

Section 11.2

1. Write the rule for the sequence 1, -4, -9, -14, -19, ... Then find a_{10} .

$$a_n = a_1 + (n-1)d$$

$$a_n = 1 + (n-1)(-5)$$

$$a_n = -5n + 6$$

$$a_{10} = -5(10) + 6$$

$$a_{10} = -44$$

2. In an arithmetic sequence, $a_7 = 34$ and $a_{18} = 122$. Write a rule for the n^{th} term.

$$a_n = a_1 + (n-1)d$$

$$34 = a_1 + 6d$$

$$a_n = a_1 + (n-1)d$$

$$122 = a_1 + 17d$$

$$122 = a_1 + 17d$$

$$-34 = -a_1 - 6d$$

$$88 = 11d$$

$$8 = d$$

$$34 = a_1 + 6d$$

$$34 = a_1 + 6(8)$$

$$-14 = a_1$$

$$a_n = a_1 + (n-1)d$$

$$a_n = -14 + (n-1)8$$

$$a_n = 8n - 22$$

3. Determine the first term in the arithmetic sequence for which $a_5 = 17$ and $d = 6$.

$$a_n = a_1 + (n-1)d$$

$$17 = a_1 + (5-1)6$$

$$-7 = a_1$$

$$a_n = -7 + (n-1)6$$

$$a_n = 6n - 13$$

4. The sum of an arithmetic sequence is 210. The first terms are -7, -4, -1. How many terms are in the sequence?

$$S_n = \frac{n(a_1 + a_n)}{2}$$

$$210 = \frac{n(-7 + 3n - 10)}{2}$$

$$420 = n(3n - 17)$$

$$d = 3$$

$$a_n = -7 + (n-1)(3)$$

$$a_n = 3n - 10$$

$$3n^2 - 17n - 420 = 0$$

$$n = 15$$

5. Determine the sum of the first 15 terms of the sequence 2, 6, 10, 14, 18, ... $d = 4$

$$a_n = 2 + (n-1)4$$

$$a_n = 4n - 2$$

$$a_{15} = 4(15) - 2$$

$$a_{15} = 58$$

$$S_n = \frac{n(a_1 + a_n)}{2}$$

$$S_{15} = \frac{15(2 + 58)}{2} = 450$$

Section 11.3

6. Write the rule for the n^{th} term of a geometric sequence with $a_1 = 16$ and a common ratio of $r = 4$.

$$a_n = 16(4)^{n-1}$$

or

$$a_n = 4^2(4)^{n-1} = 4^{n+1}$$

7. Write the rule for the sequence $-5, 10, -20, 40, \dots$ $r = -2$

$$a_n = -5(-2)^{n-1}$$

8. Determine the 7th term of the geometric sequence $100, 5, \frac{1}{4}, \frac{1}{80}, \dots$ $100r = 5$

$$a_n = 100\left(\frac{1}{20}\right)^{n-1}$$

$$r = \frac{5}{100} = \frac{1}{20}$$

$$a_7 = 100\left(\frac{1}{20}\right)^6 = \frac{100}{64,000,000} = \frac{1}{640,000}$$

1.5625×10^{-6}

9. Determine the sum of the first 15 terms of the series $\frac{14}{2} + 14 + 28 + 56 + \dots$

$$a_n = 7(2)^{n-1} \quad S_{15} = \frac{7(1-2^{15})}{1-2} = \frac{7(-32767)}{-1} = 229,369$$

$$S_n = \frac{a_1(1-r^n)}{1-r}$$

10. Given a geometric sequence with $a_3 = 18$ and $a_6 = -486$.

- Determine the value of a_1 .

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

- Determine the value of a_{12} .

$$18 = a_1 r^2$$

$$-486 = a_1 r^5$$

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

$$\frac{18}{r^2} = a_1$$

$$-486 = \frac{18}{r^2} \cdot r^5$$

$$a_n = 2(3)^{n-1}$$

$$\frac{18}{(-3)^2} = a_1$$

$$-486 = 18r^3$$

$$a_1 = 2$$

$$(-3)^2$$

$$-27 = r^3$$

$$a_{12} = 2(-3)^{11} = -354294$$

$$2 = a_1$$

$$-3 = r$$