Chapter 2 Extension Lesson #2:
Simple Interest

$$I = prt$$

I = interest
p = principle
r = rate (as a decimal)
t = time (in years)

<u>Example 1</u> $t=2$ $p=\$5000$ $r=.06$

Maria opened a savings account that earns 6% annual interest. If she deposited $5000 when she opened the account, how much interest has she earned after 2 years?

$$I = prt$$
$$I = (\$5,000)(.06)(2)$$
$$\boxed{I = \$600}$$

Example 2

$$\frac{6 \text{ mo}}{12 \text{ mo}} = \frac{1}{2} = t = .5 \quad .08 = r \quad I = \$100$$

Guadalupe opened a savings account that earns 8% annual interest. After 6 months, she has received $100 in interest. How much money had she deposited when she opened the account?

$$I = prt$$
$$100 = p(.08)(.5)$$
$$\frac{100}{.04} = \frac{.04p}{.04}$$
$$\boxed{\$2500 = p}$$

Example 3

$$p = 6000 \quad r = 9\% = .09 \quad I = 1890$$

Mike deposited $6000 into a savings account that receives 9% annual interest. If he earns $1890 in interest, how long was his money in the account?

$$I = prt$$
$$1890 = (6000)(.09)t$$
$$\frac{1890}{540} = \frac{540t}{540}$$
$$\boxed{3.5 \text{ years} = t}$$

Example 4 $p = 9000$ $2\frac{3mo}{12mo} = 2\frac{1}{4} = 2.25 = t$

$I = 2430$

Jim deposited $9000 into a savings account for 2 years and 3 months. If he earns $2430 in interest, what is the annual interest rate?

$$I = prt$$

$$2430 = (9000)(r)(2.25)$$

$$2430 = 20,250\, r$$

$$\frac{2430}{20,250} = \frac{20,250\, r}{20,250}$$

$$.12 = r$$

$$\boxed{12\% = r}$$

Example 5

Molly invested $30,000, part at 6% annual interest and the rest at 7.5% annual interest. Last year, she earned $1995 in interest. How much money did she invest at each rate?

$p = x$ $17,000$ $p = 30,000 - x$ $30,000 - 17,000$
$r = .06$ $r = .075$
$t = 1$ $t = 1$

int. @ 6%   int. @ 7.5%

$(x)(.06)(1)$ $+$ $(30,000-x)(.075)(1) = 1995$

$.06x$ $+$ $.075(30,000 - x) = 1995$

$.06x$ $+$ $2250 - .075x = 1995$

$-.015x + 2250 = 1995$
$\qquad\qquad -2250 \quad -2250$

$\dfrac{-.015x}{-.015} = \dfrac{-255}{-.015}$

$$x = 17,000$$

$\boxed{\begin{array}{l} \$17,000\ @\ 6\% \\ \text{rate} \\ \\ \$13,000\ @\ 7.5\% \\ \text{rate} \end{array}}$

Example 6

Kyle invested $12,000, part at 12% annual interest and the rest at 13.25% annual interest. His total interest last year was $1540. How much money was invested at each rate?

$p = x$
$r = .12$
$t = 1$

Int. @ 12%
$(x)(.12)(1)$

$.12x$

$.12x$ +

$p = 12,000 - x$
$r = .1325$
$t = 1$

$4,000 @ 12% rate
$8,000 @ 13.25% rate

int. @ 13.25%
$(12,000 - x)(.1325)(1) = 1540$

+ $.1325(12,000 - x) = 1540$

+ $1590 - .1325x = 1540$

$-.0125x + 1590 = 1540$
              $- 1590   -1590$

$\dfrac{-.0125x}{-.0125} = \dfrac{-50}{-.0125}$

$x = 4,000$

Example 7

Callie invested $7000 for one year, part at 8% annual interest and the rest at 10% annual interest. Her total interest for the year was $596. How much did she invest at 10% annual interest?

$5200 @8%

8%
$p = x$
$r = .08$
$t = 1$

$(x)(.08)(1)$
$.08x$
$.08x$ +

10%
$p = 7000 - x$
$r = .10$
$t = 1$

$(7000 - x)(.10)(1) = 596$
$.10(7000 - x) = 596$
$700 - .10x = 596$

$1800 @ 10%

$-.02x + 700 = 596$
         $-700   -700$

$\dfrac{-.02x}{-.02} = \dfrac{-104}{-.02}$

$x = 5200$

Example 8

Joe invested $7625, part at 8% annual interest and the rest at 6.5% annual interest. In the same amount of time, he earned three times as much interest from the 6.5% investment as he did from the 8% investment. How much money did he have invested at 6.5%?
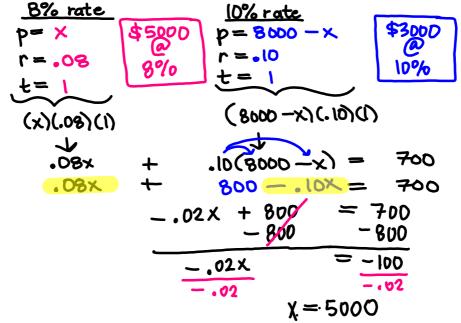
~~SKIP~~

Example 9

Joan invested some money in bonds at 6% interest and an amount $8000 less than that in stocks at 5% interest. Her total interest for the year is $1690. How much did she invest at 5%?

6% rate	5% rate
p = x $19,000	p = x−8000 → 19000−8000
r = .06	r = .05
t = 1	t = 1

$\boxed{\$11,000 @ 5\%}$

$(x)(.06)(1)$ $(x-8000)(.05)(1)$

$.06x$ + $.05(x-8000)$ = 1690

$\boxed{.06x}$ + $\boxed{.05x}$ − 400 = 1690

$.11x$ $-$ 400 = 1690

$+$ 400 $+$ 400

$.11x$ = 2090

$\dfrac{.11x}{.11}$ $\dfrac{2090}{.11}$

$x = 19,000$

1. Rosa invested $8000 for one year, part at 8% annual interest and the rest at 10% annual interest. Her total interest for the year was $700. How much money did she invest at each rate?

<u>8% rate</u>

$p = x$
$r = .08$
$t = 1$

$\boxed{\$5000 \ @ \ 8\%}$

$(x)(.08)(1)$

$\downarrow$

$.08x$

<u>10% rate</u>

$p = 8000 - x$
$r = .10$
$t = 1$

$\boxed{\$3000 \ @ \ 10\%}$

$(8000 - x)(.10)(1)$

$\downarrow$

$.10(8000 - x) = 700$

$.08x + .10(8000 - x) = 700$

$.08x + 800 - .10x = 700$

$-.02x + 800 = 700$
$\qquad\quad -800 \qquad -800$

$\dfrac{-.02x}{-.02} = \dfrac{-100}{-.02}$

$x = 5000$

2. Jake has $4000 invested at 8% annual interest. He has $2800 more to invest. At what rate must he invest the $2800 to have a total annual interest of $628?

<u>8% rate</u>

$p = 4000$
$r = .08$
$t = 1$

$(4000)(.08)(1)$

320
-320

<u>? % rate</u>

$p = 2800$
$r = r$
$t = 1$

$(2800)(r)(1) = 628$

$320 + 2800r = 628$
$\qquad\qquad\qquad -320$

$\dfrac{2800r}{2800} = \dfrac{308}{2800}$

$r = .11$

$\boxed{11\% \ rate}$