Simple interest and compound interest

Simple interest

With simple interest the amount of money borrowed remains fixed.

Simple Interest Formula

= (Amount invested x Time in year x Interest rate per year)

= (P x T x R) ÷100

With simple interest the amount of money borrowed remains fixed.

Example 1:

£400 is borrowed for 3 years at an interest rate of 5%

pa (pa means per annum, or each year).Interest for one year = 5% of £400

= $(^{5}/_{100}) \times 400$

= £20

Interest for 3 years = £20 × 3 = £60.

You can write this in a formula.

Interest = (P × T × R)÷100

- P (principal) is the amount borrowed.
- R is the rate of interest per year.
- T is the time in years. (If time is given in month change into years by dividing by 12)

Example 2

£500 is borrowed for 9 months at an interest rate of 20%

Here Time = 9 month

= 9/12 years

= ¾ years

=0.75 years.

Interest = (P × T × R)÷100

= (£500 ×0 .75 ×20)÷100

= £75

Exercise

Find simple interest when

Q1. £ 300 is invested for 3 years at 9% P.a

=_____

Q2. £ 750 is invested for 8 years at 7.5% P.a.

=_____

Q3. £ 175 is invested for 9 months years at 8.5% P.a.

=_____

Q4. Find the rate of interest to produce £ 50 as interest from £ 700 in 2 years.

=_____

Q5. Find the rate of interest to produce £ 280 as interest from £ 2000 in 18 months.

=_____

Q6.Find the time taken for a sum of £7000 to produce £250 interest at 7.5% P.a.

=_____

Q7. Find the rate of interest to produce £ 550 as interest from £ 1500 in 5 years.

=_____

Q8. Find the time taken for a sum of £5000 to produce £ 750 interest at 9% P.a.

=_____

Q9. Find the rate of interest to produce £ 550 as interest from £ 1500 in 5 years.

=_____

Q10. Find the time taken for a sum of £5000 to produce £ 750 interest at 9% P.a.

=_____

Compound Interest

Here the interest is added to the principal at the end of each year. So the next year the interest is worked out on a larger amount of money than what was originally borrowed.

This means paying interest on the interest of previous years (unlike simple interest, where you only pay interest on the original amount).

Example 1:

£400 is borrowed for 3 years at 5% compound interest.

Principal at the start = **£400**

Interest in the 1st year = $^{5}/_{100} \times 400 = £20$

Principal after 1 year = **£420**

Interest in the 2nd year = $^{5}/_{100} \times 420 = £21$

Principal after 2 years = **£441**

Interest in the 3rd year = $^{5}/_{100} \times 441 = £22.05$

Principal after 3 years = **£463.05**

The total interest charged under compound interest will be **£63.05**.

This is different to the simple interest worked out above.

Alternative Method

Example 2:

At £2500 investment for 5 years at a rate of 7.6% P.a. calculate compound interest that her investment will earn.
Sol:

$$P = £\,2500,\ n = 5,\ R = 7.6,\ A = P\left(1+\frac{R}{100}\right)^{n}$$

$$\text{Accumulated Amount} = A = 2500\left(1+\frac{7.6}{100}\right)^{5} = £3605.8$$

Compound interest = A – P = £ 1105.8

Q 11. Megan invested £2000 for 3 years at 5% Compound Interest.
Calculate the interest Megan received.

Amount =_____, Compound Interest _____

Q 12. Mr Jones buys a new car for £50 000.
The car decreases in value at the rate of 30% each year.
Find the value of the car after two years.

New price =_____, Decreased price _____

Q.13 £650 is invested for 2 years at 7% compound interest which is paid annually.
What is the total interest earned?

Amount =_____, Compound Interest _____

Q.14 £4000 is invested for 3years at 8% compound interest which is paid annually.
What is the total interest earned.

Amount =_____, Compound Interest _____

Q.15 £600 is invested for 8year at 9.50% compound interest which is paid annually. What is the total interest earned.

Amount =_____, Compound Interest _____

Q.16 The price of a new car is £15000 now. Each year the price decreases by 6% of the price of the beginning of years. Calculate the price of a car in three years time.

New price=_____

Q.17 A new computer costs £340. With depreciation its value is expected to tall each year by 15% of its value at the beginning of the year. What its value after three year.

New price=_____

Q18. Kylie wants to invest £20 000 for 3 years.

Investment A	**Investment B**
£20 000 Earns 3.02% interest per annum Interest paid yearly by cheque	£20 000 Earns 2.98% compound interest per annum

She considers two investments, Investment A and Investment B.
Kylie wants to get the greatest return on her investment.
Which of these investments should she choose?

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