

# SIMPLE INTEREST

RECALL THE "SIMPLE INTEREST" FORMULA  $I = Prt$

WHERE  $I$  WAS THE INTEREST earned (\$) by the money you put in the bank, the PRINCIPAL, for time t and the interest rate. THE TIME AND INTEREST RATE MUST HAVE CONSISTENT UNITS AND ALTHOUGH THE INTEREST RATE IS USUALLY GIVEN IN %, YOU NEED TO CONVERT IT TO A DECIMAL BEFORE USING IT IN THE FORMULA. EX) 6% per year  $\Rightarrow .06/yr$

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LETS SAY YOU PUT \$500 IN THE BANK FOR 6 MONTHS ( $\frac{1}{2}$  YEAR), AND THE BANK PAID YOU 2% PER YEAR (RATE), HOW MUCH INTEREST DID YOU HAVE AT THE END OF 6 MONTHS?

$$I = Prt \quad P = \$500 \quad r = \frac{.02}{1 \text{ yr}} = \frac{(.02/2)}{(1/2)} = .01 \text{ per } \frac{1}{2} \text{ yr}$$

$$I = (500)(.01)(1)$$

$$I = \$5$$

$\uparrow$  PRINCIPAL     $\uparrow$  INTEREST RATE FOR A  $\frac{1}{2}$  YEAR PERIOD  
 $\uparrow$  NUMBER OF  $\frac{1}{2}$  YEAR PERIODS

NOTE: 2% = .02

$\therefore$  YOU HAVE \$500 + \$5 = \$505 AT THE END OF 6 MONTHS.

IF YOU LET  $A$  = THE TOTAL AMOUNT IN THE BANK AT ANY TIME; THEN  $A$  WILL EQUAL THE PRINCIPAL + INTEREST AT ANY TIME.

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$$\therefore A = P + Prt$$

$$505 = 500 + 5$$

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"SIMPLE" INTEREST MEANS YOU PUT YOUR PRINCIPAL IN THE BANK - YOU COLLECT YOUR INTEREST AT THE END OF THE SPECIFIED PERIOD AND YOU ARE DONE.

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NOW - SUPPOSE YOU LEAVE YOUR MONEY IN THE BANK AND EVENTUALLY THE "INTEREST" STARTS EARNING MONEY!

# COMPOUND INTEREST

WHEN your "interest" ACCUMULATES AND begins to MAKE "interest" itself (interest on interest), that is called "Compound" interest. AND can be modeled by AN exponential function.

LOOK AT EXAMPLE 2, Page 369. You have a principal of \$500, AN interest RATE of 6.5% (.065), AND A compounding frequency of once per year. THAT'S WHEN your interest earned up to that point NOW STARTS TO EARN INTEREST OF ITS OWN!

Beginning balance	\$500	= \$500
After 1 year	\$500 + 500(.065) <u>LOOK</u> 500(1+.065) OR 500(1+.065)	= \$532 <sup>50</sup>
After 2 years	$[500(1+.065)](1+.065)$ 532 <sup>50</sup>	= \$567 <sup>11</sup>
After 3 years	$[500(1+.065)^2](1+.065)$ 567 <sup>11</sup>	= \$603 <sup>97</sup>

$$\therefore y = 500(1+.065)^x$$

↑ INITIAL VALUE (PRINCIPAL)      ↑ CHANGE FACTOR "GROWTH" FACTOR (1 + RATE per time period)      NUMBER OF "CHANGES" (time periods)

EX) BALANCE AFTER 18 years

$$y = 500(1.065)^{18} = 500 \cdot 3.1067 = \$1553.33$$