$\therefore i = 1,117249 - 1$$

$$i = 0,117249$$

$\therefore$  Eff. interest rate

$\therefore$  The eff. int. rate for option 1 is better than the eff. int. rate (12,3% pa annually).

$\therefore$  Option 1 is better!

NB: Remember this is a loan!

A lower int. rate is thus better!

(4) A printer is purchased for R54 000. The depreciation of the printer is 13% pa.

- (a) Calculate the book value of the printer after 4 years if the depreciation is calculated according to the **straight line method**.
- (b) Calculate the **interest rate**, according to the **reduced balance method**, for which the printer in (a) will have the same book value as in (a) after 4 years.

$$(a) A = ?$$

$$A = P(1 - i \times n)$$

$$P = R54\,000$$

$$= 54\,000 (1 - 0,13 \times 4)$$

$$i = 0,13$$

$$A = R25\,920$$

$$n = 4 \text{ years}$$

$$(b) A = R25\,920$$

$$A = P(1 - i)^n$$

$$P = R54\,000$$

$$25\,920 = 54\,000 (1 - i)^4$$

$$i = ?$$

$$\frac{25\,920}{54\,000} = (1 - i)^4$$

$$n = 4 \text{ years}$$

$$\sqrt[4]{\frac{12}{25}} = 1 - i$$

$$0,832... = 1 - i$$

$$i = 1 - 0,832...$$

$$i = 16,76\%$$