

# Interest Rates: Actual vs Effective

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CALCULATORS: Casio: fx-9750G Plus • Casio: CFX-9850G Series

## Student Worksheet

### Discussion

In the financial world there are vocabulary terms that are necessary to understand. Two such vocabulary terms are actual percentage rate and the effective percentage rate. The actual percentage rate, usually presented as the APR, is the rate which the percentage is calculated. The effective rate is what is the effect of the actual rate because you have compounded that interest, or added interest to interest. You can do calculations to find the effective percentage rate from the actual by using the following equation:

$$Eff = \left(1 + \frac{APR}{n}\right)^n - 1$$

where Eff is the effective rate, APR is the actual rate, and n is the number of compounding periods. In this activity you will calculate the effective percentage rate from the given APR value.

### Example Calculations:

**Example 1– Investment:**

Principal = \$1,000  
APR = 5%  
n = 30 years

Effective:

$(1 + 0.05 \div 30)^{30} - 1$   
1.001667<sup>30</sup> - 1  
0.05122734293  
5.127%

Thus you will make a 5.123% profit on your investment each year:

$\$1,000 \times 1.0513^{30}$   
\$4,485.39

**Example 2:**

Principal = \$20,000  
APR = 8%  
n = 10 years

Effective:

$(1 + 0.08 \div 10)^{10} - 1$   
1.008<sup>10</sup> - 1  
0.082942308  
8.294%

Thus you will make a 8.294% profit on your investment each year:

$\$20,000 \times 1.08294^{10}$   
\$44,368.42

### Using the Calculator

Find the conversions using the Casio calculator:

- Press the AC/ON button, the MENU key, and select C for TVM.
- Press F5 for Conversion.
- Enter parameters:
  - n: number of compounding periods, type **30 EXE**.
  - I%: percentage rate per compounding period, type **5 EXE**.

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Financial(1/2)
F1:Simple Interest
F2:Compound Interest
F3:Cash Flow
F4:Amortization
F5:Conversion
F6:Next Page
SMP | CMPR | CASH | AMT | CNUT | D
  
```

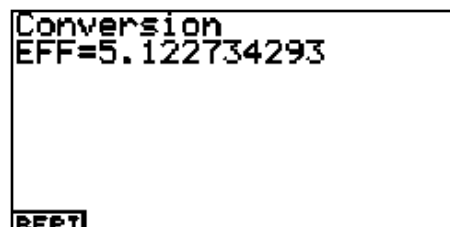
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*continued*

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- Solve for effective rate:
  - Press **F1** for ► EFF.
  - The effective rate will appear on the screen.
  - Press **EXIT** to return to the previous screen.  
The effective rate will now appear beside I%.
- Solve for actual rate:
  - Press **F2** for ► APR.
  - The actual rate will appear on the screen.
  - Press **EXIT** to return to the previous screen.



### Practice Problems

1. What is the effective rate of a loan that has 360 compounding periods at a rate of 1% per period?  
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2. What is the actual rate of a 10 year loan that has an effective rate of 5.7%?  
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3. What is the actual rate of a 30 year loan that has an effective rate of 8.2%?  
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4. What is the effective rate of a loan that has 36 months of payments at a rate of 7% APR (hint: find the rate per pay period)?  
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