

HW Answers Unit 4 Lesson 3 p. 644 #1 – 41, 55 - 67 ODD

Solutions to Odd-Numbered Exercises

1. 5, 15, 45, 135, ...

Geometric sequence, $r = 3$

3. 6, 18, 30, 42, ...

Not a geometric sequence

(Note: It is an arithmetic sequence with $d = 12$.)

5. $1, -\frac{1}{2}, \frac{1}{4}, -\frac{1}{8}, \dots$

Geometric sequence, $r = -\frac{1}{2}$

7. $\frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \frac{4}{5}, \dots$

Not a geometric sequence

9. $1, \frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \dots$

Not a geometric sequence

11. $a_1 = 8, r = 3$

$$a_2 = 8(3) = 24$$

$$a_3 = 24(3) = 72$$

$$a_4 = 72(3) = 216$$

$$a_5 = 216(3) = 648$$

13. $a_1 = 1, r = \frac{1}{2}$

$$a_1 = 1$$

$$a_2 = 1\left(\frac{1}{2}\right) = \frac{1}{2}$$

$$a_3 = \frac{1}{2}\left(\frac{1}{2}\right) = \frac{1}{4}$$

$$a_4 = \frac{1}{4}\left(\frac{1}{2}\right) = \frac{1}{8}$$

$$a_5 = \frac{1}{8}\left(\frac{1}{2}\right) = \frac{1}{16}$$

15. $a_1 = 5, r = -\frac{1}{10}$

$$a_1 = 5$$

$$a_2 = 5\left(-\frac{1}{10}\right) = -\frac{1}{2}$$

$$a_3 = \left(-\frac{1}{2}\right)\left(-\frac{1}{10}\right) = \frac{1}{20}$$

$$a_4 = \frac{1}{20}\left(-\frac{1}{10}\right) = -\frac{1}{200}$$

$$a_5 = \left(-\frac{1}{200}\right)\left(-\frac{1}{10}\right) = \frac{1}{2000}$$

17. $a_1 = 3.5, r = 5$

$$a_2 = 3.5(5) = 17.5$$

$$a_3 = 17.5(5) = 87.5$$

$$a_4 = 87.5(5) = 437.5$$

$$a_5 = 437.5(5) = 2187.5$$

19. $a_1 = 1, r = e$

$$a_1 = 1$$

$$a_2 = 1(e) = e$$

$$a_3 = (e)(e) = e^2$$

$$a_4 = (e^2)(e) = e^3$$

$$a_5 = (e^3)(e) = e^4$$

21. $a_1 = 64, a_{k+1} = \frac{1}{2}a_k$

$$a_1 = 64$$

$$a_2 = \frac{1}{2}(64) = 32$$

$$a_3 = \frac{1}{2}(32) = 16$$

$$a_4 = \frac{1}{2}(16) = 8$$

$$a_5 = \frac{1}{2}(8) = 4$$

$$r = \frac{1}{2}, a_n = 64\left(\frac{1}{2}\right)^{n-1} = 128\left(\frac{1}{2}\right)^n$$

23. $a_1 = 4, a_{k+1} = 3a_k$

$$a_1 = 4$$

$$a_2 = 3(4) = 12$$

$$a_3 = 3(12) = 36$$

$$a_4 = 3(36) = 108$$

$$a_5 = 3(108) = 324$$

$$r = 3, a_n = 4(3)^{n-1} = \frac{4}{3}(3)^n$$

25. $a_k = 6, a_{k+1} = -\frac{3}{2}a_k$

$$a_1 = 6$$

$$a_2 = -\frac{3}{2}(6) = -9$$

$$a_3 = -\frac{3}{2}(-9) = \frac{27}{2}$$

$$a_4 = -\frac{3}{2}\left(\frac{27}{2}\right) = -\frac{81}{4}$$

$$a_5 = -\frac{3}{2}\left(-\frac{81}{4}\right) = \frac{243}{8}$$

$$r = -\frac{3}{2}, a_n = 6\left(-\frac{3}{2}\right)^{n-1}$$

27. $a_1 = 4, r = \frac{1}{2}, n = 10$

$$a_n = a_1 r^{n-1}$$

$$a_{10} = 4\left(\frac{1}{2}\right)^9 = \left(\frac{1}{2}\right)^7 = \frac{1}{128}$$

