Having a new car is exciting, but buying a car can gut wrenching. Preparation is your greatest tool.

**BUYING A CAR**

consumer**math**

# Personal Finance: Car Payments

You decide to buy a truck: The question now is…How much are you <u>really</u> going to pay for that truck?

Students will learn how to calculate loan payments for a car.

# Getting a Loan

You can't afford $44,538 all at once, but you could manage $600 a month.

Can you still buy the car?

We'll use a loan chart to help us find out.

| Purchase Price of Vehicle (excluding tax, license, or registration) $44,538.00 | | | | | |
|---|---|---|---|---|---|
| | | 2.90% | 4.90% | 6.90% | 8.90% | 10.90% |
| Years | 3 | $1,293 | $1,333 | $1,373 | $1,414 | $1,456 |
| | 4 | $984 | $1,024 | $1,064 | $1,106 | $1,149 |
| | 5 | $798 | $838 | $880 | $922 | $966 |
| | 7 | $586 | $627 | $670 | $714 | $760 |

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# Getting a Loan

Let's assume for a moment that you can even get this good of an interest rate.

What is this loan really going to cost you?

| Monthly Payment Chart $44,538.00 | | | | | |
|---|---|---|---|---|---|
| | | 2.90% | 4.90% | 6.90% | 8.90% | 10.90% |
| **Years** | 3 | $1,293 | $1,333 | $1,373 | $1,414 | $1,456 |
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# Getting a Loan

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| **3** | $1,293 | $1,333 | $1,373 | $1,414 | $1,456 |
| **4** | $984 | $1,024 | $1,064 | $1,106 | $1,149 |
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| Actual Cost of Vehicle Including Interest | | | | | |
|---|---|---|---|---|---|
| **3** | $46,557 | $47,982 | $49,434 | $50,912 | $52,416 |
| **4** | $47,225 | $49,136 | $51,094 | $53,098 | $55,149 |
| **5** | $47,899 | $50,307 | $52,788 | $55,343 | $57,969 |
| **7** | $49,265 | $52,702 | $56,282 | $60,003 | $63,862 |

| How Much You lost in Interest | | | | | |
|---|---|---|---|---|---|
| **3** | $2,019 | $3,444 | $4,896 | $6,374 | $7,878 |
| **4** | $2,687 | $4,598 | $6,556 | $8,560 | $10,611 |
| **5** | $3,361 | $5,769 | $8,250 | $10,805 | $13,431 |
| **7** | $4,727 | $8,164 | $11,744 | $15,465 | $19,324 |

The Loan will cost you $4,727.
That means the truck is actually
going to cost you $49,265.

# Calculating a Loan

What if you don't have a loan chart handy?

Calculating your monthly payments are not simple.
Here is the formula:

$$M = P * \left( \frac{J}{1 - (1 + J)^{-n}} \right)$$

M = payment amount
P = principal (the amount of money borrowed)
J = effective interest rate.
N = total number of payments

# A Comment on J

$$M = P * \left( \frac{J}{1 - (1 + J)^{-n}} \right)$$

M = payment amount
P = principal (the amount of money borrowed)
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N = total number of payments

The effective interest rate is not the annual interest rate. You need to calculate your interest rate based on your payments.

If you make monthly payments, you need to convert your annual interest rate to monthly interest rate.

Simply divide your Annual Interest Rate by 12.

# Loan Payment Example

$$M = P * \left( \frac{J}{1 - (1 + J)^{-n}} \right)$$

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Practice:

If you Annual Interest Rate is 4%, what is your effective interest rate for monthly payments?

4%÷12 = 0.333%

# Loan Payment Example

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More Practice: Convert the following annual interest rates to effective interest rates.

6% annual to monthly
8% annual to monthly
15% annual to monthly
7% annual to monthly

# Loan Payment Example

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More Practice: Convert the following annual interest rates to effective interest rates.

| 6% annual to monthly | = 0.5% |
| 8% annual to monthly | = 0.667% |
| 15% annual to monthly | = 1.25% |
| 7% annual to monthly | = 0.583% |

# A Comment on n

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M = payment amount
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J = effective interest rate.
N = total number of payments

N is the number of payments. If you get a 5 year loan, you don't make only 5 payments. Typically your payments are made monthly, so you are going to pay 12 times a year for 5 years.

