

## Earning Compound Interest #16

*Percent, addition, subtraction*

Christopher's bank pays 5% a year interest on the previous year's balance – this is called compound interest. For the first year, Christopher deposited \$6,000 into the bank. If each year Christopher does not withdraw any money – how much will he have after 8 years? Round your answers to the nearest cent.

<b>Beginning Balance</b>	\$6,000
Interest earned in Year 1 ( $6,000 \times .05$ )	\$300
Total after Year 1	\$6,300
Interest earned in Year 2	\$315
Total after Year 2	\$6,615
Interest earned in Year 3	_____
Total after Year 3	_____
Interest earned in Year 4	_____
Total after Year 4	_____
Interest earned in Year 5	_____
Total after Year 5	_____
Interest earned in Year 6	_____
Total after Year 6	_____
Interest earned in Year 7	_____
Total after Year 7	_____
Interest earned in Year 8	_____
Total after Year 8	_____

How much money in interest did Christopher earn altogether? \_\_\_\_\_

**There is a much easier way to calculate compound interest!**

## More on Earning Compound Interest #17

*Percent, exponents, order of operations, multiplication, division, addition*

Interest is the amount you receive for lending money (making an investment) or the fee you pay for borrowing money. Compound interest is interest that is calculated using both the principal and the interest that has accumulated.

If you invest \$1000 at a simple interest rate of 5% annually, you will receive \$50 for every year your money remains invested. At the end of one year you will earn \$50, after 2 years you'll earn \$100, after three years you'll earn \$150, etc. At the end of 10 years you will have earned \$500 and would have \$1500.

Now if you invest the same amount of money with compound interest, you will earn interest on the original principle plus on the interest that has accumulated.

**Example:** Invest \$1000 at a rate of 5% interest compounded annually (once a year) for 10 years. The following table shows how your investment will grow. Answers are rounded to the nearest cent.

	Principle	Interest Paid (principle x 5%)	Annual Running Total
Year 1	\$1000	\$50	\$1050
Year 2	\$1050	\$52.50	\$1102.50
Year 3	\$1102.50	\$55.13	\$1157.63
Year 4	\$1157.63	\$57.88	\$1215.51
Year 5	\$1215.51	\$60.77	\$1276.29
Year 6	\$1276.29	\$63.81	\$1340.10
Year 7	\$1340.10	\$67	\$1407.11
Year 8	\$1407.11	\$70.36	\$1477.46
Year 9	\$1477.46	\$73.87	\$1551.33
Year 10	\$1551.33	\$77.57	\$1628.89

With compound interest you earn an additional \$128.89.

## Saving Money

The formula for compound interest that is calculated yearly is:

$$A = P(1 + r)^t$$

$A$  is the final amount including the principal.

$P$  is the principal amount.

$r$  is the rate of interest per year.

$t$  is the number of years invested.

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**Example 1:** Let's say that I have \$1000 to invest for 3 years at rate of 5% compound interest.

**Problem:** How much money will you have in 3 years?

**Solution:**  $A = P(1 + r)^t$   
 $A = 1000(1 + 0.05)^3 = \$1157.62.$

*You can see that my \$1000 is worth \$1157.62 after 3 years.*

**Example 2:** I invest \$10,000 for 2 years at a 6.7% interest rate.

**Problem:** How much money will I have in two years?

**Solution:** Step 1: Convert the 6.7% into a decimal:  $6.7\% = .067$   
Step 2: Plug the numbers into the formula.  
 $A = 10000(1 + 0.067)^2 = \$11,384.89$

*I will have \$11,384.89.*

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**Part 1:** Use the formula and calculate the amount after compound interest has been calculated for each situation. Round your answers to the nearest cent.

$$A = P(1 + r)^t$$

1. Sue has \$22,000 in investments. She earns 5% compound interest over 5 years. How much money will Sue have after year 1, year 2, year 3, year 4, and year 5?

Year 1: \_\_\_\_\_

Year 2: \_\_\_\_\_

Year 3: \_\_\_\_\_

Year 4: \_\_\_\_\_

Year 5: \_\_\_\_\_

2. Lin invests \$500 for 5 years at a rate of 4% compound interest. How much money will she have at the end of 5 years?

\_\_\_\_\_

3. Mike invests \$1000 for 4 years at 4% interest and the following year he invests \$3000 for 3 years at 2% interest. How much money will he have after 4 years?

\_\_\_\_\_

4. Jill invests \$5000 at a 5.9% compound interest rate. The investment is for 2 years. How much money will she have at the end of 2 years?

\_\_\_\_\_

5. Joey invests \$2500 for 4 years at a rate of 3% compound interest. How much money will he have at the end of 4 years?

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