# Simple and Compound interest

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## Simple interest

$I = Prt$

$I$ interest earned
$P$ amount of money started with (Principle)
$r$ interest rate as a decimal
$t$ time in years.

1) You invest $400 at 3% interest for 2 years. How much interest do you earn?

$P = 400$
$r = 0.03$
$t = 2$

$I = Prt$
$= (400)(0.03)(2)$
$= \$24$

2) You invest $1000 at 2.5% interest for 6 months. How much is your investment worth at the end?

$P = 1000$
$r = 0.025$
$t = 6 \text{ months} = 0.5 \text{ years}$

$I = Prt$
$= (1000)(0.025)(0.5)$
$= \$12.50$

$A = P + I$
$= \$1000 + \$12.50$
$= \$1012.50$

3) You invest $500 at 4% interest. You earn $20 interest. How long was the amortization period?

$P = 500$
$r = 0.04$
$I = 20$

$\frac{I}{Pr} = \frac{Prt}{Pr} \Rightarrow t = \frac{I}{Pr}$

$= \frac{20}{(500 \times 0.04)}$

$= 1$

4) You earn $35 after investing for 2.5 years at 0.25% interest. How much did you invest?

$t = 2.5$
$r = 0.0025$
$I = 35$

$\frac{I}{rt} = \frac{P\cancel{t}}{\cancel{t}} \Rightarrow P = \frac{I}{rt}$

$= \frac{35}{[(0.0025)(2.5)]}$

$= \$5600$

5) You earn $125 on a $650 investment, invested for 7 yrs. What was the interest rate?

$I = 125$
$P = 650$
$t = 7$

$\frac{I}{Pt} = \frac{P r \cancel{t}}{\cancel{t}} \Rightarrow r = \frac{I}{Pt} \times 100$

$= \frac{125}{(650 \times 7)} \times 100$

$= 2.7\%$

Compound interest

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

A actual amount Principle and interest together.
P principle
r interest rate as a decimal
t term in years
n Compounding period
- how many times compounded each year.
yearly $n = 1$ semi-annually $n = 2$ quarterly $n = 4$
monthly $n = 12$ weekly $n = 52$

D) You invest $1000 at 1.5% interest, compounded quarterly for 2 years. How much is your investment worth after 2 years?

$P = 1000$
$n = 4$
$t = 2$
$r = 0.015$

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

$= 1000 \times \left(1 + \frac{0.015}{4}\right)^{(4 \times 2)}$

$= 1030.40$