Day 2-MCR3U Date: _____

PRESENT VALUE

RECAP

Simple Interest Formula	Compound Interest Formula
$A = P(1+rt)$	$A = P(1+i)^n$
$P = \frac{A}{1+rt}$	$P = \frac{A}{(1+i)^n} = A(1+i)^{-n}$

Another word for... A = Amount is... Final / accumulated / Future value

P = Principal is ... deposit / present value

PRESENT VALUE FORMULA

The compound interest formula $A = P(1+i)^n$ can be rearranged to solve for P so that

$P = \frac{A}{(1+i)^n}$ or written with a negative exponent $P = A(1+i)^{-n}$

EXAMPLE 1: INVESTMENTS

Ravi wants to invest enough money **today** to have $5 500 for college tuition in **two years**. If he invests his money at 6% per year, **compounded monthly**, how much does he need to invest?

$P = ?$

$A = 5500$

$i = \frac{0.06}{12} = 0.005$

$n = 2 \times 12 = 24$

$P = A(1+i)^{-n}$

$= 5500(1.005)^{-24}$

$= \$4879.52$

EXAMPLE 2: LOANS

Suppose you want to borrow $200. A **creditor** will add interest to the principal and then give you a loan for the full amount (interest included). You then make payments until the entire loan is paid off.

Jamie took out a $3 000 loan, due in four years. If interest is 5.7% per year, **compounded semi-annually**, how much should Jamie's creditor be willing to accept to pay off the loan **today**?

$P = ?$

$A = 3000$

$i = \frac{0.057}{2}$

$n = 4 \times 2 = 8$

$P = 3000\left(1+\frac{0.057}{2}\right)^{-8}$

$= \$2396.00$

Day 2-MCR3U

Date: _____

PRESENT VALUE PRACTICE

Use the present value formula $P = A(1+i)^{-n}$ to solve the following problems.

1. A loan of $5000, at 12% per year **compounded monthly** is due to be repaid in 3 years. How much is the present value (principal) of the loan?

$P =$?

$A =$ 5000

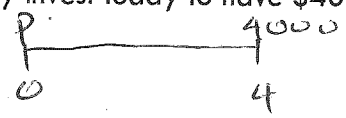
$i = \frac{0.12}{12} = 0.01$

$n =$ 36

$P = 5000(1.01)^{-36}$

$= \$3494.62$

2. How much money must Kerry invest today to have $4000 in two years, at 12% per year, **compounded quarterly?**



$P =$?

$A =$ 4000

$i =$ 0.03

$n =$ 2x4

$= 8$

$P = 4000(1.03)^{-8}$

$= \$3157.64$

3. Jenay will invest some money on July 3, her sixteenth birthday, at 4.5 per year, **compounded monthly.** How much should she invest if she wants to have $10 000 on the November 3 following her eighteenth birthday?

$P =$?

$A =$ 10000

$i =$ $0.045/12 =$

$n =$ 28

$P = 10000\left(1+\frac{0.045}{12}\right)^{-28}$

$= 9005.01$

4. An investment fund pays 6.3% per year, **compounded monthly.** How much should a 25-year-old woman invest in the fund to have $50 000 by age 35?

$P =$

$A = 50000$

$i = 0.00525$

$n = 120$

$P = 50000(1+0.00525)^{-120}$

$= 26673.51$

Day 2-MCR3U

Date: _____

Compare Compounding Periods

5. Suppose you need $5 000 in 4 years. How much money do you need to invest at 6.5% per year if the investment is compounded:

a) Yearly

$P =$

$A = 5000$

$i = 0.065$

$n = 4$

$P = 5000(1 + 0.065)^{-4}$

$= 3886.62$

b) Semi-annually

$P =$

$A = 5000$

$i = 0.0325$

$n = 8$

$P = 5000(1 + 0.0325)^{-8}$

$= 3871.23$

c) Monthly

$P =$

$A = 5000$

$i = \frac{0.065}{12}$

$n = 48$

$P = 5000\left(1 + \frac{0.065}{12}\right)^{-48}$

$= 3857.96$

d) Weekly

$P =$

$A = 5000$

$i = \frac{0.065}{52}$

$n = 208$

$P = 5000\left(1 + \frac{0.065}{52}\right)^{-208}$

$= 3855.88$

e) Daily

$P =$

$A = 5000$

$i = \frac{0.065}{365}$

$n = 1460$

$P = 5000\left(1 + \frac{0.065}{365}\right)^{-1460}$

$= 3855.35$

Homework: p. 498 #2,3,5,8,12, p. 500 #1