Name ______________________ Date ______________ Class______________

LESSON 13-4

Compound Interest

Reteach

There are three formulas used to model investments that earn **compounding interest**. In each formula, *V* represents the value of the account at time *t, r* is the annual interest rate, and *P* is the principal, or the initial amount invested.

I. When interest is compounded once per year: $V(t) = P(1 + r)^t$

II. When interest compounded *n* times per year: $V(t) = P\left(1 + \frac{r}{n}\right)^{nt}$

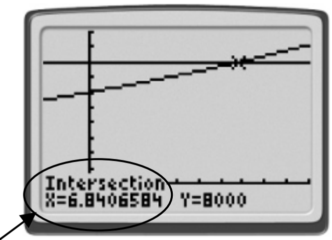
If the account is compounded: *monthly* then $n = 12$, *quarterly* then $n = 4$, *semiannually* then $n = 2$, *daily* then $n = 365$.

III. When interest is compounded continuously: $V(t) = Pe^{rt}$

When solving compound interest problems where *V*, *P*, and *r* (and sometimes *n*) are given, you must solve for *t*. To do this, first determine which formula to use. Then write a model that represents the problem. Solve for *t* using a graphing calculator. Graph each side of the equation. The *x*-value of the point of intersection is the solution.

Example

Peter opens an account with $6000 that earns 4.25% interest, compounded semiannually. How long will it take for the account value to be $8000?

Step 1	Step 2	Step 3
Since the account is compounded semiannually, $n = 2$. Use $V(t) = P\left(1 + \frac{r}{n}\right)^{nt}$.	Substitute using the values given for *V*, *P*, *r,* and *n*, and simplify. $V(t) = P\left(1 + \frac{r}{n}\right)^{nt}$ $8000 = 6000\left(1 + \frac{0.0425}{2}\right)^{2t}$ $8000 = 6000(1.02125)^{2t}$	Graph each side of the equation and use the intersection feature to solve for *t*. 

It will take about 6.8 years for the account value to be $8000.

Solve.

1. Fatima opens an account with $1300 that earns 3.5% interest, compounded monthly. How long will it take the account value to be $2500?

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2. Eli opens an account with $10,000 that earns 6% interest, compounded continuously. How long will it take the account value to be $20,000?

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Reteach 13-2

1. $f(x)=\left(\frac{1}{2}\right)^x$; $b=\frac{1}{2}$; $y=-2$; $(3, 2)$, $(2, 6)$
2. $f(x)=\left(\frac{1}{10}\right)^x$; $b=\frac{1}{10}$; $y=1$; $(-2, 8)$, $(-3, 71)$
3. $f(x)=0.3^x$; $b=0.3$; $y=-3$; $(-3, 3)$, $(-4, 17)$
4. $f(x)=\left(\frac{1}{4}\right)^x$; $b=\frac{1}{4}$; $y=-5$; $(6, -6)$, $(5, -9)$
5. $f(x)=\left(\frac{2}{3}\right)^x$; $b=\frac{2}{3}$; $y=9$; $(0, 10)$, $(-1, 10.5)$
6. $f(x)=\left(\frac{3}{10}\right)^x$; $b=\frac{3}{10}$; $y=7$; $(4, 5)$, $\left(3, \frac{1}{3}\right)$

Reteach 13-3

1. $g(x)=-2e^{x+1}-3$
2. $g(x)=3e^{x-9}+4$
3. $g(x)=0.5e^{x-2}-0.1$
4. $g(x)=-e^{x+3}+2$

Reteach 13-4

1. About 18.8 years
2. About 11.6 years

Reteach 14-1

1. $y=1.2\bullet 1.3^x$
2. $y=56\bullet 0.9^x$
3. $y=-20\bullet 1.1^x$
4. $y=3.0\bullet 2.1^x$
5. $y=100\bullet 0.8^x$
6. $y=-5\bullet 0.5^x$

Reteach 14-2

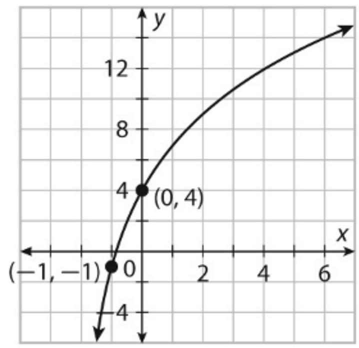
1. $f(x)=0.598\bullet 2.402^x$
2. $f(x)=2.156x+13.642$
3. $f(x)=0.526x^2-7.803x+81.341$
4. $f(x)=203.67\bullet 0.95^x$

Reteach 15-1

1. $\log_2 64=6$
2. $\log_4 \frac{1}{16}=-2$
3. $\log_{\frac{1}{3}} \frac{1}{27}=3$
4. $7^2=49$
5. $2^{-4}=\frac{1}{16}$
6. $8^x=48$
7. 4
8. $\frac{1}{3}$
9. –2

Reteach 15-2

1. $x=-2$; $(-1, -1)$, $(0, 4)$;



2. $x=-5$; $(-4, 2)$, $(5, 1)$;