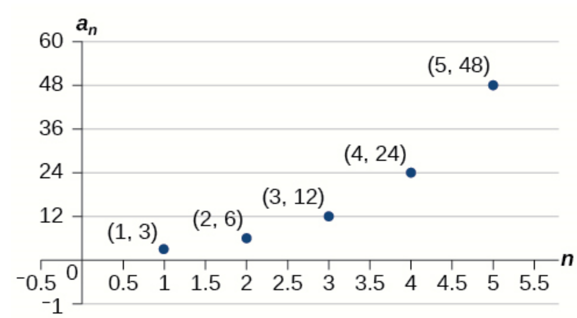
11.3 Geometric Sequences

1. A sequence in which the ratio of any two consecutive terms is constant.
3. Divide each term in a sequence by the preceding term. If the resulting quotients are equal, then the sequence is geometric.
5. Both geometric sequences and exponential functions have a constant ratio. However, their domains are not the same. Exponential functions are defined for all real numbers, and geometric sequences are defined only for non-negative integers. Another difference is that, while the base of neither can be 0 or 1, the base of a geometric sequence (the common ratio) can be negative, but the base of an exponential function must be positive.
7. The common ratio is -2.
9. The sequence is geometric. The common ratio is 2.
11. The sequence is geometric. The common ratio is $-\frac{1}{2}$.
13. The sequence is geometric. The common ratio is 5.
15. First five terms: $5, 1, \frac{1}{5}, \frac{1}{25}, \frac{1}{125}$
17. First five terms: $800, 400, 200, 100, 50$
19. $a_4 = -\frac{16}{27}$
21. $a_7 = -\frac{2}{729}$
23. First five terms: $7, 1.4, 0.28, 0.056, 0.0112$
25. $a_1 = -32,\ a_n = \frac{1}{2}a_{n-1}$
27. $a_1 = 10,\ a_n = -0.3a_{n-1}$
29. $a_1 = \frac{3}{5},\ a_n = \frac{1}{6}a_{n-1}$
31. $a_1 = \frac{1}{512}, a_n = -4a_{n-1}$
33. First five terms: $12, -6, 3, -\frac{3}{2}, \frac{3}{4}$
35. $a_n = 3^{n-1}$
37. $a_n = 0.8 \cdot (-5)^{n-1}$
39. $a_n = -\left(\frac{4}{5}\right)^{n-1}$
41. $a_n = 3 \cdot \left(-\frac{1}{3}\right)^{n-1}$
43. $a_{12} = \frac{1}{177{,}147}$
45. There are 12 terms in the sequence.
47. The graph does not represent a geometric sequence.
49.



51. Answers will vary. Examples: $a_1 = 800,\ a_n = 0.5a_{n-1}$ and $a_1 = 12.5,\ a_n = 4a_{n-1}$
53. $a_5 = 256b$
55. The sequence exceeds 100 at the 14th term, $a_{14} \approx 107$.
57. $a_4 = -\frac{32}{3}$ is the first non-integer value
59. $a_n = 400 \cdot 0.5^{n-1}$; First four terms: $400, 200, 100, 50$; $a_8 = 3.125$