8 Algebra CC HW #__________

Read each word problem below. Use an exponential growth or decay model to solve.

1. A fully inflated raft containing 4500 cubic inches of air loses 6.6% of its air every day.

   a) After 5 days, how much air remains in the raft? *Round to the nearest cubic inch.*

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

   3199 cubic inches

   $y = 4500(1 - 0.066)^t$

   $\mathbf{y = 4500(0.934)^t}$ ← ***Function Rule***

   $y = 4500(0.934)^5$

   $y = 3198.50\ldots$

   b) How much air was lost? $4500 - 3199 = 1301$

   About 1301 cubic inches

2. The current enrollment of the Roslyn Middle School is expected to increase over the next five years. Each year the population is expected to increase by about 3.2% from the previous year. How many more students are expected to be enrolled in year 5 than in year 4 if the current enrollment is 850 students?

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

   $y = 850(1 + 0.032)^t$

   $\mathbf{y = 850(1.032)^t}$

   Function Rule

   Year 4

   $y = 850(1.032)^4$

   $y = 964.13\ldots$

   964 students

   Year 5

   $y = 850(1.032)^5$

   $y = 994.98\ldots$

   995 students

   $995 - 964 = 31$ **About 31 more students**

3. In a particular state, the population of black bears has been decreasing at the rate of 0.75% per year. In 1990, it was estimated that there were 400 black bears in the state. If the population continues to decline at the same rate, what will the population be in 2020?

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

   $y = 400(1 - 0.0075)^t$

   $\mathbf{y = 400(0.9925)^t}$

   Function Rule

   $2020 - 1990 = 30$ years

   $y = 400(0.9925)^{30}$

   $y = 319.135\ldots$

   In 2020, the population of black bears is expected to be about 319.

4. Camilo purchased a rare coin from a dealer for \$300. The value of the coin increases 5.5% each year. How many years will it take for the coin to increase in value by \$100?

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

   $y = 300(1 + 0.055)^t$

   $\mathbf{y = 300(1.055)^t}$

   Function Rule

x	y
5	392.09
6	413.65

   Viewed table on calculator.

   It will take about 6 years for the coin to increase in value by \$100.

5. Elise is buying a new car for \$42,500. As time goes by, the value of the car will decrease. It's worth can be estimated using the equation $y = 42{,}500(0.91)^x$ in which y represents the value of the car over x years.

a) What is the depreciation rate, r, of this particular car? *Express your answer as a percent.*

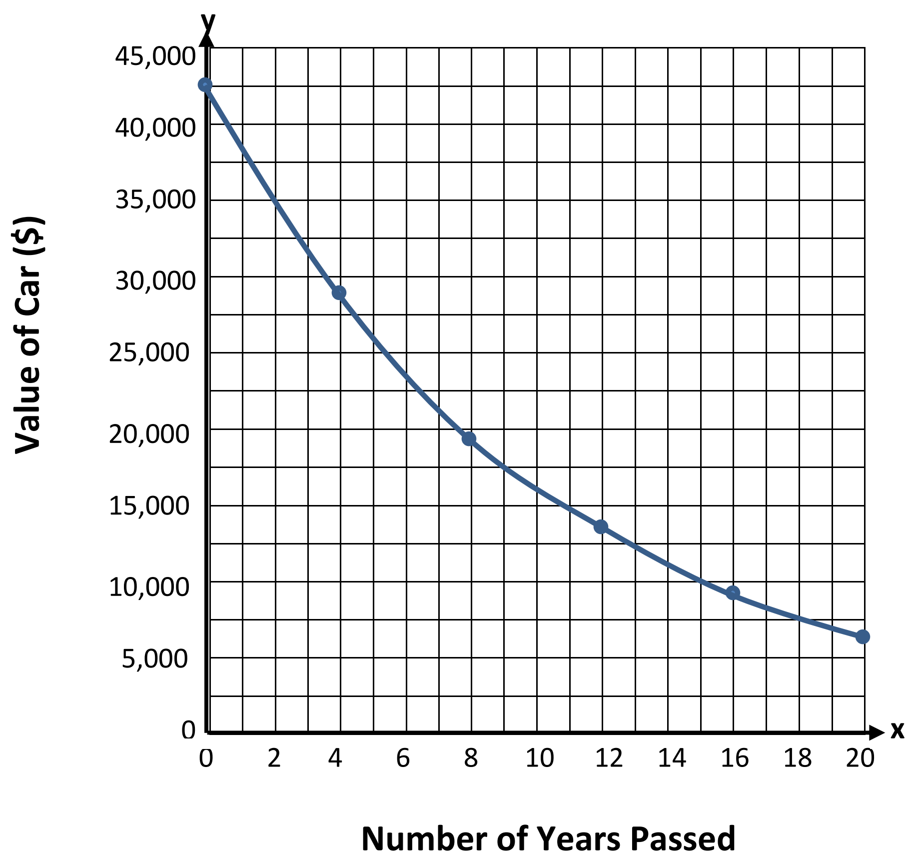
$$1 - r = 0.91 \rightarrow 1 - 0.91 = 0.09$$

9%

b) Create a table of values that shows the car's value over a period of 20 years. *Round all values to the nearest dollar.*

Number of Years Passed	**Value of the Car (*rounded to the nearest dollar*)**
0	\$42,500
4	29,144
8	19,986
12	13,705
16	9,398
20	6,445

c) Using your table of values, create a graph over the interval $0 \leq x \leq 20$.



d) What will Elise's car be worth after 15 years?

$y = 42500(0.91)^{15}$

$y \approx$ **\$10,328**