**Car Loan Calculations**

1. You graduate college and land your first job, so you decide to buy a new car to celebrate your new paycheck. Choose a new car and finance package from the options below. Indicate which you chose.

|  |  |  |
| --- | --- | --- |
| **2014 Ford Mustang**$27,510$2,000 down payment4% APR, 72 months | **2014 Chevy Corvette**$54,000$2,000 down payment4% APR , 72 months | **2014 BMW M6**$111,200$2,000 down payment4% APR, 72 months |

1. What is your monthly payment for the car? Use the formula: $M= \frac{P\left(\frac{r}{12}\right)\left(1+\frac{r}{12}\right)^{12t}}{\left(1+\frac{r}{12}\right)^{12t}-1}$
2. What is the total amount you pay in payments after 72 months?

How much TOTAL do you end up paying for the car after 72 months?

1. How much extra are you spending by making monthly payments on the car instead of paying for it in cash (i.e. how much interest are you paying on the car)? This is called the finance charge.
2. If the car loses 75% of its value in the first 5 years, what is the car worth after 5 years?
3. After 6 years, what is the total amount you’ve lost after buying your new car?

2. Suppose you buy an inexpensive used car for $2,000 that you can afford instead of the brand new car you can’t afford.

1. If you invest the money you would have spent in a car payment each month in a mutual fund that earns 8% annually, how much would you earn after one year? Six years? Ten years? Use the following formula, where interest is compounded monthly (because you’re making monthly deposits): $B=\frac{P\left[\left(1+\frac{r}{n}\right)^{nt}-1\right]}{\frac{r}{n}}$

One year:

Six Years:

 Ten years:

1. After one year, suppose you decide to trade in your current car for $2,000 and buy another used car for $5,000. You take the additional $3,000 out of your investment account. If you continue to make the same monthly deposit into your investment account, how much would you have after one year? Use the formula from part (a).

1. After another year, you decide to trade in your car for $5,000 and buy another used car for $10,000. You take the additional $5,000 out of your investment account. If you continue to make the same monthly deposit into your investment account, how much would you have after one year?
2. After another year, you decide to trade in your car for $10,000 and buy another used car for $15,000. You take the additional $5,000 out of your investment account. If you continue to make the same monthly deposit into your investment account, how much would you have after one year?
3. After another year, you decide to trade in your car for $15,000 and buy another used car for $20,000. You take the additional $5,000 out of your investment account. If you continue to make the same monthly deposit into your investment account, how much would you have after one year?
4. If you keep your car and keep depositing money into your account each month for two more years, how much will you have earned in total over the course of six years? How does this amount compare to the amount you would’ve lost over six years if you had taken out a loan?

Amount earned Amount lost Amount Saved

1. Now, if you keep your car (or trade it in for one of equal value each year) and stop depositing money into your account each month but you are still earning 8% interest annually, how long will it take you to afford the sticker price of the car you wanted six years ago? Use the simple interest formula $I=Prt$ because you are no longer making monthly deposits. *(Hint: your principle is the amount in your investment account currently. You will first need to determine the amount of interest you need to earn, then solve the equation for time).*

**Car Loan Calculations KEY**

1. You graduate college and land your first job, so you decide to buy a new car to celebrate your new paycheck. Choose a new car and finance package from the options below. Indicate which you chose.

|  |  |  |
| --- | --- | --- |
| **2014 Ford Mustang**$27,510$2,000 down payment4% APR, 72 months | **2014 Chevy Corvette**$54,000$2,000 down payment4% APR , 72 months | **2014 BMW M6**$111,200$2,000 down payment4% APR, 72 months |

1. What is your monthly payment for the car? Use the formula: $M= \frac{P\left(\frac{r}{12}\right)\left(1+\frac{r}{12}\right)^{12t}}{\left(1+\frac{r}{12}\right)^{12t}-1}$

Ford: P=$27,510 – 2,000 = $25,510 r = 0.04 t = 6 Monthly payment =$399.11

Chevy: P = $54,000 – 2,000 = $52,000 r = 0.04 t = 6 Monthly payment =$813.55

BMW: P = $111,200 – 2,000 = $109,200 r = 0.04 t = 6 Monthly payment =$1,708.45

1. What is the total amount you pay in payments after 72 months?

Ford: $399.11(72) = $28,735.92

Chevy: $813.55(72) = $58,575.60

BMW: $1708.45(72) = $123,008.40

How much TOTAL do you end up paying for the car after 72 months?

 Ford: $28,735.92 + 2,000 = $30,735.92

Chevy: $58,575.60 + 2,000 = $60,575.60

BMW: $123,008.40 + 2,000 = $125,008.40

1. How much extra are you spending by making monthly payments on the car instead of paying for it in cash (i.e. how much interest are you paying on the car)? This is called the finance charge.

