A Question of Interest

Junior high school

Objective

Understand, use and calculate with percentages.
Select suitable sequences of operations and methods of computation, including trial-and-improvement methods, to solve problems involving integers, decimals and percentages.
Give solutions in the context of the problem, selecting an appropriate degree of accuracy, and interpret the display on a calculator.

Explanation of the activity

Use the calculator to find solutions to problems involving interest rates.
While working on this activity, students will develop their understanding of percentages within the context of compound interest situations.

Using the calculator

Calculator functions used: % calculation, multiplication

Press the following buttons and then start operation.

[ON/C] [MODE] [0]

[SET UP] [2] [1]

If you invest money at a certain level of interest, by how much will your money grow?

Example:

$100 is invested at 0.1% annual interest.

Using multiplication: Multiply the principal $100 by 1.001.

100 [×] 1.001 [=]

```
DEG
100×1.001=
N1                100.1
```

For the total after two years, multiply the previous answer again by 1.001.

[×] 1.001 [=]

```
DEG
ANS×1.001=
N1             100.2001
```

After three years... [=]

```
DEG
ANS×1.001=
N1          100.3003001
```

After four years... [=]

```
DEG
ANS×1.001=
N1          100.4006004
```

After 10 years, you have approximately $101.

[=] [=] [=] [=] [=] [=]

```
DEG
ANS×1.001=
N1           101.004512
```

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Using the % calculation key: After one year, you should have 0.1% of your $100.

100 [+] 0.1 [2ndF] [%]

```
DEG
100+0.1%
N1                100.1
```

You now have $100.10.

After two years, you have 0.1% more. [+] 0.1 [2ndF] [%]

```
DEG
ANS+0.1%
N1                100.2001
```

After three years... [2ndF] [%]

```
DEG
ANS+0.1%
N1                100.3003001
```

After 10 years...

[2ndF] [%] [2ndF] [%] [2ndF] [%] [2ndF] [%] [2ndF] [%] [2ndF] [%] [2ndF] [%]

You have approximately $101.

```
DEG
ANS+0.1%
N1                101.004512
```

Using the activity in the classroom

This activity is probably best introduced orally. After a discussion about investments and interest rates, the teacher can use the sequence function of the calculator to generate sequences showing how an initial capital sum grows for a fixed interest rate. Students can be asked to find the annual interest rate that ensures their money is doubled in 10 years.

Students can then investigate the annual interest rates that would double their money for different numbers of years. These interest rates could be plotted on a graph.

5 years	14.9%
10 years	7.2%
15 years	4.7%
20 years	3.6%
25 years	2.8%

Points for students to discuss

It may be useful to show students how to generate sequences on the calculator.

Further Ideas

- Investigate interest rates that would triple an investment, or...
- From 1970 to 1980 prices tripled. What was the average rate of inflation?

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For High school Students

How much will your investment be worth in *n* years?
Let's make an equation.

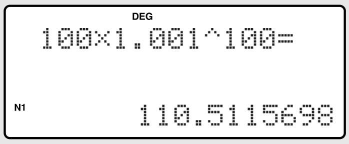
The original amount of money invested, called the principal, multiplies each year by the amount *x*.
Let's use this equation to see how much money we have after 100 years.

Press the following buttons and then start operation.

[ON/C] [MODE] [0]

[SET UP] [2] [1]

The original amount, or principal, is $100; so a = 100.
The number of years is 100; so n = 100.
The interest is 0.1%; so x = 1.001.



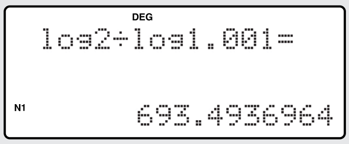
100 [×] 1.001 [y^x] 100 [=]

You have $110.50 after 100 years.

How many years would it take for the money to double?
Let's make an equation.
The money invested multiplies each year by the amount *x*.
After *n* years the money doubles, so...

	$ax^n = 2a$
Divide both sides by '*a*'	$x^n = 2$
Calculates the 'log' of both sides	$\log x^n = \log 2$
	$n\log x = \log 2$
	$\therefore n = \log 2/\log x$

If '*a*' is the money deposited, the savings would double.



[log] 2 [÷] [log] 1.001 [=]

It takes approximately 694 years for your money to double.