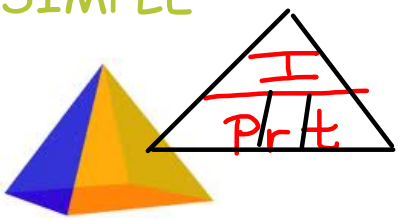
COMPOUND Interest...

Jan 9-9:40 PM

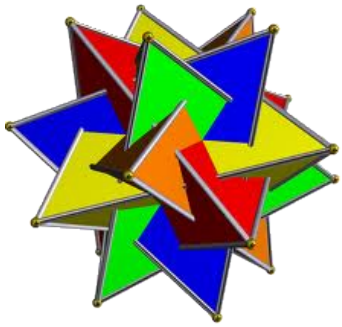
SIMPLE



$I = Prt$

$A = P + I$

COMPOUND



Oct 13-8:06 PM

Terminology Tango

daily

semi-annually

monthly

quartly

twice a year

four times a year

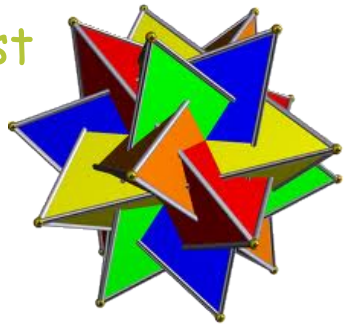
365 times a year

twelve times a year

Click on the picture to verify the match.

Oct 14-7:30 PM

COMPOUND Interest

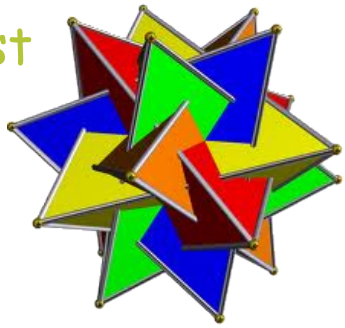


Allison wants to invest $2000.00. His bank offers an investment option that earns compound interest at a rate of 1.75% per year compounded annually for 3 years.

Interest period	Investment value at beginning of period	Interest earned I = Prt	Investment value at end of period
1	$2000	$2000x0.0175x1= $35	$2035
2	$2035	$2035x0.0175x1= $35.61	$2070.61
3	$2070.61	$2070.61x0.0175x1= $36.24	$2106.85

Oct 14-7:30 PM

COMPOUND Interest



Allison wants to invest $2000.00. His bank offers an investment option that earns compound interest at a rate of 1.75% per year for ~~3~~ 10 years.

Interest period	Investment value at beginning of period	Interest earned I = Prt	Investment value at end of period
1	$2000	$2000x0.0175x1= $35	$2035
2	$2035	$2035x0.0175x1= $35.61	$2070.61
3	$2070.61	$2070.61x0.0175x1= $36.24	$2106.85

??

Take too long

Oct 14-7:30 PM

COMPOUND Interest

Interest is added to the principal periodically throughout the year. New interest may be paid on the principal plus the interest. The interest rate is stated per annum and is divided by the number of **compounding periods**.

$$A = P\left(1 + \frac{r}{n}\right)^{nt}$$

A = I + P

$$I = A - P$$

A = final value of the investment ...(principal + interest)
P = principal
r = annual interest rate
n = number of compounding periods in a year
t = term of the investment or loan in number of years

Jan 9-9:06 PM

EXAMPLE #1: If $1000 is invested at 8 %/a compounded semi-annually for 2 years, how much will the investment be worth?

Using the simple interest formula...

$A = P\left(1+\frac{r}{n}\right)^{nt}$

$A = 1000\left(1+\frac{0.08}{2}\right)^{(2)}$

$A = 1000(1.04)^4$

$A = 1169.86$

I = 1000(0.08)(6/12)
= $40 (after 1st interest period)

New principal = 1000 + 40
= $1040

I = 1040(0.08)(6/12)
= $41.60 (after 2nd interest period)

New Principal = 1040 + 41.60
= $1081.60

I = 1081.60(0.08)(6/12)
= $43.26 (after 3rd interest period)

New Principal = 1081.60 + 43.26
= $1124.86

I = 1124.86(0.08)(6/12)
= $44.99 (after 4th interest period)

New Principal = 1124.86 + 44.99
= $1169.85

Using the formula...

$A = P(1 + i)^n$
$= 1000(1+0.08/2)^{2\times 2}$
$= \$1169.86$

Jan 9-9:31 PM

EXAMPLE #2:

Calculate the final value of an initial investment of $6000.00. Interest is paid at 4% per annum, compounded semi-annually, for three years.

A = final value of the investment ...(principal + interest)
P = principal
r = annual interest rate
n = number of compounding periods in a year
t = term of the investment or loan in number of years

$$A = P\left(1+\frac{r}{n}\right)^{nt}$$

$$A = 6000\left(1+\frac{0.04}{2}\right)^{(2)(3)}$$

$$A = 6000(1+0.02)^6$$

$$A = 6000(1.02)^6$$

$$A = 6000(1.1262)$$

$$A = \$6756.98$$

Oct 14-9:57 PM

EX #3: Maggie invests $30 000 at 10% /a compounded quarterly for 20 years. Determine...

a) How much will this investment be worth?

b) How much interest did you earn?

