



### **Web Resources**

#### **Compound Interest Lesson:**

<http://www.mathwarehouse.com/compound-interest/formula-calculate.php>

#### **Compound Interest Calculator (Solves for any variable)**

<http://www.mathwarehouse.com/calculators/online-compound-interest-calculator.php>

#### **Exponential Growth Lesson**

<http://www.mathwarehouse.com/exponential-growth/graph-and-equation.php>

Mathworksheetsgo.com recommends [www.meta-calculator.com](http://www.meta-calculator.com), a free online graphing calculator (graphs implicit equations, does advanced statics like T-tests and much more) that works on any device!



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## Easy/Medium Compound Interest Problems

### Formulas:

$A = P \left(1 + \frac{r}{n}\right)^{nt}$ <p><i>A = ending dollar amount</i>  <i>P = principal, beginning dollar amount</i>  <i>r = interest rate in decimal form</i>  <i>n = number of times the interest is compounded annually</i>  <i>(annually = 1, semiannually = 2, quarterly = 4, monthly = 12)</i>  <i>t = years</i></p>	$A = Pe^{rt}$ <p><i>A = ending dollar amount</i>  <i>P = principal, beginning dollar amount</i>  <i>e = constant <math>\approx 2.71</math></i>  <i>r = interest rate in decimal form</i>  <i>t = years</i></p>
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### Example 1:

<p><math>A = ???</math>  <math>P = \\$200.00</math>  <math>r = 6.2\%</math> so use 0.062 in formula  <math>n = 4</math>  <math>t = 5</math></p>	<p><math>A = P \left(1 + \frac{r}{n}\right)^{nt}</math>, always start with the formula</p> <p>Plug values in their proper place in the formula ...</p> <p><math>A = 200 \left(1 + \frac{0.062}{4}\right)^{4 \cdot 5}</math>, order of operations is important</p> <p><math>A = 200(1 + 0.0155)^{20}</math></p> <p><math>A = 200(1.0155)^{20}</math></p> <p><math>A = 200(1.3602)</math>, decimal rounded to ten thousandths place</p> <p><math>A = 272.04</math>, round to hundredths place since the answer is a dollar amount</p>
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**Example 2:**

If, at the end of two years, a savings account has a balance of \$1172.60, and the interest rate is compounded monthly at 3.2%, then what is the original amount deposited two years ago?

$A = 1172.60$ $P = ???$ $r = 0.032$ $n = 12$ $t = 2$	$A = P \left(1 + \frac{r}{n}\right)^{nt}$ $1172.60 = P \left(1 + \frac{0.032}{12}\right)^{12 \cdot 2}$ $1172.60 = P(1 + 0.0027)^{24}$ $1172.60 = P(1.0027)^{24}$ $1172.60 = P(1.0660)$ $\frac{1172.60}{1.0660} = \frac{P(\cancel{1.0660})}{\cancel{1.0660}}, \text{ divide both sides by } 1.0660$ $\$1100.00 = P$
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1.  $A = ???, P = \$600.00, r = 4\%, n = 1, t = 10$
2.  $A = ???, P = \$1200.00, r = 4\%, n = 1, t = 5$
3.  $A = ???, P = \$150.00, r = 3.5\%, n = 4, t = 20$
4.  $A = ???, P = \$12,550.00, r = 2.8\%, n = 2, t = 2$
5.  $A = ???, P = \$7,000.00, r = 9\%, n = 12, t = 3$
6.  $A = \$1403.60, P = ???, r = 6.8\%, n = 12, t = 5$
7.  $A = \$563.35, P = ???, r = 1.2\%, n = 1, t = 10$
8.  $A = \$2024.02, P = ???, r = 2.5\%, n = 4, t = 7$

9.  $A = \$1,119,656.69, P = ???, r = 2.9\%, n = 2, t = 28$
10.  $A = \$211.63, P = ???, r = 1\%, n = 12, t = 75$
11. An initial deposit of \$5,000.00 is made into a savings account that compounds 7.1% interest annually. How much is in the account at the end of five years?
12. After 80 years of 5.8% interest compounded monthly, an account has \$102,393.44. What was the original deposit amount?
13. Bank A is offering a 2.7%, compounded annually, savings account guaranteed for three years. Bank B is offering a 1.9%, compounded monthly, savings account guaranteed for two years. Which bank would yield the most on a principal of \$500.00? What is the dollar amount difference between the two bank accounts?
14. How much would need to be deposited into an account earning 4.7%, compounded quarterly, so that the balance will be \$1,000,000.00 in 20 years?
15. Mary discovers a bank account her parents left for her that was opened when she was born 50 years ago. The statement she found states the deposit amount of \$100.00 into an account earning 1.8% compounded quarterly. What is the balance of her account now?
16. In the same box, Mary discovers another statement for an account her grandparents opened for her when she was born. This statement shows a deposit amount of \$100.00 into a 3.6%, compounded quarterly, account. How much is in this account now?

17. Luckily, Mary finds a third statement for an account her Aunt opened for her. This was also \$100.00 at 1.8%, but it is compounded monthly. How much is in this account now? Based on the answers for each of the accounts Mary discovered, is it better to compound more often or earn a higher interest rate?
  
18. An account earning 6.6% interest compounded continuously for 10 years would have a balance of how much if the principal was \$550.00?
  
19. What was the principal for a continuously compounded account earning 3.9% for 15 years that now has a balance of \$2,500,000.00?
  
20. A teenager saved small dollar amounts throughout the school year and now has \$712.00. They can choose from two bank offers. The first is 5.3% compounded continuously for six years. The second is compounded quarterly for five years at 6.0%. Which account will yield the most money? What is the dollar amount difference between the accounts at the end of their terms?

**Answer Key**

1. \$888.15
2. \$1,459.98
3. \$301.14
4. \$13,267.70
5. \$9,160.52
6. \$1,000.00
7. \$500.00
8. \$1,700.00
9. \$500.00
10. \$100.00
11. \$7,045.59
12. \$1,000.00
13. Bank A, \$22.25
14. \$392,774.20
15. \$245.46
16. \$600.11
17. \$245.79, higher interest rate
18. \$1,064.14
19. \$1,392,764.66
20. The continuous compounded account, \$19.60

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