Algebra II
Compound Interest
10-7a

Name:_____

Solve.

1) One thousand dollars is invested at 12% interest compound annually. Determine how much the investment is worth after 3 years. $1404.93

2) A $100 loan earns interest at 7.2% compounded annually. Determine how much the investment is worth after:
   a) 1 year $107.20
   b) 5 years $141.57
   c) 10 years $200.42
   d) 20 years $401.69
   e) Estimate the doubling time for the value of this loan.
      About 10 years

3) A CD is purchased for $5,000 and has a quarterly compounded interest rate of 6.5%. How many years will it take to mature to $20,000? 21.5 years

$P=5000$ $n=4$ $A=20000$ $r=0.065$

$\frac{20000}{5000} = \frac{5000\left(1+\frac{.065}{4}\right)^{4t}}{5000}$ $\quad 4 = (1.01625)^{4t}$ $\quad \ln 4 = 4t \ln 1.01625$ $\quad \ln 4 = 4t \ln 1.01625$

4) What is the interest rate of a $2000 monthly-compounded CD if it matures at $10,000 in 20 years. 8.07%

$n=12$

$\frac{10000}{2000} = \frac{2000\left(1+\frac{r}{12}\right)^{12(20)}}{2000}$ $\quad \sqrt[240]{5} = \sqrt[240]{\left(1+\frac{r}{12}\right)^{240}}$

5) How long will it take to double your money if you invest it at a rate of 8% compounded annually? 9 years

6) $1000 is invested at 9.5% compounded daily for 30 years. How much is the investment worth at maturity? $17,281.37

7) $5,000 is put into a savings account with a 2.1% interest rate compounded monthly. How much is this investment worth after 20 years? $7607.01

8) How long will it take to triple your money if you invest it at a rate of 6% compounded annualy? 18.85 years

Pick $P.$ → 100 for fun, $A=300$

$300 = 100\left(1+\frac{.06}{1}\right)^{1t}$

9) How much money was invested a 4.7% compounded quarterly for 15 years if the account matured at $30,000? $14,884.30

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4) What is the interest rate of a $2000 monthly-compounded CD if it matures at $10,000 in 20 years. 8.07%

P $\quad n=12$

$A=10{,}000$ $\quad t=20$

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

$\frac{10000}{2000} = \frac{2000\left(1+\frac{r}{12}\right)^{12(20)}}{2000}$

$\sqrt[240]{5} = \sqrt[240]{\left(1+\frac{r}{12}\right)^{240}}$

$1.0067\ldots^{-1} = 1^{-1} + \frac{r}{12}$

$12\left(0.0067\ldots = \frac{r}{12}\right)$

$.0807 = r$ $\quad 8.07\%$

5) How long will it take to double your money if you invest it at a rate of 8% compounded annually? 9 years

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

$$\frac{20}{10} = \frac{10\left(1 + \frac{.08}{1}\right)^{1t}}{10}$$

$$2 = (1.08)^t$$

$$\ln 2 = \ln(1.08)^t$$

$$\frac{\ln 2}{\ln(1.08)} = \frac{t \cdot \ln(1.08)}{\ln(1.08)}$$

$$9.007 = t$$

≈ 9 years

6) $1000 is invested at 9.5% compounded daily for 30 years. How much is the investment worth at maturity? $17,281.37

Find A

$$A = 1000\left(1 + \frac{.095}{365}\right)^{365(30)}$$

9) How much money was invested a 4.7% compounded quarterly for 15 years if the account matured at $30,000? $14,884.30

$$30000 = P\left(1 + \frac{.047}{4}\right)^{4(15)}$$