Monthly payments = n = 5x12

n = yearsx12

# A Comment on n

$$M = P * \left( \frac{J}{1 - (1 + J)^{-n}} \right)$$

M = payment amount
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N = total number of payments

How many monthly payments for the following loans?
5 years
7 years
10 years
15 years
30 years

# A Comment on n

$$M = P * \left( \frac{J}{1 - (1 + J)^{-n}} \right)$$

M = payment amount
P = principal (the amount of money borrowed)
J = effective interest rate.
N = total number of payments

How many monthly payments for the following loans?
5 years   = 60 months or 60 payments
7 years   = 84 months or 84 payments
10 years = 120 months or 120 payments
15 years = 180 months or 180 payments
30 years = 360 months or 360 payments

# Example 1

$$M = P * \left( \frac{J}{1 - (1 + J)^{-n}} \right)$$

## Use the formula to solve the following:

Assume you are purchasing a vehicle. The cost of the vehicle is $20,000. You loan interest rate is 6% for 5 years. What are your payments?

M = payment amount
P = principal (the amount of money borrowed)
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J = 6%÷12
N = 5*12

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M = payment amount
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$$M = 20,000 * \left( \frac{0.06 \div 12}{1 - \left(1 + (0.06 \div 12)\right)^{-(5*12)}} \right)$$

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$$M = 20{,}000 * \left( \frac{0.06 \div 12}{1 - (1 + (0.06 \div 12))^{-(5*12)}} \right)$$

# $386.66

# Example 2

$$M = P * \left( \frac{J}{1 - (1 + J)^{-n}} \right)$$

## Use the formula to solve the following:

Assume you are purchasing a vehicle. The cost of the vehicle is $8,000. You loan interest rate is 5% for 5 years. What are your payments?

M = payment amount
P = $8,000
J = 5%÷12
N = 5*12

$$M = 20,000 * \left( \frac{0.05 \div 12}{1 - (1 + (0.05 \div 12))^{-(5*12)}} \right)$$

# Example 2

$$M = P * \left( \frac{J}{1 - (1 + J)^{-n}} \right)$$

## Use the formula to solve the following:

Assume you are purchasing a vehicle. The cost of the vehicle is $8,000. You loan interest rate is 5% for 5 years. What are your payments?

M = payment amount
P = $8,000
J = 5%÷12
N = 5*12

$$M = 20,000 * \left( \frac{0.05 \div 12}{1 - (1 + (0.05 \div 12))^{-(5*12)}} \right)$$
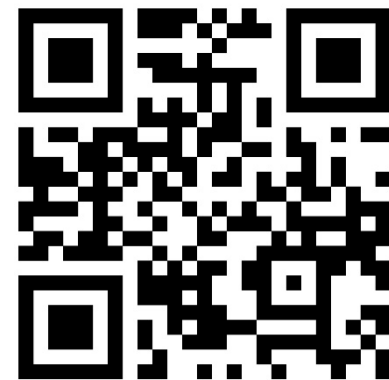
## $150.97

# Loan Calculator

$$M = P * \left( \frac{J}{1 - (1 + J)^{-n}} \right)$$

## The formula is difficult to use and remember

Most people will use a table or online loan calculator rather than try to remember the formula.

Loan calculators are easy to find on the internet or at http://consumermath.org/calculators/calc-automobile/

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What are some ways you could get the dealer to sell the car to you for less?

Could you buy the car for less somewhere else?

We'll talk more about this
in the next presentation.

# Review:

1. What information is needed to calculate a car loan?

2. What are the step for calculating loan payments?

# Review:

1. What information is needed to calculate a car loan?
   1. Length of Loan
   2. Interest Rate of Loan
   3. Amount Borrowed

2. What are the step for calculating loan payments?

   Step 1: Use that hard formula

   or

   Step 1: Use an Loan payment Calculator

   $$M = P * \left( \frac{J}{1 - (1+J)^{-n}} \right)$$

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