

Recall for Compound Interest:

$$\text{Final amount} = P \left(1 + \frac{r}{100}\right)^n$$

$$\text{Interest earned} = \text{Final amount} - \text{principal}$$

Task 1 – Calculate the final amount in the account, given no money is withdrawn and a deposit of:

1) £600 at 5% per year for 3 years	<b>£694.58</b>
2) £1,000 at 4% per year for 2 years	<b>£1,081.60</b>
3) £2,500 at 6% per year for 4 years	<b>£3,156.19</b>
4) £800 at 3.5% per year for 5 years	<b>£950.15</b>
5) £3,200 at 2% per year for 3 years	<b>£3,395.87</b>

Task 2 – Calculate the interest earned on an investment of:

6) £1,200 at 3% per year for 4 years	<b>£150.62</b>
7) £900 at 4.5% per year for 2 years	<b>£82.82</b>
8) £4,000 at 5% per year for 3 years	<b>£630.50</b>
9) £2,700 at 6.5% per year for 5 years	<b>£999.23</b>
10) £1,500 at 7% per year for 1 year	<b>£105</b>

Task 3

11) Liam invests £1,500 in a bank account paying 5% compound interest per year. What is Liam's total balance after 3 years?

$$\text{Total balance} = 1500 \left(1 + \frac{5}{100}\right)^3 = \mathbf{£1736.44}$$

12) A business deposits £10,000 into a fixed account at 4% compound interest per year for 5 years. What is the total amount in the account after 5 years?

$$\text{Total amount} = 10000 \left(1 + \frac{4}{100}\right)^5 = \mathbf{£12,166.53}$$

13) Maria invests £2,000 at 3% compound interest for 6 years. How much interest will she earn in total?

$$\text{Total amount} = 2000 \left(1 + \frac{3}{100}\right)^6 = \mathbf{£2388.10}$$

$$\text{Interest earned} = \mathbf{£2388.10 - £2000 = £388.10}$$

14) A company sets aside £5,500 in a reserve account earning 6% compound interest per year. After 2 years, they withdraw half the total balance. How much is withdrawn?

$$\text{Total amount} = 5500 \left(1 + \frac{6}{100}\right)^2 = \mathbf{£6179.80}$$

$$\text{Amount withdrawn} = \mathbf{£6179.80 \div 2 = £3089.90}$$

15) A student places £750 in an account that earns 4.5% compound interest per year for the first 2 years and 6% compound interest for the third year. How much money is in the account at the end of 3 years?

$$\text{After 2 years} = 750 \left(1 + \frac{4.5}{100}\right)^2 = \mathbf{£819.02}$$

$$\text{After 3 years} = 819.02 \left(1 + \frac{6}{100}\right)^1 = \mathbf{£868.16}$$

16) £3,000 is invested in a bank at 3.5% compound interest per year. If no money is withdrawn, how many years until the account has a balance of at least £3950?

Trial and error:

$$3000 \left(1 + \frac{3.5}{100}\right)^6 = \mathbf{£3,687.77}$$

$$3000 \left(1 + \frac{3.5}{100}\right)^7 = \mathbf{£3,816.84}$$

$$3000 \left(1 + \frac{3.5}{100}\right)^8 = \mathbf{£3,950.43}$$

**8 years**

17) A charity invests £15,000 at r% compound interest per year. After 3 years, they have a total amount of £17,117.49 in the account. Work out the interest rate earned to 1 decimal place.

$$15000 \left(1 + \frac{r}{100}\right)^3 = 17117.49$$

$$\left(1 + \frac{r}{100}\right)^3 = \frac{17117.49}{15000}$$

$$1 + \frac{r}{100} = \sqrt[3]{\frac{17117.49}{15000}}$$

$$1 + \frac{r}{100} = 1.044999 \dots$$

$$\frac{r}{100} = 0.044999 \dots$$

$$r = 4.4999 \dots$$

**Interest rate = 4.5% (1 dp)**

18) Jack is deciding between two offers at different banks.

Bank A: Open a savings, deposit £3000 and earn 7% interest for the first 4 years.

Bank B: Open a savings, deposit £3000 and earn 6% simple interest for the first 4 years. An additional payout of £250 will be given at the end of the 4 years.

Which offer should Jack choose? You must show all your working.

$$\text{Bank A: } 3000 \left(1 + \frac{7}{100}\right)^4 = \text{£3,932.39}$$

$$\begin{aligned}\text{Bank B: } 3000 \times 0.06 \times 4 &= \text{£720} \\ 3000 + 720 + 250 &= \text{£3,970}\end{aligned}$$

**Jack should choose Bank B.**

19) £2,200 is saved in an account that pays 6% compound interest per year, compounded monthly. How much interest is earned after 4 months?

$$\text{Monthly interest} = 6\% \div 12 = 0.5\%$$

$$\text{Final amount} = 2200 \left(1 + \frac{0.5}{100}\right)^4 = \text{£2244.33}$$

$$\text{Interest earned} = \text{£2244.33} - \text{£2200} = \text{£44.33}$$

Recall for Depreciation:

$$\text{Value after depreciation} = P \left(1 - \frac{r}{100}\right)^n$$

#### Task 4

20) A car is bought for £18,000. It depreciates at 12% per year. What is its value after 3 years?

$$\text{Value} = 18000 \left(1 - \frac{12}{100}\right)^3 = \text{£12,266.50}$$

21) A laptop costs £1,200 and loses value at 20% per year. How much will it be worth after 4 years?

$$\text{Value} = 1200 \left(1 - \frac{20}{100}\right)^4 = \text{£491.52}$$

22) A motorbike costs £6,500 and depreciates at 8% per year. Find its value after 5 years.

$$\text{Value} = 6500 \left(1 - \frac{8}{100}\right)^5 = \text{£4284.03}$$

23) A machine costs £25,000 and depreciates at 15% per year. Calculate its value after 2 years.

$$\text{Value} = 25000 \left(1 - \frac{15}{100}\right)^2 = \text{£18,062.50}$$

24) A delivery van is bought for £28,000. After 5 years, it is worth £12,335. Find the annual depreciation rate to 1 decimal place.

$$28000 \left(1 - \frac{r}{100}\right)^5 = 12335$$

$$\left(1 - \frac{r}{100}\right)^5 = \frac{12335}{28000}$$

$$1 - \frac{r}{100} = \sqrt[5]{\frac{12335}{28000}}$$

$$1 - \frac{r}{100} = 0.848782 \dots$$

$$\frac{r}{100} = 0.151217 \dots$$

$$r = 15.1\% \text{ (1 dp)}$$

25) A camera is bought for £2,000 and depreciates at a rate of 14% per year. How many years will it take for its value to fall below £1,000?

**Trial and error:**

$$2000 \left(1 - \frac{14}{100}\right)^3 = \text{£1,272.11}$$

$$2000 \left(1 - \frac{14}{100}\right)^4 = \text{£1,094.02}$$

$$2000 \left(1 - \frac{14}{100}\right)^5 = \text{£940.85}$$

**5 years**