

## Repeated Percentage Change And Compound Interest

If an amount of money  $P$  is deposited in a bank account which pays  $r$  percent compound interest per year, then the accrued amount  $A$  after  $n$  years is given by

$$A = P \left( 1 + \frac{r}{100} \right)^n .$$

For example, if £2000 is deposited in a bank account which pays 7% per year, then after 10 years there would be  $2000 \times 1.07^{10} = \text{£}3934.30$  in the account.

1. Simon buys an antique. In the first year it increases in value by 7%. In the second year it increases by 19%. What is the overall percentage increase over the two years? 27.33% increase
2. A stock price increases by 15% in a year. The following year it falls by 35%. What is the overall percentage change? 25.25% decline
3. Gurvinder starts to day-trade. In the first day he makes 6% profit. In the second day he makes  $a\%$  profit. Overall he makes 15.54% profit. Find  $a$ .  $a = 9$
4. Colin also day-trades. In the first day he makes 20% profit. In the second day he makes 30% profit. In the third day he loses money so that he has exactly the same amount of money he started with. What percentage loss does he make on the third day? Give your answer to 3 significant figures. 35.9% loss
5. Kristina deposits £5000 in a bank account that pays 6% interest per year.
  - (a) How much does she have in the account after seven years? £7518.15
  - (b) How much *profit* does she have after 12 years? £5060.98
  - (c) After  $n$  years there is £32266.93 in the account. Using trial and improvement, find  $n$ .  $n = 32$
6. Nikolai deposits £1000000 in a bank account that pays 6% compound interest. After  $n$  years, £2132928.26 has accrued in the account. Using trial and improvement, find the integer value of  $n$ .  $n = 13$
7. Dwayne deposits £100 in a bank account that pays 3% interest per year.
  - (a) How much does he have in the account after 5 years? £115.92
  - (b) How much *profit* does he have after 16 years? £60.47
  - (c) After  $n$  years there is £606.84 in the account. Using trial and improvement, find  $n$ .  $n = 61$
8. Obadiah deposits some money in a bank account that pays 3% interest per year. After 4 years there is £3489.08 in the account.
  - (a) How much money was originally deposited in the account? £3100
  - (b) How much profit does Simon make after 15 years. £1729.70
  - (c) After  $n$  years there is £5277.54 in the account. Using trial and improvement, find  $n$ .  $n = 18$
9. A car loses 10% of its value every year. The car originally cost £45000.
  - (a) Find the value of the car after 10 years. £15690.53

(b) Find the *reduction* in the value of the car after 15 years.

£35734.90

10. £5000 is deposited in a bank account. After 12 years, £14063.32 has accrued in the account. What is the interest rate?

9%