

Simple Interest

Finite Math

19 February 2019

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All of these things have an *interest rate* attached to them, essentially rent on the money, which is paid as *interest*.

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where I = interest, P = principal, r = annual simple interest rate (written as a decimal), and t = time in years.

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Suppose you deposit \$2,000 into a savings account with an annual simple interest rate of 6%. How much interest will accrue after 6 months?

Future Value

Often, we might be more curious about how much will be in the account or how much will be owed on the loan after a certain period. This amount is called the *future value*. Another name for principal is *present value*. It is found by simply adding the original investment/loan amount to the interest accrued.

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Suppose you take out a \$10,000 loan at a simple annual interest rate of 3.2%. How much would be due on the loan after 10 months?

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Solution

\$3,011.25

Solving for Other Details

We can use this formula to predict what interest rate we need or how much principal to take out/deposit.

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You're looking to invest \$5,000 and make \$100 in interest after 10 weeks. What annual rate on your investment will you need to accomplish this?

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You invest \$4,000 at an annual rate of 3.9%. How long will it take for the investment to be worth \$5,000? Give your answer in years, correct to 2 decimal places.

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Solution

6.41 years

Commission Schedules

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Suppose a brokerage firm uses the following commission schedule

<i>Principal</i>	<i>Commission</i>
<i>Under \$3,000</i>	<i>\$25+1.8% of principal</i>
<i>\$3,000 - \$10,000</i>	<i>\$37+1.4% of principal</i>
<i>Over \$10,000</i>	<i>\$107+0.7% of principal</i>

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An investor purchases 450 shares of a stock at \$21.40 per share, keeps the stock for 26 weeks, then sells the stock for \$24.60 per share. What was the annual interest rate earned on the investment?

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Suppose a brokerage firm uses the following commission schedule

<i>Principal</i>	<i>Commission</i>
<i>Under \$3,000</i>	<i>\$32+1.8% of principal</i>
<i>\$3,000 - \$10,000</i>	<i>\$56+1% of principal</i>
<i>Over \$10,000</i>	<i>\$106+0.5% of principal</i>

An investor purchases 75 shares of a stock at \$37.90 per share, keeps the stock for 150 days, then sells the stock for \$41.20 per share. What was the annual interest rate earned on the investment? (Again, assume a 360-day year.)

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Solution

6.352%

Average Daily Balance

A common method for calculating interest on a credit card is to use the *average daily balance method*. As the name suggests, the average daily balance is computed, then the interest is computed on that.

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Example

A credit card has an annual interest rate of 19.99% and interest is calculated using the average daily balance method. If the starting balance of a 30-day billing cycle is \$523.18 and purchases of \$147.98 and \$36.27 are posted on days 12 and 25, respectively, and a payment of \$200 is credited on day 17, what will be the balance on the card at the start of the next billing cycle?

Now You Try It!

Example

A credit card has an annual interest rate of 19.99% and interest is calculated using the average daily balance method. If the starting balance of a 28-day billing cycle is \$696.21 and purchases of \$25.59, \$19.95, and \$97.26 are posted on days 6, 13, and 25, respectively, and a payment of \$140 is credited on day 8, what will be the balance on the card at the start of the next billing cycle?

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Solution

\$708.92