ARITHMETIC (Q 1, PAPER 1)

LESSON NO. 6: INTEREST

2007

1 (b) €8500 was invested for 2 years at compound interest.

(i) The rate of interest for the first year was 4%.
Find the amount of the investment at the end of the first year.

(ii) The amount of the investment at the end of the second year was €9237·80.
Find the rate of interest for the second year.

SOLUTION

1 (b) (i) If the sum of money P is invested for n years at the rate per annum of R% which remains unchanged for each year then the amount at the end of n years is:

$$A = P\left(1+\frac{R}{100}\right)^n \quad \ldots\ldots \; 3$$

Year 1:

P = €8,500
n = 1
R = 4
A = ?

$$A = P\left(1+\frac{R}{100}\right)^n = 8500\left(1+\frac{4}{100}\right)^1 = €8,840$$

1 (b) (ii)

Year 2:

P = €8,840
n = 1
R = ?
A = €9237·80

$$A = P\left(1+\frac{R}{100}\right)^n \Rightarrow 9237.8 = 8840\left(1+\frac{R}{100}\right)^1$$

$$\Rightarrow \left(1+\frac{R}{100}\right) = \frac{9237.8}{8840} \Rightarrow 1+\frac{R}{100} = 1.045 \Rightarrow \frac{R}{100} = 0.045$$

$$\therefore R = 4.5\%$$

2003

1 (c) (ii) What sum of money invested at 6% per annum compound interest will amount to €5000 in 7 years?
Give your answer correct to the nearest euro.

SOLUTION

R = 6%
A = €5,000
n = 7
P = ?

$$A = P\left(1+\frac{R}{100}\right)^n \quad \ldots\ldots \; 3$$

$$5000 = P\left(1+\frac{6}{100}\right)^7 \Rightarrow 5000 = P(1.06)^7$$

$$\therefore P = \frac{5000}{(1.06)^7} = €3,325$$

2001

1 (c) IR£5000 was invested for 3 years at compound interest.

The rate for the first year was 4%. The rate for the second year was $4\frac{1}{2}$%.

(i) Find the amount of the investment at the end of the second year.

At the beginning of the third year a further IR£4000 was invested.
The rate for the third year was r %.
The total investment at the end of the third year was IR£9811.36.

(ii) Calculate the value of r.

SOLUTION

1 (c) (i)

Year 1:

P = £5,000
n = 1
R = 4%
A_1 = ?

$$A = P\left(1+\frac{R}{100}\right)^n \quad \text{.....} \ 3$$

$$A_1 = 5000\left(1+\frac{4}{100}\right)^1 = 5000(1.04) = £5200$$

Year 2:

P = £5020
n = 1
R = 4.5%
A_2 = ?

$$A_2 = 5020\left(1+\frac{4.5}{100}\right)^1 = 5020(1.045) = £5434$$

1 (c) (ii)

Year 3:

P = £5434 + £4000 = £9434
n = 1
R = ?
A = £9811.36

$$9811.36 = 9434\left(1+\frac{R}{100}\right)^1 \Rightarrow \frac{9811.36}{9434} = \left(1+\frac{R}{100}\right)$$

$$\Rightarrow 1.04 = 1+\frac{R}{100} \Rightarrow 0.04 = \frac{R}{100}$$

$$\therefore R = 4\%$$

1998

1 (b) (i) At what rate of interest will IR£2000 amount to IR£2065 after one year?

SOLUTION

R = ?
P = £2,000
A = £2,065
n = 1

$$A = P\left(1+\frac{R}{100}\right)^n \quad \text{.....} \ 3$$

$$2065 = 2000\left(1+\frac{R}{100}\right)^1 \Rightarrow \frac{2065}{2000} = \left(1+\frac{R}{100}\right)$$

$$\Rightarrow 1.0325 = 1+\frac{R}{100} \Rightarrow 0.0325 = \frac{R}{100}$$

$$\therefore R = 100 \times 0.0325 = 3.25\%$$

1997

1 (b) IR£2500 was invested for three years at compound interest.
The rate of interest was 4% per annum for the first year and 3% per annum for the second year.
Calculate the amount of the investment after two years.
If the investment amounted to IR£2744.95 after three years, calculate the rate of interest per annum for the third year.

SOLUTION

1 (b)

$$A = P\left(1+\frac{R}{100}\right)^n \quad \ldots\ldots \text{ 3}$$

Year 1:
P = £2500
R = 4%
n = 1
A_1 = ?

$$A_1 = 2500\left(1+\frac{4}{100}\right)^1 = 2500(1.04) = £2600$$

Year 2:
P = £2600
R = 3%
n = 1
A_2 = ?

$$A_2 = 2600\left(1+\frac{3}{100}\right)^1 = 2600(1.03) = £2678$$

Year 3:
P = £2678
R = ?
n = 1
A_3 = £2744.95

$$2744.95 = 2678\left(1+\frac{R}{100}\right)^1 \Rightarrow \frac{2744.95}{2678} = 1+\frac{R}{100}$$

$$\Rightarrow 1.025 = 1+\frac{R}{100} \Rightarrow \frac{R}{100} = 0.025$$

$$\therefore R = 0.025(100) = 2.5\%$$