Instruction

Problem-Based Task 4.1.2: Investing Money

Coaching Sample Responses

a. What is the equation for the investment at the first bank?

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

$$A = 2000\left(1+\frac{0.03}{1}\right)^{1t}$$

$$A = 2000(1.03)^{t}$$

b. What is the equation for the investment at the second bank? Keep in mind that you spent $100 of the money you initially planned to invest.

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

$$A = 1900\left(1+\frac{0.032}{12}\right)^{12t}$$

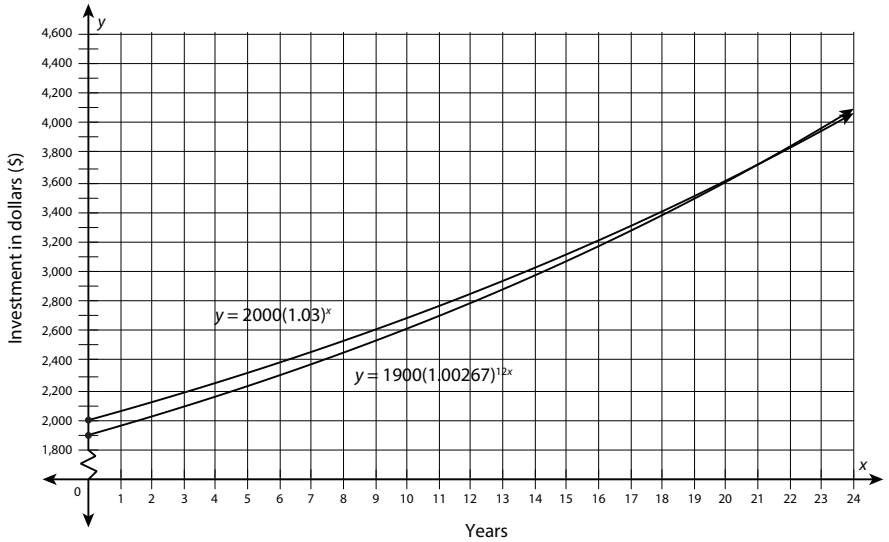
$$A = 1900(1.00267)^{12t}$$

c. Graph the equations on the same set of axes, and be sure to label each equation.

To do this, first rewrite each equation in the form $y = ab^x$.

$A = 2000(1.03)^t$ becomes $y = 2000(1.03)^x$.

$A = 1900(1.00267)^{12t}$ becomes $y = 1900(1.00267)^{12x}$.



d. Looking at the graph of the investment you actually made, how many years does it take to earn back the $100 you spent?

It looks like the investment earns back $100 and reaches $2,000 after a little more than a year and a half, or about 18 months.

e. How many years does it take before the investment you made is equal to the investment you almost made?

The graphs intersect at about 21 years, so the investments will be equal in about 21 years.

f. What would be the equation of the investment at the second bank if you had not spent the $100?

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

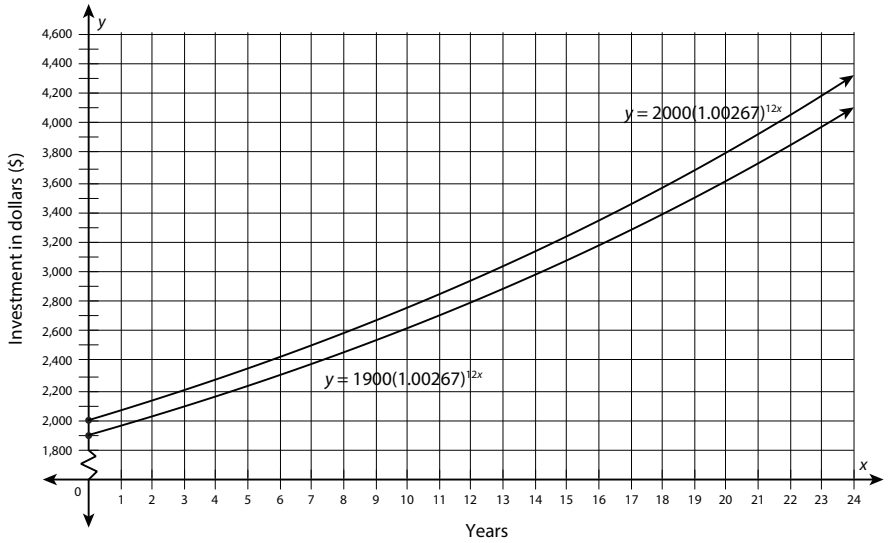
$$A = 2000\left(1 + \frac{0.032}{12}\right)^{12t}$$

$$A = 2000(1.00267)^{12t}$$

g. Graph the equation from part f on the same set of axes as the equation from part b.

Before graphing, rewrite the equation in the form $y = ab^x$.

$A = 2000(1.00267)^{12t}$ becomes $y = 2000(1.00267)^{12x}$.



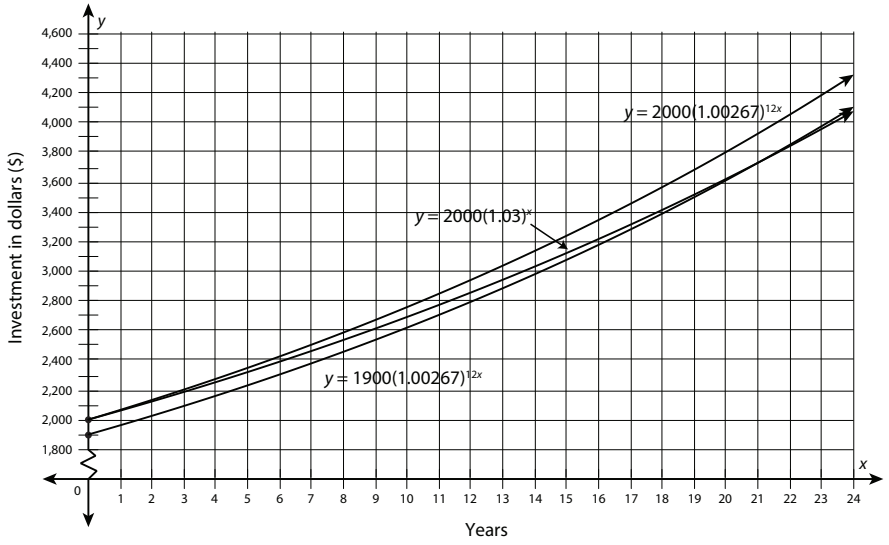
h. Look at various points along the graph and use the equations. What is the difference in investments after 10 years? 20 years?

The investment of the principal amount of $2,000 will always be greater than the investment with the principal amount of $1,900. After 10 years, the investment of $2,000 grows to $2,754.18, and the investment of $1,900 grows to $2,616.47, a difference of $137.71.

After 20 years, the investment of $2,000 grows to $3,792.76, and the investment of $1,900 grows to $3,603.12. The difference is $189.64. The gap between the larger and smaller investments is slowly widening.

i. Compare the investments of all three graphs and make observations. What conclusions can you draw about the amount you invest initially or the principal amount? What can you conclude about the number of times the interest is compounded in a year? What effect does this have on the investment?

The more you invest to begin with, the more your investment will grow. The more times the interest is compounded in a year, the faster the investment will grow for the same annual interest rate. If two banks are offering the same rate but one bank is compounding the interest more frequently, invest in the bank that compounds more often. If the rates are different, draw graphs to compare the investments.



Recommended Closure Activity

Select one or more of the essential questions for a class discussion or as a journal entry prompt.