Chapter 13 Project

Let's Get Radical!

An activity to demonstrate the use of radical expressions in real life.

There are many different situations in real life that require working with radicals, such as solving right triangle problems, working with the laws of physics, calculating volumes, and even solving investment problems. Let's take a look at a simple investment problem to see how radicals are involved.

The formula for computing compound interest for a principal P that is invested at an annual rate r and compounded annually is given by $A = P(1+r)^n$, *where A is the accumulated amount in the account after n years.*

1. Let's suppose that you have \$5000 to invest for a term of 2 years. If you want to be sure and make at least \$600 in interest, then at what interest rate should you invest the money?

a. One way to approach this problem would be through trial and error, substituting various rates for r in the formula. This approach might take a while. Using the table below to organize your work, try substituting 3 values for r. Remember that rates are percentages and need to be converted to decimals before using in the formula. Did you get close to \$5600 for the accumulated amount in the account after 2 years?

Annual Rate (r)	Principal (P)	Number of Years (n)	Amount, $A = P(1+r)^n$
	\$5000	2	
	\$5000	2	
	\$5000	2	

b. Let's try a different approach. Substitute the value of 2 for n and solve this formula for r. Verify that you get the following result: $r = \sqrt{\frac{A}{P}} - 1$ (**Hint:** First solve for $(1 + r)^2$ and then take the square root of both sides of the equation.) Notice that you now have a radical expression to work with. Substitute \$5000 for P and \$5600 for A (which is the principal plus \$600 in interest) to see what your rate must be. Round your answer to the nearest percent.

2. Now, let's suppose that you won't need the money for 3 years.

a. Use $n = 3$ years and solve the compound interest formula for r.

b. What interest rate will you need to invest the principal of \$5000 at in order to have at least \$5600 at the end of 3 years? (To evaluate a cube root you may have to use the rational exponent of $\frac{1}{3}$ on your calculator.) Round to the nearest percent.

c. Compare the rates needed to earn at least \$600 when $n = 2$ years and $n = 3$ years. What did you learn from this comparison? Write a complete sentence.

3. Using the above formulas for compound interest when $n = 2$ years and $n = 3$ years, write the general formula for r for any value of n.

4. Using the formula from Problem 3, compute the interest rate needed to earn at least \$3000 in interest on a \$5000 investment in 7 years. Round to the nearest percent.

5. Do an internet search on a local bank or financial institution to determine if the interest rate from Problem 4 is reasonable in the current economy. Using three to five sentences, briefly explain why or why not.