For each sequence, state if it is arithmetic, geometric, or neither.

1) 3, 15, 75, 375, 1875, ...
2) −405, 135, −45, 15, −5, ...
3) −3, −6, −12, −24, −48, ...
4) \(\frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \frac{1}{16}, \frac{1}{32}, \ldots\)

Find the common difference and the three terms in the sequence after the last one given.

5) −1, −31, −61, −91, ...
6) 9, −191, −391, −591, ...
7) −12, −18, −24, −30, ...
8) 35, 25, 15, 5, ...

Find the common ratio and the three terms in the sequence after the last one given.

9) −1, −5, −25, −125, ...
10) −4, 16, −64, 256, ...
11) 2, 6, 18, 54, ...
12) 2, 4, 8, 16, ...

Find the recursive formula.

13) −15, −115, −215, −315, ...
14) 40, 35, 30, 25, ...
15) 3, −15, 75, −375, ...
16) −1, 6, −36, 216, ...

Find the explicit formula.

17) 37, 41, 45, 49, ...
18) −35, −235, −435, −635, ...
19) 34, 54, 74, 94, ...
20) 2, 12, 72, 432, ...
21) \(-3, 18, -108, 648, \ldots\)  

22) \(4, -24, 144, -864, \ldots\) 

Determine if the sequence is arithmetic. If it is, find the term named in the problem. 

23) \(3, 6, 11, 18, \ldots\) Find \(a_{22}\) 

24) \(-4, -104, -204, -304, \ldots\) Find \(a_{20}\) 

Determine if the sequence is geometric. If it is, find the term named in the problem. 

25) \(4, 8, 16, 32, \ldots\) Find \(a_9\) 

26) \(1, 2, 4, 8, \ldots\) Find \(a_{10}\) 

Given the first term and the common difference of an arithmetic sequence find the explicit formula. 

27) \(a_1 = 22, \ d = 3\) 

28) \(a_1 = 22, \ d = -200\) 

29) \(a_1 = 30, \ d = 8\) 

30) \(a_1 = 32, \ d = -5\) 

Given the first term and the common ratio of a geometric sequence find the explicit formula. 

31) \(a_1 = -1, \ r = -2\) 

32) \(a_1 = -2, \ r = -6\) 

33) \(a_1 = 4, \ r = -4\) 

34) \(a_1 = -3, \ r = -6\) 

Find the missing term or terms in each arithmetic sequence. 

35) \(\ldots, -39, \_, \_, \_, -45, \ldots\) 

36) \(\ldots, 6, \_, \_, 26, \ldots\) 

Find the missing term or terms in each geometric sequence. 

37) \(\ldots, -3, \_, -48, \ldots\) 

38) \(\ldots, 3, \_, \_, 375, \ldots\)
Perform the indicated operation.

39) \( g(x) = 2x - 4 \)
   \( f(x) = 2x + 4 \)
   Find \( g(8) + f(8) \)

40) \( g(n) = n - 3 \)
   \( h(n) = n + 1 \)
   Find \( g(h(-6)) \)

41) \( g(x) = 2x + 2 \)
   \( h(x) = 4x - 2 \)
   Find \( g(-2) \cdot h(-2) \)

42) \( g(n) = -n^2 + 2n \)
   \( f(n) = n - 5 \)
   Find \( g(-7) \div f(-7) \)

43) \( f(t) = t^2 - t \)
   \( g(t) = 2t - 5 \)
   Find \( f(g(t)) \)

44) \( g(x) = 4x + 3 \)
   \( f(x) = -3x + 1 \)
   Find \( g(f(x)) \)

45) \( g(n) = -n - 3 \)
   \( h(n) = n^2 - 5 \)
   Find \( g(n) + h(n) \)

46) \( h(x) = 2x - 4 \)
   \( g(x) = x^3 - 4x^2 \)
   Find \( h(x) + g(x) \)

Solve each equation.

