# MATH: Depreciation of Car Value

In life, you may not always see things losing value at a steady rate. Often things with a limited lifespan, like many electronics and cars, will lose more value in the first few years and less value as time goes on. This concept is called depreciation and it can be modeled using exponential decay.

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| Math Topics | Personal Finance Topics |
|---|---|
| • Exponential Functions<br>• Exponential Decay | • Depreciation<br>• Inflation |

**Part I: Exponential Decay Example**

Example 1: A school purchases equipment to screen print their own athletic uniforms. The equipment initially costs $8,000 and will depreciate at 8% annually. They are told this type of equipment has a lifespan of about 10 years. How much will the screen printing equipment be worth in 10 years when the school anticipates needing to replace the equipment?

**Setting up the equation:**

$$y = ab^x$$

y = Value after 10 years (this is what we are solving for)

a = $8,000 (the initial value)

b = 100% - 8% = .92 (100% maintains initial value - 8% decrease in value per year)

x = 10 years (how many years)

**Solving the equation:**

$$y = ab^x$$

$$y = 8,000(.92)^{10}$$

$$y = 8,000(0.434388454224)$$

$$y = \$3,475.11$$

Solution:
The screen printing equipment will be worth $3,475.11 in 10 years.

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**Part II: Practice Problems**

Now that you know how to solve exponential decay equations, let's see how this looks with a car's value over time! Complete the following practice problems and show your work in the space provided. Then, write your final solution in the answer boxes.

| Question 1 | Answer |
|---|---|
| Tara just bought her first car in order to commute to college, a used 2014 Toyota RAV4! The value of the car today is $13,000, but will lose 11% of it's value each year for the next several years. Down the road, Tara will trade the RAV4 in for a down payment on a newer car. If she trades in her car 4 years from now, how much will it be worth? | |

| Question 2 | Answer |
|---|---|
| Tara decides to keep the car for a few years longer. If she decides to trade in her car 8 years from now, how much will it be worth? | |

| Question 3 | Answer |
| --- | --- |
| JaRhondaLynn bought a Nissan Sentra about 4 years ago. Her car depreciates at a rate of 7% annually. The current value of her Nissan is $18,701.30. What was the value of her car when she first purchased it? | |

| Question 4 | Answer |
| --- | --- |
| Maggie's Ford Expedition currently has a value of $16,357.75. Her car depreciates at a rate of 10% annually. If she purchased it 8 years ago, what was the value of her car when she first got it? | |

**Part III: Reflection**

5. Refer back to questions 1 and 2. Draw a sketch of the value of Tara's Toyota RAV4 starting at the time she purchased the car, 4 years later, and then 8 years later.

6. Your friend is selling his family's old car to save up for a new car! He says, "My parents are letting me sell the old car! They bought it five years ago for $15,000 and the new car I want is $20,000. So I just need to sell the old one and only pay $5,000 out of my pocket to get the new car!" What might you say to him?