Ford: $28,735.92 – 25,510 = $3,225.92

Chevy: $58,575.60 – 52,000 = $6,575.60

BMW: $123,008.40 – 109,200 = $13,808.40

1. If the car loses 75% of its value in the first 5 years, what is the car worth after 5 years?

Ford: $27,510 – 27,510(0.75) = $6,877.50

Chevy: $54,000 – 54,000(0.75) = $13,500

BMW: $111,200 – 111,200(0.75) = $27,800

1. After 6 years, what is the total amount you’ve lost after buying your new car?

Ford: $30,735.92 – 6,877.50 = $23,858.42

Chevy: $60,575.60 – 13,500 = $47,075.60

BMW: $125,008.40 – 27,800 = $97,208.40

2. Suppose you buy an inexpensive used car for $2,000 that you can afford instead of the brand new car you can’t afford.

1. If you invest the money you would have spent in a car payment each month in a mutual fund that earns 8% annually, how much would you earn after one year? Six years? Ten years? Use the following formula, where interest is compounded monthly (because you’re making monthly deposits): $B=\frac{P\left[\left(1+\frac{r}{n}\right)^{nt}-1\right]}{\frac{r}{n}}$n = 12, r = 0.08

1 Year 6 Years 10 Years

Ford: P = $311.99, t=1 $4,968.89 t=6 $36,728.23 t=10 $73,015.59

Chevy: P=813.55, t=1 $10,128.64 t=6 $74,867.20 t=10 $148,835.75

BMW: P=1708.45, t=1 $21,270.08 t=6 $157,220.67 t=10 $312,554.15

1. After one year, suppose you decide to trade in your current car for $2,000 and buy another used car for $5,000. You take the additional $3,000 out of your investment account. If you continue to make the same monthly deposit into your investment account, how much would you have after one year? Use the formula from part (a).

Ford: $4,968.89 + (4,968.89 – 3,000) = $6,937.78

Chevy: $10,128.64 + (10,128.64 – 3,000) = $17,257.28

BMW: $21,270.08 + (21,270.08 – 3,000) = $39,540.16

1. After another year, you decide to trade in your car for $5,000 and buy another used car for $10,000. You take the additional $5,000 out of your investment account. If you continue to make the same monthly deposit into your investment account, how much would you have after one year?

Ford: $4,968.89 + (6,937.78– 5,000) = $6,906.67

Chevy: $10,128.64 + (17,257.28 – 5,000) = $22,385.92

BMW: $21,270.08 + (39,540.16 – 5,000) = $55,810.24

1. After another year, you decide to trade in your car for $10,000 and buy another used car for $15,000. You take the additional $5,000 out of your investment account. If you continue to make the same monthly deposit into your investment account, how much would you have after one year?

Ford: $4,968.89 + (6,906.67 – 5,000) = $6,875.56

Chevy: $10,128.64 + (22,385.92 – 5,000) = $27,514.56

BMW: $21,270.08 + (55,810.24 – 5,000) = $72,080.32

1. After another year, you decide to trade in your car for $15,000 and buy another used car for $20,000. You take the additional $5,000 out of your investment account. If you continue to make the same monthly deposit into your investment account, how much would you have after one year?

Ford: $4,968.89 + (6,875.56 – 5,000) = $6,844.45

Chevy: $10,128.64 + (27,514.56 – 5,000) = $32,643.20

BMW: $21,270.08 + (72,080.32 – 5,000) = $88,350.40

1. If you keep your car and keep depositing money into your account each month for two more years, how much will you have earned in total over the course of six years? How does this amount compare to the amount you would’ve lost over six years if you had taken out a loan?

Amount earned Amount lost Amount Saved

Ford: $10,350.20 + 6,844.45 = $17,194.65 $23,858.42 $41053.07

Chevy: $21,097.95 + 32,643.20 = $53,741.15 $20,075.60 $99,016.75

BMW: $44,305.56 + 88,350.40 = $132,655.96 $41,608.40 $229,864.36

 Compound interest earned on monthly deposit for two more years:

 $B=\frac{P\left[\left(1+\frac{r}{n}\right)^{nt}-1\right]}{\frac{r}{n}}$

Ford: P = $311.99, r = 0.08, n = 12, t = 2 B = $10,350.20

 Chevy: P = $813.55, r = 0.08, n = 12, t = 2 B = $21,097.95

 BMW: P = $1708.45, r = 0.08, n = 12, t = 2 B = $44,305.56

1. Now, if you keep your car (or trade it in for one of equal value each year) and stop depositing money into your account each month but you are still earning 8% interest annually, how long will it take you to afford the sticker price of the car you wanted six years ago? Use the simple interest formula $I=Prt$ because you are no longer making monthly deposits. *(Hint: your principle is the amount in your investment account currently. You will first need to determine the amount of interest you need to earn, then solve the equation for time).*

Ford: I = 27,510 – 17,194.65 = $10,315.35 t = 7.5 years

Chevy: I = 54,000 - 53,741.15 = $258.85 t = 0.06 years, or less than one month

BMW: I = 111,200 – 132,655.96 t = 0 years – you already have more than that!