

**PAP Algebra 2**  
**Exponential Applications Intro.**

Name: \_\_\_\_\_

**Engage**

A) Your favorite shoes are on sale 30% off. The original price was \$74.99. What is the sale price of the shoes?

B) You and your friend go to dinner and the bill is \$45.62. You want to tip the waiter 23% because 23 is your favorite number. What will be the total including the tip?

**Explain**

**General Growth/Decay**

$$y = a(b)^x$$

**Percentage Rate  
Growth/Decay**

$$y = a(1 + r)^x$$

$$y = a(1 - r)^x$$

**Half-Life**

$$y = a\left(\frac{1}{2}\right)^{\frac{\text{time}}{\text{half-life}}}$$

**1. Ed bought a new mustang for \$20,000. Mustangs depreciate at a rate of 22% per year.**

- a) What is the initial value?
- b) What is the growth/decay rate?
- c) Write an equation.
- d) How much will the Mustang be worth in 6 years when he graduates from college?
- e) When will the car be worth \$1000?

**2. The school currently has 1800 students and a 25% rate of growth due to people moving in to the school each year.**

- a) What is the initial amount?
- b) What is the growth rate?
- c) Write an equation.
- d) Predict the number of students in 2 years.

**3. The Interwrite Pad Mrs. Granier is using this year has become famous and is now considered a collector's item. As a result, it will appreciate at a rate of 15% per year. The school paid \$150 for the pad initially.**

- a) What is the initial value?
- b) What is the growth/decay rate?
- c) Write an equation.
- d) How much will it be worth in 10 years?
- e) When will it be worth \$10,000?

**4. The number of redhawks in Frisco is doubling every 6 months. Currently there are 200 redhawks in Frisco.**

- a) What is the initial amount?
- b) What is the growth/decay rate?
- c) Write an equation.
- d) How many redhawks will there be in 4 years?
- e) When will there be 10,000 redhawks in the area?

**5. Mr. Smith had to take 50 mg of Iodine-131 to treat his thyroid disease.**

**Iodine-131 has a half-life of 8 hours.**

- a) What is the initial amount?
- b) What is the growth/decay rate?
- c) Write an equation.
  
- d) How much was left in his body after 1 day?
  
- e) When did the amount drop below 1 mg?

**6.** A new drug to treat a disease has a half-life of 3 hours. If 50cc is initially administered, how much will still be in your system 24 hours later?

**7.** Nobelium -259 has a half-life of 58 minutes. How much remains of a 1 kg sample of 1 day?

**8.** Dubnium-262 has a half-life of 34 seconds. How many grams did we begin with if, after 5 minutes, we are left with only 1 gram?

**9.** Caffeine in the blood stream has a half-life of 5 hours as shown in the table below. A venti sized coffee from Starbucks has 415 mg of caffeine. How much caffeine would be left behind in your body 24 hours after drinking a venti coffee?

<b>Time (hours)</b>	<b>Amount of caffeine in body (mg)</b>
0	415
5	207.5
10	103.75
15	51.875