

Unit 4 Lesson 1: Interest Formula

In this lesson you will:

- Apply the Interest Formula to calculate interest, principal, interest rate, and time

Use the Interest Formula to calculate how much interest (I) you will pay on money borrowed. You can also use the formula to calculate the principal (P), the interest rate (R), or the time (T), when given any three of the four values in the formula.

Here is the formula: $I = \frac{P * R * T}{12}$

INTEREST = PRINCIPAL * RATE * TIME / 12

100

Look carefully at the formula:

You must divide the 'time' by 12, and then divide the 'P*R*T/12' by 100

Why divide the 'time' by 12? Because the time is calculated per year, and a year contains 12 months

Why divide the 'P*R*T' BY 100? Because you are converting to percentage, which is based on 100

Example #1:

Find simple interest:

P = \$5000

R = 10%

T = 15 mo

I = ?

'I' is the missing value, or the unknown

$$I = \frac{5000 * 10 * 15/12}{100}$$

First, divide the 15 by 12 (the 12 refers to the 12 months in a year)

$$15/12 = 1.25$$

Substitute the 1.25 for 15/12 in the formula

$$I = \frac{5000 * 10 * 1.25}{100}$$

$$I = \frac{625000}{100} = \$625$$

Answer = \$625

Using the same formula, you can use algebra skills to substitute the given values into the formula, and then solve to find the missing value. You have to follow the rules for solving equations, though, to solve for the missing, or unknown value.

Example #2:

Find the time:

$$P = \$10000$$

$$R = 5\%$$

$$I = \$750$$

$$T = ?$$

T (time) is the missing value, or the unknown, which is represented by the variable T.

Use the formula:

$$\text{INTEREST} = \frac{\text{PRINCIPAL} * \text{RATE} * \text{TIME}}{100}$$

$$750 = \frac{10000 * 5 * T}{100}$$

Now you have to remember your algebra rules for solving equations.

You have to 'isolate' the unknown to one side of the equation. The unknown is T, or T/12.

When you move it to the other side of the equation, you will need to do the 'opposite' of divide, which is multiply. More on that in a minute....

You will then have to move the '750' to the other side of the equation because you are isolating the unknown (T/12) to the left side.

Here is the revised equation.

$$T(12) = \frac{750 * 100}{10000 * 5}$$

Why is it different? Because when you move terms across the equation (to the opposite side) you have to perform the opposite operation. SO, if you move 750 from the left side to the right side, you must multiply by 100, instead of divide by 100 (750 x 100), and then the '10000 x 5' moves from the numerator to the denominator (or from the top of the fraction to the bottom of the fraction).

From here you calculate the values.

$$T/12 = \frac{75000}{50000}$$

$$T/12 = 1.5$$

Now you must get rid of the 12, and to do that you use the opposite operation. The opposite of division is multiplication. Instead of T divided by 12, multiply T by 12. Then multiply the other side by 12.

$$T * 12 = 1.5 * 12$$

T = 18, and the unit of time is months

SO, T = 18 months

Example #3:

$$\text{INTEREST} = \frac{\text{PRINCIPAL} * \text{RATE} * \text{TIME}}{12}$$

Find the interest Rate:

$$P = \$15000$$

$$R = ?$$

$$T = 24 \text{ mo}$$

$$I = \$2400$$

$$2400 = \frac{15000 * R * 24/12}{100} \quad (\text{In this case, } T = 24/12, \text{ which is an even number, or 2. Easy...})$$

Follow the same steps:

Isolate the unknown variable, which is R, by moving it across the equation. You also have to move the interest amount (I) across the equation, too. Otherwise, R would not be isolated....

$$R = \frac{2400 * 100}{15000 * 2}$$

$$R = \frac{240000}{30000}$$

R = 8, and the unit is percent, SO

$$R = 8\%$$

Example #4:

$$\text{INTEREST} = \frac{\text{PRINCIPAL} * \text{RATE} * \text{TIME}}{12}$$

Find the principal:

$$R = 6.25\%$$

$$T = 20 \text{ mo}$$

$$I = \$2200$$

$$P = ?$$

P (principal) is the missing value, or the unknown, which is represented by the variable P.

$$2200 = \frac{P * 6.25 * 20/12}{100} \quad (\text{Remember, calculate } T = 20/12 = 1.66666\dots \text{ or } 1.67 \text{ to substitute})$$

Isolate 'P' by moving it across the equation.

Move 'I' (2200) across the equation

$$P = \frac{2200 * 100}{6.25 * 1.67}$$

$$P = \frac{220000}{10.44}$$

$$P = \$21072$$

Note: Answers may vary slightly according to how you round your answers.

Use these examples to solve the following problems.

I = Interest

P = Principal

R = Rate (in percentages)

T = Time (in months)

Interest Formula:

$$\text{INTEREST} = \frac{\text{PRINCIPAL} * \text{RATE} * \text{TIME}}{12}$$

Practice Problems: Using the Interest Formula, solve for the unknown:

1) Find P

$$P = ?$$

$$R = 10\%$$

$$T = 16 \text{ mo}$$

$$\text{Interest} = \$1047.20$$

2) Find R

$$P = \$5236$$

$$R = ?$$

$$T = 20 \text{ mo}$$

$$I = \$1199.47$$

3) Find I

$$P = \$85000$$

$$R = 15\%$$

$$T = 24 \text{ mo}$$

$$I = ?$$

4) Find T

$$P = \$56000$$

$$R = 8\%$$

$$T = ?$$

$$I = \$3360$$

5) Find R

$$P = \$5231$$

$$R = ?$$

$$T = 16 \text{ mo}$$

$$I = \$627.72$$

6) Find T

$$P = \$7800$$

$$R = 8\%$$

$$T = ?$$

$$I = \$780$$

7) Find P

$$P = ?$$

$$R = 10\%$$

$$T = 13 \text{ mo}$$

$$I = \$1083.33$$

8) Find R

$$P = \$12000$$

$$R = ?$$

$$T = 14 \text{ mo}$$

$$I = \$980$$

9) Find I

$$P = \$12500$$

$$I = 5\%$$

$$T = 15 \text{ mo}$$

$$I = ?$$

10) Find T

$$P = \$15500$$

$$I = 6\%$$

$$T = ?$$

$$I = \$1395$$

11) Find P

$$P = ?$$

$$R = 7\%$$

$$R = 10 \text{ mo}$$

$$I = \$933.33$$

12) Find I

$$P = \$3245$$

$$R = 8.5\%$$

$$T = 15$$

$$I = ?$$

Submit your answers in the text box.