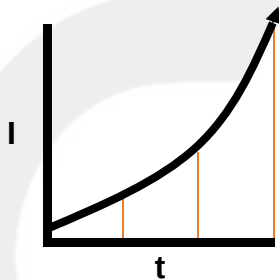


Compound Interest

Compound Interest

Compound interest is interest based on the initial principal amount, plus all accumulated interest from previous interest periods. In other words, it is interest based on an updated sum of money.

Compound interest is charged based on the total amount. The interest charged increases exponentially.



Compound interest can be **positive** (total appreciation) or **negative** (total depreciation). This is based on whether the value of a sum increases or decreases over time.

EXAMPLE:

A \$12,000 diamond appreciates at 11.2% p.a. compounded yearly over three years.

OR

A \$25,000 car depreciates at 8% p.a. compounded monthly over five years.

The compound interest formula is

$$A = P \left(1 \pm \frac{r}{n} \right)^{nt}$$

A = total amount, P = principal amount, r = annual interest rate (decimal), n = number of times compounded per year, t = years

EXAMPLE: Find the total appreciation (interest) if

$P = 500$, $r = 10\%$ p.a. compounded biannually and $t = 3$ years

$$A = P \left(1 \pm \frac{r}{n} \right)^{nt} = 500 \left(1 + \frac{0.10}{2} \right)^{2 \times 3} = \$670.05$$

$$I = A - P = \$670.05 - \$500 = \$170.05 \text{ (total appreciation)}$$



Instructions: Answer the questions below, rounding to two decimals.

1

Find the total value.

$$P = \$180$$

$$r = 2.35\% \text{ p.a. appreciation}$$

$$n = \text{compounded annually}$$

$$t = 5 \text{ years}$$

2

Find the principal value.

$$A = \$455$$

$$r = 4.2\% \text{ p.a. depreciation}$$

$$n = \text{compounded monthly}$$

$$t = 3 \text{ years}$$

3

Find the total appreciation.

$$P = \$296$$

$$r = 12.8\% \text{ p.a. appreciation}$$

$$n = \text{compounded bi-annually}$$

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

4

Find the rate of appreciation.

$$A = \$700$$

$$P = \$420$$

$$n = \text{compounded annually}$$

$$t = 2 \text{ years}$$



5 Find the total depreciation.
 $A = \$850$
 $r = 5.5\%$ p.a. depreciation
 $n =$ compounded monthly
 $t = 4$ years

6 Find the principal value.
 $A = \$680$
 $r = 7.8\%$ p.a. appreciation
 $n =$ compounded quarterly
 $t = 7$ years

7 Find the rate of depreciation.
 $A = \$255$
 $P = \$975$
 $n =$ compounded annually
 $t = 6$ years

8 Find the total appreciation.
 $P = \$2600$
 $r = 9.95\%$ p.a. appreciation
 $n =$ compounded quarterly
 $t = 6$ years



9 Find the rate of appreciation.
 $A = \$1450$
 $P = \$330$
 $n =$ compounded annually
 $t = 8$ years

10 Find the total depreciation.
 $A = \$4420$
 $r = 8.25\%$ p.a. depreciation
 $n =$ compounded bi-annually
 $t = 7$ years

11 Find the total value.
 $P = \$1080$
 $r = 6.75\%$ p.a. appreciation
 $n =$ compounded monthly
 $t = 9$ years

12 Find the rate of depreciation.
 $A = \$900$
 $P = \$2400$
 $n =$ compounded annually
 $t = 12$ years

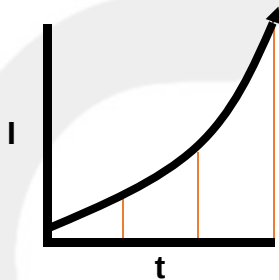


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EXAMPLE: Find the total appreciation (interest) if

$P = 500$, $r = 10\%$ p.a. compounded biannually and $t = 3$ years

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$$I = A - P = \$670.05 - \$500 = \$170.05 \text{ (total appreciation)}$$



Instructions: Answer the questions below, rounding to two decimals.

1

Find the principal value.

$$A = \$562$$

$$r = 3.3\% \text{ p.a. depreciation}$$

$$n = \text{compounded monthly}$$

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

2

Find the rate of appreciation.

$$A = \$620$$

$$P = \$196$$

$$n = \text{compounded annually}$$

$$t = 5 \text{ years}$$

3

Find the total value.

$$P = \$475$$

$$r = 5.3\% \text{ p.a. appreciation}$$

$$n = \text{compounded bi-annually}$$

$$t = 3 \text{ years}$$

4

Find the total depreciation.

$$A = \$1060$$

$$r = 2.15\% \text{ p.a. depreciation}$$

$$n = \text{compounded quarterly}$$

$$t = 6 \text{ years}$$



5 Find the rate of depreciation.
 $A = \$430$
 $P = \$1485$
 $n = \text{compounded annually}$
 $t = 7 \text{ years}$

6 Find the total appreciation.
 $P = \$1793$
 $r = 6.75\% \text{ p.a. appreciation}$
 $n = \text{compounded quarterly}$
 $t = 5 \text{ years}$

7 Find the total value.
 $P = \$2205$
 $r = 7.9\% \text{ p.a. appreciation}$
 $n = \text{compounded monthly}$
 $t = 5 \text{ years}$

8 Find the total depreciation.
 $P = \$3323$
 $r = 4.38\% \text{ p.a. depreciation}$
 $n = \text{compounded bi-annually}$
 $t = 8 \text{ years}$



9

Find the principal value.

$$A = \$5986$$

$r = 8.6\%$ p.a. appreciation

$n =$ compounded tri-annually

$t = 9$ years

10

Find the total depreciation.

$$A = \$4501$$

$r = 3.98\%$ p.a. depreciation

$n =$ compounded monthly

$t = 11$ years

11

Find the rate of appreciation.

$$A = \$9540$$

$$P = \$4945$$

$n =$ compounded annually

$t = 7$ years

12

Find the total appreciation.

$$P = \$14,350$$

$r = 8.55\%$ p.a. appreciation

$n =$ compounded quarterly

$t = 3$ years