Unit 2 5.7 **Geometric Sequence Word Problems** Name: _____

Objective: The student will be able to solve real-world problems involving geometric sequences.

$$\boldsymbol{a_n = a_o * (r)^n}$$

*If there is a % in the problem:

1. Determine if the % is increasing, decreasing, or if the r value has been provided.
   a. If it is increasing start at 100% and add on to it, change to a decimal (100% + 5% = 105% = 1.05)
   b. If it is decreasing start at 100% and subtract from it, change to a decimal (100% - 7% = 93% = .93)
   c. If the common ratio is given: a bouncy ball, when dropped, bounces back up to 88% of its original height (r is .88)
2. Determine which term you want to start with: a_0, a_1, a_2,…
3. Write the equation, taking into consideration which term you started with and subtract from "n".

*If there is a multiplier in the problem: doubled, tripled, cut in half

1. The common ratio has been provided ($r = 2, r = \frac{1}{2}$, …)
2. Determine which term you want to start with: a_0, a_1, a_2,…
3. Write the equation, taking into consideration which term you started with and subtract from "n".

Practice:

Ex: George has taken a job with a starting salary of $50,000. Find his salary during his fourth year on the job if he receives an annual raise of 2%.

Raise=increasing → 100%+2%=102% → 1.02

Starting salary (1st year) → $a_1 = 50{,}000$

$a_n = 50{,}000(1.02)^{n-1}$

4th year:

$a_4 = 50{,}000(1.02)^{4-1}$

$= \$53{,}060.40$

1. In a certain region, the number of highway accidents increased by 15% each year. How many accidents were there in 2016 if there were 5120 in 2002?

2. If groceries now cost Mrs. Boughen $275, she predicts that the cost will increase 10% per year due to inflation and her 3 growing boys eating more and more each year. How much money will she be spending per week on groceries 5 years from now?

3. Suppose you drop a tennis ball from a height of 15 feet. After the ball hits the floor, it loses 15% of its previous height. How high will the ball rebound after its sixth bounce? Round to the nearest tenth.

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4. A super ball is dropped from a height of 6 m and bounces back to 90% of its original height on each bounce. How high off the floor is the ball at the top of the eighth bounce?

5. Mrs. Pischke gave us a huge review packet for the final. One the first day we got it, I had 3072 problems to do. I worked my butt off, and by the 2nd day, I only had 1536 left. On the 3rd day, I had 768 left. How many will I have left on the 7th day? On what day will I only have 3 questions left?

6. A ball on a pendulum moves 50 cm on its first swing. Each succeeding swing it loses 10% of the distance of the previous swing. Write the first six terms of the sequence generated.

7. Sam has purchased a $30,000 car for his business. The car depreciates 30% every year. (Depreciation means the value of the car goes down by that percent each year.) What will be the value of the car after the 5th year?

8. Rude Dogg Promotions charges $300 for the first month and then increases their fees by 1.2% each additional month. How much will the 12th month cost?

9. The first year a toy manufacturer introduces a new toy; its sales total $495,000. The company expects its sales to drop 10% each succeeding year. Find the total expected sales in year 6.

10. You complain that the hot tub in your hotel suite is not hot enough. The hotel tells you that they will increase the temperature by 10% each hour. If the current temperature of the hot tub is 75º F, what will be the temperature of the hot tub after 3 hours, to the *nearest tenth* of a degree?