Geometric Sequence Word Problems

1. 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%

$$a_4 = 50000 (1.02)^3 = \boxed{53060.40}$$

$$a_1 = 50,000 \qquad a_2 = 51,000 \qquad a_3 = 52,020 \qquad a_4 = 53060.40$$
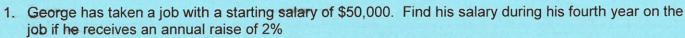
2. In a certain region, the number of highway accidents increased by 15% each year. How many accidents were there in 2016 if there were 5120 in 2002?
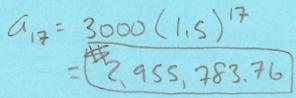
$$a_{14} = 5120 (1.15)^{14} = 36227.61$$

about $\boxed{36,228}$ accidents

3. 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?

$$a_5 = 275 (1.1)^5 = \boxed{442.09} \text{ dollars}$$

4. 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.

$$a_6 = 15 (.85)^6 = \boxed{5.7 \text{ ft.}}$$

5. 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?

$$a_8 = 6 (.90)^8 = \boxed{2.6 \text{ m}}$$

6. ~~Carla's Clothing Shop opened eight~~ years ago. The first year she made $3,000 profit. Each year ~~thereafter her profits~~ averaged 50% greater than the previous year. How much profit did Carla earn ~~during her~~ 18th year of business?

$$a_{17} = 3000(1.5)^{17}$$
$$= \boxed{\$2,955,783.76}$$

7. 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.

$$50, 45, 40.5, 36.45, 32.805, 29.5245$$

8. 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? Note: The car is 0 years old when purchased so the first year is the second entry in the sequence.

$$a_5 = 30000(.70)^5$$
$$= \boxed{\$5042.10}$$

9. 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?

$$a_{12} = 300(1.012)^{11}$$
$$= \boxed{\$342.06}$$

$$a_1 = 300$$
$$r = 1.012$$

10. 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.

$$a_6 = 263063.30$$

$$a_2 = 495000(.90) = 445500 \qquad a_5 = 360855(.9)$$
$$a_3 = 445500(.90) = 400950 \qquad = 324769.50$$
$$a_4 = 400950(.90) = 360855 \qquad \boxed{a_6 = 324769.50(.90) = 292292.55}$$

11. 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 75° F, what will be the temperature of the hot tub after 3 hours, to the *nearest tenth* of a degree?

$$a_3 = 75(1.1)^3 = \boxed{99.8°F}$$