HOMEWORK... Questions

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

$I = Prt$

&

$A = P + I$

OR

$A = P + Prt$

$A = P(1 + rt)$

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?

$I = A - P$

$I = 15000 - 12000$

$I = 3000$

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

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

$r = 2.5\%$

b) $A = P + Prt$

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

$A = \$16\,200$

10. Shaun has been looking at houses. He has $10 000 that he wants to invest, hoping that he can end up with $15 000 to make a down payment on a house. He has an opportunity to invest at 6.5% simple interest, paid annually. How long will it take before Shaun can make a down payment of $15 000?

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?

$t = \frac{I}{Pr}$ years

$= \frac{5000}{10000(0.065)}$

$= 7.69$ years

$= 7$ yrs 8 mths

a) $P = \frac{I}{rt}$

$= \frac{7258.62}{1724.38(0.032)(5)}$

$= 14$ years

a) $I = Prt$ X

$A = P + I$ X

$A = P + Prt$ ☺ col

or

$A = P(1 + rt)$ ✓x2

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

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

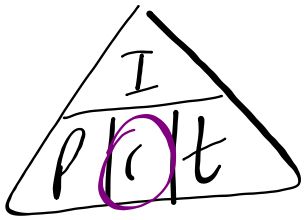
$\frac{20000}{(1+0.032 \times 5)} = P$

$\$17241.38 = P$

WARM-UP...

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

What was the interest rate?



$r = \frac{I}{Pt} \times 100\%$

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

$r = 4\%$

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.

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

I x100

P

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

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

$= 7.5$ years

8 years

b) ROR $= \frac{3000}{5000} \times 100\%$

$= 60\%$

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:

$A = P + Prt$

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

$A = 8200$

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

Interest earned:

$8200 - $5000 = $3200

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

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

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

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

The rate of return is 64% over 8 years.

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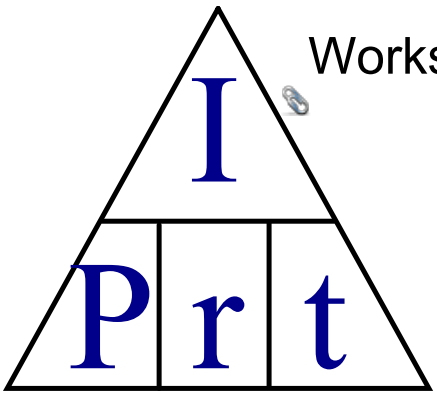
EXAMPLE 4 Determining the rate of interest on a simple interest investment

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?

Check YOUR solution with the text...

PRACTICE rearranging... $\mathbf{I = Prt}$



Worksheet - Rearranging Simple Interest.pdf

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

Text p. 452: #3 & #12

Attachments

Worksheet - Rearranging Simple Interest.pdf