29. $a_1 = 6, r = -\frac{1}{3}, n = 12$

$$a_n = a_1 r^{n-1}$$

$$a_{12} = 6\left(-\frac{1}{3}\right)^{11} = \frac{-2}{3^{10}}$$

33. $a_1 = 16, a_4 = \frac{27}{4}, n = 3$

$$\frac{27}{4} = 16r^3 \Rightarrow r = \frac{3}{4}$$

$$a_n = a_1 r^{n-1}$$

$$a_3 = 16\left(\frac{3}{4}\right)^2 = 9$$

31. $a_1 = 500, r = 1.02, n = 14$

$$a_n = a_1 r^{n-1}$$

$$a_{14} = 500(1.02)^{13} \approx 646.8$$

35. $a_2 = a_1 r = -18 \Rightarrow a_1 = \frac{-18}{r}$

$$a_3 = a_1 r^2 = (a_1 r)r = -18r = \frac{2}{3} \Rightarrow r = -\frac{1}{3}$$

$$a_1 = \frac{-18}{r} = \frac{-18}{-1/3} = 54$$

$$a_6 = a_1 r^5 = 54\left(-\frac{1}{3}\right)^5 = \frac{54}{243} = -\frac{2}{9}$$

$$37. r = \frac{21}{7} = 3.$$

$$a_9 = a_1 r^{9-1} = 7(3)^8 = 45,927$$

$$41. r = \frac{\frac{3}{4}}{\frac{3}{16}} = 4$$

$$a_{12} = a_1 r^{12-1} = \frac{3}{16}(4)^{11} = 786,432$$

$$55. \sum_{n=1}^9 2^{n-1} \Rightarrow a_1 = 1, r = 2$$

$$S_9 = \frac{1(1-2^9)}{1-2} = 511$$

$$59. \sum_{n=0}^{20} 3\left(\frac{3}{2}\right)^n = \sum_{n=1}^{21} 3\left(\frac{3}{2}\right)^{n-1} \Rightarrow a_1 = 3, r = \frac{3}{2}$$

$$S_{21} = 3 \left[\frac{1 - (3/2)^{21}}{1 - (3/2)} \right] = -6 \left[1 - \left(\frac{3}{2}\right)^{21} \right] \approx 29,921.31$$

$$61. \sum_{i=1}^{10} 8\left(-\frac{1}{4}\right)^{i-1} \Rightarrow a_1 = 8, r = -\frac{1}{4}$$

$$S_{10} = 8 \left[\frac{1 - (-1/4)^{10}}{1 - (-1/4)} \right] = \frac{32}{5} \left[1 - \left(-\frac{1}{4}\right)^{10} \right] \approx 6.4$$

$$63. \sum_{n=0}^5 300(1.06)^n = \sum_{n=1}^6 300(1.06)^{n-1} \Rightarrow a_1 = 300, r = 1.06$$

$$S_6 = 300 \left[\frac{1 - (1.06)^6}{1 - 1.06} \right] \approx 2092.60$$

$$65. 5 + 15 + 45 + \dots + 3645$$

$$r = 3 \text{ and } 3645 = 5(3)^{n-1} \Rightarrow n = 7$$

$$\text{Thus, the sum can be written as } \sum_{n=1}^7 5(3)^{n-1}.$$

$$67. 2 - \frac{1}{2} + \frac{1}{8} - \dots + \frac{1}{2048}$$

$$r = -\frac{1}{4} \text{ and } \frac{1}{2048} = 2\left(-\frac{1}{4}\right)^{n-1} \Rightarrow n = 7$$

$$\sum_{n=1}^7 2\left(-\frac{1}{4}\right)^{n-1}$$

$$39. r = \frac{30}{5} = 6$$

$$a_{10} = a_1 r^{10-1} = 5(6)^9 = 50,388,480$$

$$57. \sum_{i=1}^7 64\left(-\frac{1}{2}\right)^{i-1} \Rightarrow a_1 = 64, r = -\frac{1}{2}$$

$$S_7 = 64 \left[\frac{1 - (-1/2)^7}{1 - (-1/2)} \right] = \frac{128}{3} \left[1 - \left(-\frac{1}{2}\right)^7 \right] = 43$$

