# Uses of Simple Interest

Finite Math

13 February 2017

# Quiz

If $P$ dollars is invested in a savings account with an annual simple interest rate $r$ for $t$ years, how much is earned in interest?

$$I = ???$$

# Simple Interest

Simple interest is computed as

$$I = Prt$$

# Simple Interest

Simple interest is computed as

$$I = Prt$$

where $I =$ interest

# Simple Interest

Simple interest is computed as

$$I = Prt$$

where $I =$ interest, $P =$ principal

# Simple Interest

Simple interest is computed as

$$I = Prt$$

where $I =$ interest, $P =$ principal, $r =$ annual simple interest rate (written as a decimal)

# Simple Interest

Simple interest is computed as

$$I = Prt$$

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

# Future Value

## Definition (Future Value)

$$A = P + I$$

# Future Value

## Definition (Future Value)

$$A = P + I = P + Prt$$

# Future Value

## Definition (Future Value)

$$A = P + I = P + Prt$$

*and in a simplified form*

# Future Value

## Definition (Future Value)

$$A = P + I = P + Prt$$

*and in a simplified form*

$$A = P(1 + rt)$$

# Future Value

## Definition (Future Value)

$$A = P + I = P + Prt$$

*and in a simplified form*

$$A = P(1 + rt)$$

*where*

# Future Value

## Definition (Future Value)

$$A = P + I = P + Prt$$

*and in a simplified form*

$$A = P(1 + rt)$$

*where* $A =$ *future value,*

# Future Value

## Definition (Future Value)

$$A = P + I = P + Prt$$

*and in a simplified form*

$$A = P(1 + rt)$$

*where $A =$ future value, $P =$principal/present value,*

# Future Value

## Definition (Future Value)

$$A = P + I = P + Prt$$

*and in a simplified form*

$$A = P(1 + rt)$$

*where $A =$ future value, $P =$principal/present value, $r =$annual simple interest rate,*

# Future Value

## Definition (Future Value)

$$A = P + I = P + Prt$$

*and in a simplified form*

$$A = P(1 + rt)$$

*where $A =$ future value, $P =$principal/present value, $r =$annual simple interest rate, $t =$time in years.*

# Solving for Other Details

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

# Solving for Other Details

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

## Example

*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?*

# Now You Try It!

**Example**

*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.*

# Now You Try It!

## Example

*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.*

## Solution

6.41 *years*

# Commission Schedules

One often uses a brokerage firm when making investments, many of which charge you a fee based on the transaction amount (principle) when both buying AND selling stocks.

# Commission Schedules

One often uses a brokerage firm when making investments, many of which charge you a fee based on the transaction amount (principle) when both buying AND selling stocks.

## Example

*Suppose a brokerage firm uses the following commission schedule*

| *Principal* | *Commission* |
|---|---|
| *Under $3,000* | *$25+1.8% of principal* |
| *$3,000 - $10,000* | *$37+1.4% of principal* |
| *Over $10,000* | *$107+0.7% of principal* |

# Commission Schedules

One often uses a brokerage firm when making investments, many of which charge you a fee based on the transaction amount (principle) when both buying AND selling stocks.

## Example

*Suppose a brokerage firm uses the following commission schedule*

| *Principal* | *Commission* |
|---|---|
| *Under $3,000* | *$25+1.8% of principal* |
| *$3,000 - $10,000* | *$37+1.4% of principal* |
| *Over $10,000* | *$107+0.7% of principal* |

*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?*

# Now You Try It!

## Example

*Suppose a brokerage firm uses the following commission schedule*

| *Principal* | *Commission* |
|---|---|
| *Under $3,000* | *$32+1.8% of principal* |
| *$3,000 - $10,000* | *$56+1% of principal* |
| *Over $10,000* | *$106+0.5% of principal* |

*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.)*

# Now You Try It!

## Example

*Suppose a brokerage firm uses the following commission schedule*

| *Principal* | *Commission* |
|---|---|
| *Under $3,000* | *$32+1.8% of principal* |
| *$3,000 - $10,000* | *$56+1% of principal* |
| *Over $10,000* | *$106+0.5% of principal* |

*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.)*

## 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.

# 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.

## 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?*