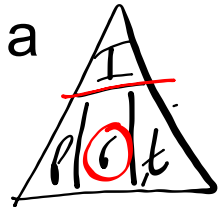


$I = prt$
 $A = P + I$

WARM-UP

$A = P + Prt$
 $A = P(1 + rt)$

You earned \$107.42 simple interest on a \$671.37 investment over four years.



What was the interest rate?

$$\frac{I}{P} = \frac{prt}{P}$$

$$r = \frac{I}{Pt}$$

$$= \frac{107.42}{671.37(4)} \times 100\%$$

$$= 4\%$$

HOMEWORK Questions?

p. 452: #1 - 6, 10, 11

3, 11, 2, 6

$$I = Prt$$

&

$$A = P + I$$

OR

$$A = P + Prt$$

$$A = P(1 + rt)$$

2. Cam has \$5000 to invest. He wants his principal to grow to \$6500 in 5 years so that he can afford a new drum kit.

- a) What simple interest rate will allow him to meet his goal?
- b) Suppose that interest is paid semi-annually and Cam withdraws all the money after 3.25 years. How much money will he have?

$$A = P + I$$

$$A - P = I$$

a) $P = 5000$
 $A = 6500$
 $t = 5$
 $r = ?$

$I = 1500$

$$I = P \cdot r \cdot t$$

$$\frac{1500}{5000(s)} = \frac{5000(s)r}{5000(s)}$$

$$6\% = r$$

b) $A = P + P \cdot r \cdot t$

$$= 5000 + 5000(0.06)(3)$$

| | |
|--------------------------|------|
| $5000 + 5000 * 0.06 * 3$ | |
| $5000 * 0.06 * 3$ | 5900 |
| Ans + 5000 | 900 |
| | 5900 |

6. a) A \$12 000 Canada Savings Bond has a term of 10 years. What interest rate is needed for the future value of the CSB to be \$15,000 at maturity?
- b) Suppose that the interest rate from part a) was increased by 1%. What would be the future value of the CSB at maturity?

$$I = A - P$$

$$= 15000$$

$$\underline{- 12000}$$

$$I = 3000$$

a)

$$r = \frac{I}{Pt}$$

$$= \frac{3000}{12000(10)} \times 100\%$$

$$= 2.5\%$$

b)

$$A = P + Prt$$

$$= 12000 + 12000(0.035)(10)$$

$$= \$16200$$

11. A bank is offering a simple interest rate of 3.2% for a guaranteed investment certificate with a 5-year term.



- a) What principal would you need to invest if you wanted to have \$20 000 at the end of the term?
- b) How long would it take for the value of the GIC to be \$25 000?

a) $r = 3.2\%$
 $t = 5 \text{ yrs}$
 $A = 20000$
 $P = ?$

~~$I = Prt$~~ ~~$A = P + I$~~ ~~$A = P + Prt$~~

$A = P(1 + rt)$

$(1 + rt) \quad (1 + rt)$

$\frac{A}{(1 + rt)} = P$

$\frac{20000}{(1 + 0.032 \times 5)} = P$

$17241.39 = P$

-
3. a) Principal of \$1000 is invested at 5% simple interest, paid annually, for 5 years. What is the rate of return?
- b) Which option below would yield the greatest future value?
What is the rate of return for this option?
- A. increasing the principal to \$1050
 - B. increasing the interest rate to 6%
 - C. paying interest every 6 months
 - D. increasing the term to 6 years

Jonight

rate of return

The ratio of money earned (or lost) on an investment relative to the amount of money invested, usually expressed as a decimal or a percent.

$$ROR = \frac{\text{earn / lost}}{\text{invested}}$$

EXAMPLE 3
p. 448

Determining the duration of a simple interest investment

Ingrid invested her summer earnings of \$5000 at 8% simple interest, paid annually. She intends to use the money in a few years to take a holiday with a girlfriend.

- a) How long will it take for the future value of the investment to grow to \$8000?
- b) What is Ingrid's **rate of return** ?

Ingrid's Solution

a) $A = P + Prt$

P is \$5000.
 r is 8%, or 0.08.
 A is \$8000.

$$8000 = 5000 + (5000)(0.08)t$$

$$3000 = 400t$$

$$7.5 = t$$

I knew P , r , and A . I determined t by substituting these known values into the formula $A = P + Prt$ and solving for t .

Because I needed to isolate t , I knew that the $A = P + Prt$ form of the equation would have fewer solution steps than the $A = P(1 + rt)$ form would.

It will take 8 years for the future value of the investment to be at least \$8000.

I knew 7.5 years would not work because the interest is paid annually. This meant that I had to round up to the next whole year. It also meant that, at 8 years, the future value would be more than \$8000.

b) After 8 years:

$$A = P + Prt$$

$$A = 5000 + (5000)(0.08)(8)$$

$$A = 8200$$

I determined the interest earned by subtracting the principal from the future value.