$A = P\left(1+\frac{r}{n}\right)^{nt}$

$A = 30000\left(1+\frac{0.1}{4}\right)^{4(20)}$

$A = 30000\,(1.025)^{80}$

$A = 216\,287.03$

b) $I = A - P$

$I = 216\,287.03 - 30\,000$

$= 186\,287.03$

Jan 9-9:41 PM

EXAMPLE #4...

A keen MVHS student wants to save some money from their summe employment. They decide to take out a Canada Savings Bond which pays 2.5 % interest per year compounded monthly. If the student invests $850 into the bond, how much interest will they earn if they don't touch the money for 3 years?

Jan 9-9:43 PM

HOMEWORK...

Worksheet - Introduction to Compound Interest.doc

Dec 6-3:48 PM

Geometry, Measurement and Finance 10
Worksheet - Compound Interest

1. Complete the following chart:

Principal	Rate/a	Time	Compounded	Formula	Amount	Interest
$1200	12%	5 a	Semi-annually	$A = 1200\left(1 + \frac{0.12}{2}\right)^{10}$	$2149.02	$949.02
$480	6%	3 a	Quarterly			
$10000	8%	12 a	Annually			
$5600	$7\frac{1}{4}\%$	10 a	Semi-annually			
$80	$10\frac{1}{2}\%$	20 a	Monthly			
$1 200 000	5%	7 a	Quarterly			

Jan 12-2:07 PM

2. Examine how varying interest rates and compounding intervals affects the following investment.

Principal	Rate/a	Time	Compounded	Formula	Amount	Interest
$12 000	8%	15 a	Annually			
$12 000	8%	15 a	Semi-Annually			
$12 000	8%	15 a	Quarterly			
$12 000	8%	15 a	Monthly			
$12 000	8%	15 a	Daily			
$12 000	8%	15 a	Simple Interest			

Jan 12-2:07 PM

3. Which of the following investments would be worth the most money after 20 years?

$5000 at 8%/a compounded semi-annually	**$7000 at 6%/a compounded daily**	**$17000 at 2%/a compounded monthly**

Jan 12-2:07 PM

the RULE of 72

ACTIVITY 3.5
THE RULE OF 72

There is a quick way to estimate the time it takes for an investment compounded annually to double in value. This method is called the **Rule of 72.**

Rule of 72: a quick method of estimating the time it takes for an investment to double in value

To calculate the approximate length of time in years it takes for an investment to double, divide 72 by the annual interest rate expressed as a percentage. If you wanted to know approximately how long it would take an investment with an interest rate of 3.00% per annum to double in value, you would divide 72 by 3.

$72 \div 3 = 24$ years

Using the Rule of 72, you can estimate that it would take about 24 years for the investment to double in value.

1. Using the information above, write a formula that describes the Rule of 72. Use the formula to answer question 2.
2. If you wanted to double your money in 10 years, at what rate of interest would you need to invest your money?

SOLUTIONS

1. The Rule of 72 can be expressed with the following formula.

   Years to double investment = 72 ÷ interest rate

   $y = 72 \div r$

2. $y = 72 \div r$

   $10 = 72 \div r$

   $r = 72 \div 10$

   $r = 7.2\%$

   You would need to invest your money at an interest rate of 7.2%.

Oct 15-6:38 PM

Hang on.... HOMEWORK!!!

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Questions:
1-7

3.2 Build Your Skills Detaild Solutions.pdf

Oct 14-10:09 PM

ACTIVITY 3.6
THE EFFECT OF DIFFERENT COMPOUNDING PERIODS

1. Calculate the interest and the final value for an investment of $4000.00 at 3.00% per annum over 2 years for the following different compounding periods. Show your answers in a table like the one below. Use any method you wish to calculate your answers.
2. Which compounding period yields the greatest interest on the investment? Which yields the least? How would knowing this affect your choice of investment?

SOLUTIONS

1.

Interest period	*Final value of investment (A)*	*Interest (I)*
Annually	$\$4000.00\left(1+\frac{0.03}{1}\right)^{(1\times 2)} \approx \$4243.60$	$243.60
Semi-annually	$\$4000.00\left(1+\frac{0.03}{2}\right)^{(2\times 2)} \approx \$4245.45$	$245.45
Quarterly	$\$4000.00\left(1+\frac{0.03}{4}\right)^{(4\times 2)} \approx \$4246.40$	$246.40
Monthly	$\$4000.00\left(1+\frac{0.03}{12}\right)^{(12\times 2)} \approx \$4247.03$	$247.03
Daily	$\$4000.00\left(1+\frac{0.03}{365}\right)^{(365\times 2)} \approx \$4247.34$	$247.34

2. The daily compounding period yields the most interest. The annual compounding period yields the least interest. Knowing this, you would choose an investment which is compounded the most times per year to accumulate the most interest.

Jan 9-10:02 PM

Attachments

Worksheet - Introduction to Compound Interest.doc

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