

## The Interest Equations

### Simple Interest Equation

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

INTEREST  
EARNED OR  
PAID

PRINCIPAL  
(AMOUNT DEPOSITED  
OR BORROWED)

INTEREST RATE  
(%)

TIME (YEARS)

PRINCIPAL

TIME

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

INTEREST  
RATE

TOTAL FUTURE  
AMOUNT  
IN AN ACCOUNT  
OR  
PAID BACK

### Compound Interest Equation

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

TOTAL FUTURE  
AMOUNT IN AN  
ACCOUNT

INITIAL  
DEPOSIT  
AMOUNT

INTEREST RATE (%)

TIME (YEARS)

NUMBER OF COMPOUNDS PER YEAR

✓  $n = 12$  (MONTHLY)

$n = 52$  (WEEKLY)

$n = 365$  (DAILY)

✓  $n = 4$  (QUARTERLY)

✓  $n = 1$  (ANNUAL)

✓  $n = 2$  (SEMI-ANNUAL)

**Part I: Examples of Simple Interest (Section 2.1)**

1. You deposit \$5000 in a simple interest account for 5 years. If the interest rate is 2%, how much interest do you earn and what will be the total amount be in your account after the 5 year period?

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

$$I = (\$5000)(0.02)(5)$$

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$$I = \$500$$

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

$$A = \$5000(1 + 0.02(5))$$

$$A = \$5000(1 + 0.10)$$

$$A = \$5000(1.10)$$

$$A = \$5500$$

2. A person borrows \$5000 for 5 years at 17% simple interest for 5 years. How much interest is earned and how much will be in the account after the 5 year period?

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

$$I = (\$5000)(0.17)(5)$$

$$I = \$4250$$

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

$$A = \$5000(1 + 0.17(5))$$

$$A = \$5000(1 + 0.85)$$

$$A = \$5000(1.85) = \$9250$$

3. How much money would you need to deposit in a simple interest account today that pays 3% interest for you to reach a goal of \$20,000 upon your graduation from Radford University?

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

$$\$20,000 = P(1 + 0.03(4))$$

$$\$20,000 = P(1 + 0.12)$$

$$\$20,000 = P(1.12)$$

$$P = \$17,857.14$$

4. What is the simple interest rate of an account that starts at \$3000 and grows to \$3700 in 12 years?

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

$$\$700 = (\$3000) \cdot r \cdot 12$$

$$\$700 = \$36,000 \cdot r$$

$$\frac{\$700}{\$36,000} = r$$

$$0.0194 = r = 1.94\%$$