At 8 years, the future value will be \$8200.

Interest earned:
 $\$8200 - \$5000 = \$3200$

$$\text{Rate of return} = \frac{3200}{5000}$$

$$\text{Rate of return} = 0.64$$

I compared the interest earned with the principal to determine the rate of return.

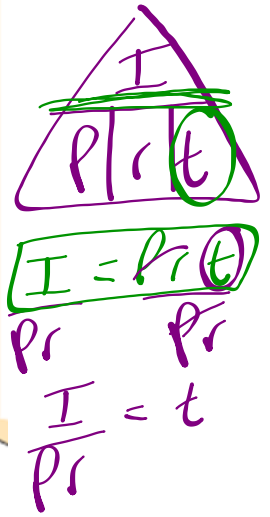
The rate of return is 64% over 8 years.



EXAMPLE 3 | Determining the duration of a simple interest investment
 p. 448

Ingrid invested her summer earnings of \$5000 at 8% simple interest, paid annually. She intends to use the money in a few years to take a holiday with a girlfriend.

- a) How long will it take for the future value of the investment to grow to \$8000?
 b) What is Ingrid's rate of return?



$$I = A - P$$

$$= 8000 - 5000$$

$$= 3000$$

a) $t = \frac{I}{Pr}$

$$= \frac{3000}{5000(0.08)}$$

$$= 7.5 \text{ years}$$

$t = 8 \text{ years}$

b) $ROR = \frac{I}{P}$

$$= \frac{5000(0.08)(8)}{5000}$$

$$= 64\%$$

EXAMPLE 4 | Determining the rate of interest on a simple interest investment | p. 450

Grant invested \$25 000 in a simple interest Canada Savings Bond (CSB) that paid interest annually.

- a) If the future value of the CSB is \$29 375 at the end of 5 years, what interest rate does the CSB earn?
- b) Grant cashed in the bond after 4.5 years because a house he had been admiring came up for sale and he needed a down payment. How much money did he have for the down payment?



$$I = P \cdot r \cdot t$$

$$A = P + I$$

$$A - P = I$$

$$29375 - 25000 = I$$

$$4375 = I$$

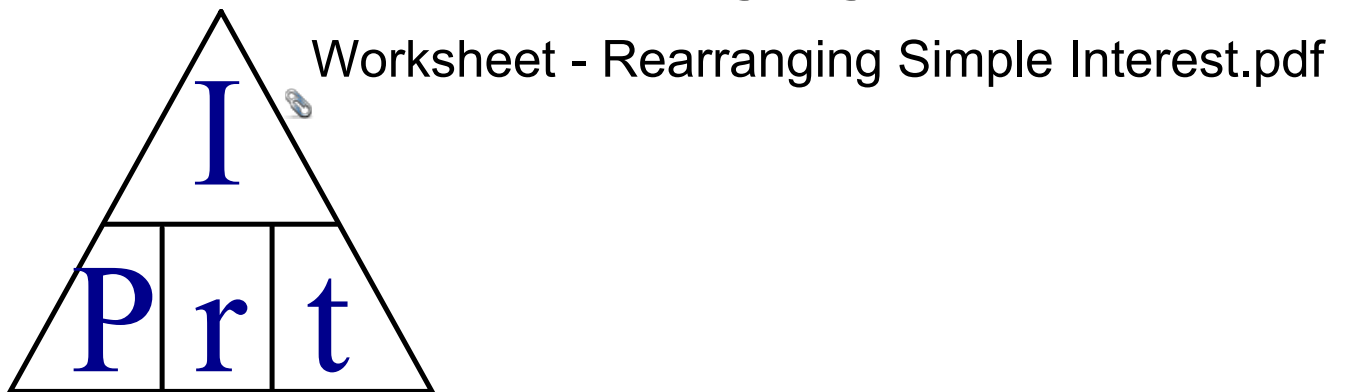
$$\begin{aligned}
 a) \quad r &= \frac{I}{P \cdot t} \\
 &= \frac{4375}{25000(5)} \\
 &= 3.5\%
 \end{aligned}$$

x 100 %

$$\begin{aligned}
 b) \quad A &= P + P \cdot r \cdot t \\
 &= 25000 + 25000(0.035)(4.5)
 \end{aligned}$$

| | |
|---|-----------------------------|
| = | 25000 + 25000 * 0.035 * 4.5 |
| | 28500 |
| | 25000(1 + 0.035 * 4.5) |
| | 28500 |

PRACTICE rearranging... $I = Prt$



When finished...PRACTICE rate of return (ROR)

Text p. 452: #3 & #12

Attachments

Worksheet - Rearranging Simple Interest.pdf