

Algebraic Pre-Requisites

Using your calculator and algebra skills, determine the value of  $x$  in the following equations.

a)  $72 = (x)(0.08)(4)$

$$\frac{72}{0.32} = \frac{x(0.32)}{0.32}$$

$$225 = x$$

b)  $x = (8500)(0.05)(80/365)$

$$x = 93.15$$

c)  $19.74 = (94)(x)(3)$

$$\frac{19.74}{282} = \frac{282x}{282}$$

$$0.07 = x$$

d)  $3.7 = (222)(0.025)(x/12)$

$$\frac{3.7}{0.4625} = \frac{0.4625x}{0.4625}$$

$$8 = x$$

If some of your income is deposited into a bank, it can earn **interest**, a fee for allowing the temporary use of your money. Likewise, if you borrow money from the bank, they will expect to earn interest from you.

**Simple interest** is calculated as a percentage of the amount deposited or borrowed (the principal). The formula we use for simple interest is:

$$I = Prt$$

where  $I$  = Interest earned

$P$  = Principal, the amount invested or borrowed

$r$  = rate per year, as a decimal

$t$  = time, in years

The future value of an investment can be determined by adding the principal to the amount of interest earned. The formula we use is:

$$A = P + I$$

or

$$A = P + Prt$$

where  $A$  = future value

**Example 1:** Mary deposited \$200 into an account earning simple interest of 4% per year. Calculate the simple interest earned at the end of one year and at the end of five months.

After 1 year:  $I = Prt = (200)(0.04)(1) = 8$

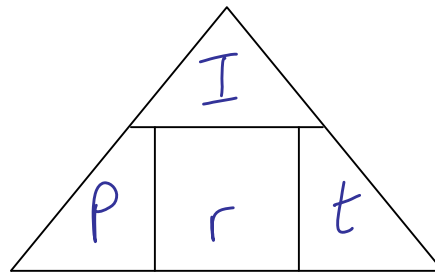
After 5 months:  $= (200)(0.04)\left(\frac{5}{12}\right) = 3.33$

**Example 2:** Find the interest earned if \$500 is invested at  $4\frac{1}{2}\%$  per annum for 80 days and then for 5 years.

After 80 days:  $I = Prt = (500)(0.045)\left(\frac{80}{365}\right) = 4.93$

After 5 years:  $I = Prt = (500)(0.045)(5) = 112.50$

Sometimes the simple interest figure will be given and you will need to calculate p, r, or t. In these cases, division will need to be performed to obtain the solution. Here is a handy method of remembering the formula and when to multiply or divide.



If you are trying to determine the value of r...  $\frac{I}{P \cdot t}$

If you are trying to determine the value of p...  $\frac{I}{r \cdot t}$

If you are trying to determine the value of t...  $\frac{I}{P \cdot r}$

**Example 3:** Alice deposited \$4000 into an account earning simple interest at a rate of 6.2% per year. Calculate the number of months the money was in the account if it earned \$260 interest.

$$t = \frac{I}{P \cdot r} = \frac{260}{4000(0.062)} = 1.05 \text{ yrs} \times 12 = 12.58 \text{ months}$$

**Example 4:** If Gerri borrowed \$800 from her grandmother for nine months and owed \$32 interest fees, what was the simple rate of interest they agreed upon?

$$r = \frac{I}{P \cdot t} = \frac{32}{800 \cdot \frac{9}{12}} = 0.053$$

5.3%

**Example 5:** How much money would you have to invest at  $5\frac{3}{4}\%$  per annum in order for it to earn \$37 in interest after 300 days?

$$P = \frac{I}{rt} = \frac{37}{0.0575 \left( \frac{300}{365} \right)} = 782.90$$

**Example 6:** Marty invested in a \$2500 guaranteed investment certificate (GIC) at 2.5% simple interest, paid annually, with a term of 10 years.

a. How much interest will accumulate over the term of Marty's investment?

$$\begin{aligned} I &= Prt \\ &= (2500)(0.025)(10) \\ &= 625 \end{aligned}$$

b. What is the future value of his investment at maturity?

$$2500 + 625 = 3125$$