

General Algebra 2 Worksheet #7 Unit 10 Selected Solutions

Solve each of the following problems. Show your work neatly organized.

2. Find the sum of the first 8 terms of the sequence defined by $a_n = (-2)^n$.

$$\begin{array}{l} \text{geometric series} \\ a_1 = -2 \quad r = -2 \quad n = 8 \end{array} \quad S_n = \frac{a_1(1 - r^n)}{1 - r} \quad S_8 = \frac{-2[1 - (-2)^8]}{1 - (-2)}$$

$$S_8 = \frac{a_1(1 - r^8)}{1 - r} \quad S_8 = \frac{-2(1 - 256)}{3} = 170$$

5. Evaluate the series $3 + 6 + 12 + 24 + 48 + \dots + 3072$.

$$\begin{array}{l} \text{geometric series} \\ a_1 = 3 \quad r = 2 \quad a_n = 3072 \end{array} \quad S_n = \frac{a_1 - a_n r}{1 - r}$$

$$S_n = \frac{3 - (3072)(2)}{1 - 2} = 6,141$$

6. Evaluate the infinite series $1 - 0.5 + 0.25 - 0.125 + \dots$

$$\begin{array}{l} \text{infinite geometric series} \\ a_1 = 1 \quad r = -0.5 \end{array} \quad S = \frac{a_1}{1 - r}$$

$$S = \frac{1}{1 - (-.5)} = \frac{1}{1.5} = \frac{10}{15} = \frac{2}{3}$$

Solve each of the following problems. Show your work neatly organized.

8. Evaluate: $\sum_{i=1}^{\infty} \left(\frac{2}{3}\right)\left(\frac{1}{2}\right)^{(i-1)} = \left(\frac{2}{3}\right)\left(\frac{1}{2}\right)^0 + \left(\frac{2}{3}\right)\left(\frac{1}{2}\right)^1 + \left(\frac{2}{3}\right)\left(\frac{1}{2}\right)^2 + \dots$

$$\begin{array}{l} \text{infinite geometric series} \\ a_1 = \frac{2}{3} \quad r = \frac{1}{2} \end{array} \quad S = \frac{a_1}{1 - r} \quad S = \frac{\frac{2}{3}}{1 - \frac{1}{2}} = \frac{\frac{2}{3}}{\frac{1}{2}} = \frac{2}{3}(2) = \frac{4}{3}$$

10. A ball is dropped from a height of 100 inches onto a concrete floor. On each bounce the ball rebounds to 80% of its previous height. What is the total vertical distance that the ball has traveled when it hits the floor for the tenth time?

(Both cases below are geometric series.)

Downward	Upward	Total $\approx 446.31 + 346.31$
$100 + 80 + 64 + \dots$	$80 + 64 + 51.2 + \dots$	≈ 792.6
$a_1 = 100 \quad r = 0.8 \quad n = 10$	$a_1 = 80 \quad r = 0.8 \quad n = 9$	
$S_{10} = \frac{100(1 - 0.8^{10})}{1 - 0.8} \approx 446.31$	$S_{10} = \frac{80(1 - 0.8^9)}{1 - 0.8} \approx 346.31$	

The total vertical distance is about 792.6 inches.