47) \( \left| \frac{b}{4} \right| + 5 = 7 \)

48) \(-5 \left| -9a \right| = -45 \)

49) \( -10 + p = 6 = 12 \)

50) \( -8n - 1 = 15 \)

51) \( -b - 1 = 9 \)

52) \( 4 \left| p - 6 \right| - 7 = 41 \)

Solve each inequality.

53) \( r + 9 < 2 < 10 \)

54) \( 9 \left| a - 4 \right| < 108 \)

Solve each compound inequality and graph its solution.

55) \( -6 < n - 8 \leq -5 \)

56) \( -4 \leq 2 + x < 9 \)
4.3 Arithmetic and Geometric Sequences Worksheet

For each sequence, state if it is arithmetic, geometric, or neither.

1) 3, 15, 75, 375, 1875, ...
   Geometric

2) −405, 135, −45, 15, −5, ...
   Geometric

3) −3, −6, −12, −24, −48, ...
   Geometric

4) \( \frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \frac{1}{16}, \frac{1}{32}, \ldots \)
   Geometric

Find the common difference and the three terms in the sequence after the last one given.

5) −1, −31, −61, −91, ...
   Common Difference: \( d = −30 \)
   Next 3 terms: −121, −151, −181

6) 9, −191, −391, −591, ...
   Common Difference: \( d = −200 \)
   Next 3 terms: −791, −991, −1191

7) −12, −18, −24, −30, ...
   Common Difference: \( d = −6 \)
   Next 3 terms: −36, −42, −48

8) 35, 25, 15, 5, ...
   Common Difference: \( d = −10 \)
   Next 3 terms: −5, −15, −25

Find the common ratio and the three terms in the sequence after the last one given.

9) −1, −5, −25, −125, ...
   Common Ratio: \( r = 5 \)
   Next 3 terms: −625, −3125, −15625

10) −4, 16, −64, 256, ...
    Common Ratio: \( r = 4 \)
    Next 3 terms: −1024, 4096, −16384

11) 2, 6, 18, 54, ...
    Common Ratio: \( r = 3 \)
    Next 3 terms: 162, 486, 1458

12) 2, 4, 8, 16, ...
    Common Ratio: \( r = 2 \)
    Next 3 terms: 32, 64, 128

Find the recursive formula.

13) −15, −115, −215, −315, ...
    \( a_n = a_{n-1} − 100 \)
    \( a_1 = −15 \)

14) 40, 35, 30, 25, ...
    \( a_n = a_{n-1} − 5 \)
    \( a_1 = 40 \)

15) 3, −15, 75, −375, ...
    \( a_n = a_{n-1} − 5 \)
    \( a_1 = 3 \)

16) −1, 6, −36, 216, ...
    \( a_n = a_{n-1} − 6 \)
    \( a_1 = −1 \)

Find the explicit formula.

17) 37, 41, 45, 49, ...
    \( a_n = 33 + 4n \)

18) −35, −235, −435, −635, ...
    \( a_n = 165 − 200n \)

19) 34, 54, 74, 94, ...
    \( a_n = 14 + 20n \)

20) 2, 12, 72, 432, ...
    \( a_n = 2 \cdot 6^{n-1} \)
21) $-3, 18, -108, 648, ...$
   \[ a_n = -3 \cdot (-6)^{n-1} \]

22) $4, -24, 144, -864, ...$
   \[ a_n = 4 \cdot (-6)^{n-1} \]

Determine if the sequence is arithmetic. If it is, find the term named in the problem.

23) $3, 6, 11, 18, ...$
   Find $a_{22}$
   
   Not arithmetic

24) $-4, -104, -204, -304, ...$
   Find $a_{20}$
   
   $a_{20} = -1904$

Determine if the sequence is geometric. If it is, find the term named in the problem.

25) $4, 8, 16, 32, ...$
   Find $a_9$
   
   $a_9 = 1024$

26) $1, 2, 4, 8, ...$
   Find $a_{10}$
   
   $a_{10} = 512$

Given the first term and the common difference of an arithmetic sequence find the explicit formula.

27) $a_1 = 22, \ d = 3$
   \[ a_n = 22 + (n - 1) \cdot 3 \]

28) $a_1 = 22, \ d = -200$
   \[ a_n = 22 + (n - 1) \cdot -200 \]

29) $a_1 = 30, \ d = 8$
   \[ a_n = 30 + (n - 1) \cdot 8 \]

30) $a_1 = 32, \ d = -5$
   \[ a_n = 32 + (n - 1) \cdot -5 \]

Given the first term and the common ratio of a geometric sequence find the explicit formula.

31) $a_1 = -1, \ r = -2$
   \[ a_n = (-2)^{n-1} \]

32) $a_1 = -2, \ r = -6$
   \[ a_n = -2 \cdot (-6)^{n-1} \]

33) $a_1 = 4, \ r = -4$
   \[ a_n = 4 \cdot (-4)^{n-1} \]

34) $a_1 = -3, \ r = -6$
   \[ a_n = -3 \cdot (-6)^{n-1} \]

Find the missing term or terms in each arithmetic sequence.

35) ..., $-39, \ ___, \ ___, \ -45, ...$
   $-41, \ -43$

36) ..., $6, \ ___, \ 26, ...$
   16

Find the missing term or terms in each geometric sequence.

37) ..., $-3, \ ___, \ -48, ...$
   $-12$

38) ..., $3, \ ___, \ ___, \ 375, ...$
   15, 75
Perform the indicated operation.

39) \( g(x) = 2x - 4 \)
   \( f(x) = 2x + 4 \)
   Find \( g(8) + f(8) \)
   \( 32 \)

40) \( g(n) = n - 3 \)
   \( h(n) = n + 1 \)
   Find \( g(h(-6)) \)
   \(-8 \)

41) \( g(x) = 2x + 2 \)
   \( h(x) = 4x - 2 \)
   Find \( g(-2) \cdot h(-2) \)
   \( 20 \)

42) \( g(n) = -n^2 + 2n \)
   \( f(n) = n - 5 \)
   Find \( g(-7) \div f(-7) \)
   \( \frac{21}{4} \)

43) \( f(t) = t^2 - t \)
   \( g(t) = 2t - 5 \)
   Find \( f(g(t)) \)
   \( 4t^2 - 22t + 30 \)

44) \( g(x) = 4x + 3 \)
   \( f(x) = -3x + 1 \)
   Find \( g(f(x)) \)
   \(-12x + 7 \)

45) \( g(n) = -n - 3 \)
   \( h(n) = n^2 - 5 \)
   Find \( g(n) + h(n) \)
   \( n^2 - n - 8 \)

46) \( h(x) = 2x - 4 \)
   \( g(x) = x^3 - 4x^2 \)
   Find \( h(x) + g(x) \)
   \( x^3 - 4x^2 + 2x - 4 \)

Solve each equation.

47) \( \left| \frac{b}{4} \right| + 5 = 7 \)
   \( \text{Solutions: } \{8, -8\} \)

48) \( -5|9a| = -45 \)
   \( \text{Solutions: } \{-1, 1\} \)

49) \( -10 + p |-6 = 12 \)
   \( \text{Solutions: } \{28, -8\} \)

50) \( -8n - 1 \)
   \( \text{Solutions: } \{-2, \frac{7}{4}\} \)

51) \( -|b - 1| = 9 \)
   \( \text{Solutions: } \{-10, 8\} \)

52) \( 4|p - 6| - 7 = 41 \)
   \( \text{Solutions: } \{18, -6\} \)

Solve each inequality.

53) \( |r + 9| - 2 < 10 \)
   \( -21 < r < 3 \)

54) \( 9|a - 4| < 108 \)
   \( -8 < a < 16 \)

Solve each compound inequality and graph its solution.

55) \( -6 < n - 8 \leq -5 \)
   \( 2 < n \leq 3 \)

56) \( -4 \leq 2 + x < 9 \)
   \( -6 \leq x < 7 \)