Arithmetic and Geometric Sequences, Series … Set 1

Arithmetic and Geometric Sequences

Find the three terms in the sequence after the last one given. Write a brief description of the pattern.

1) $-4,\ 1,\ 6,\ 11,$ _____, _____, _____

2) $0.6,\ 3,\ 15,\ 75,$ _____, _____, _____

3) $-4,\ -20,\ -100,\ -500,$ _____, _____, _____

4) $-37,\ -35,\ -33,\ -31,$ _____, _____, _____

5) $-2,\ -4,\ -8,\ -16,$ _____, _____, _____

6) $4,\ 3.7,\ 3.4,\ 3.1,$ _____, _____, _____

7) $-6,\ 14,\ 34,\ 54,$ _____, _____, _____

8) $-1,\ 4,\ -16,\ 64,$ _____, _____, _____

Sequences involving repeated addition or subtraction are known as Arithmetic. (Think of subtraction as adding a negative number and these can all be written as addition patterns.)

9) Go back and circle the problem numbers in the above sequences (1-8) which represent Arithmetic sequences.

10) $23,\ 26,\ 29,\ 32,\ \ldots$

a) Find the common difference.

b) Write an explicit formula for the sequence

c) Find a_{37}

11) $10,\ 1,\ -8,\ -17,\ \ldots$

a) Find the common difference.

b) Write an explicit formula for the sequence

c) Find a_{31}

Answers

Arithmetic and Geometric Sequences

Find the three terms in the sequence after the last one given. Write a brief description of the pattern.

1) −4, 1, 6, 11, _____, _____, _____
16, 21, 26

2) 0.6, 3, 15, 75, _____, _____, _____
375, 1875, 9375

3) −4, −20, −100, −500, _____, _____, _____
−2500, −12500, −62500

4) −37, −35, −33, −31, _____, _____, _____
−29, −27, −25

5) −2, −4, −8, −16, _____, _____, _____
−32, −64, −128

6) 4, 3.7, 3.4, 3.1, _____, _____, _____
2.8, 2.5, 2.2

7) −6, 14, 34, 54, _____, _____, _____
74, 94, 114

8) −1, 4, −16, 64, _____, _____, _____
−256, 1024, −4096

Sequences involving repeated addition or subtraction are known as Arithmetic. (Think of subtraction as adding a negative number and these can all be written as addition patterns.)

9) Go back and circle the problem numbers in the above sequences (1-8) which represent Arithmetic sequences.

10) 23, 26, 29, 32, ...

Common Difference: $d = 3$
$a_{37} = 131$
Explicit: $a_n = 20 + 3n$

a) Find the common difference.

b) Write an explicit formula for the sequence

c) Find a_{37}

11) 10, 1, −8, −17, ...

Common Difference: $d = -9$
$a_{31} = -260$
Explicit: $a_n = 10 + (n-1) \cdot -9$

a) Find the common difference.

b) Write an explicit formula for the sequence

c) Find a_{31}

Arithmetic and Geometric Sequences, Series … Set 1

Find the common difference, the explicit formula, and the term named in the problem.

12) 31, −69, −169, −269, ...
Find a_{40}

13) −22, −222, −422, −622, ...
Find a_{32}

14) 12, 16, 20, 24, ...
Find a_{30}

15) 0, −4, −8, −12, ...
Find a_{31}

16) −10, −30, −50, −70, ...
Find a_{21}

17) 11, 20, 29, 38, ...
Find a_{34}

18) −38, −36, −34, −32, ...
Find a_{21}

19) 40, −160, −360, −560, ...
Find a_{23}

20) 14, 24, 34, 44, ...
Find a_{31}

21) 22, 52, 82, 112, ...
Find a_{36}

Arithmetic and Geometric Sequences, Series … Set 1

Answers

Find the common difference, the explicit formula, and the term named in the problem.

12) 31, −69, −169, −269, ...
Find a_{40}

Common Difference: $d = -100$
$a_{40} = -3869$
Explicit: $a_n = 31 + (n-1) \cdot -100$

13) −22, −222, −422, −622, ...
Find a_{32}

Common Difference: $d = -200$
$a_{32} = -6222$
Explicit: $a_n = -22 + (n-1) \cdot -200$

14) 12, 16, 20, 24, ...
Find a_{30}

Common Difference: $d = 4$
$a_{30} = 128$
Explicit: $a_n = 12 + (n-1) \cdot 4$

15) 0, −4, −8, −12, ...
Find a_{31}

Common Difference: $d = -4$
$a_{31} = -120$
Explicit: $a_n = 0 + (n-1) \cdot -4$

16) −10, −30, −50, −70, ...
Find a_{21}

Common Difference: $d = -20$
$a_{21} = -410$
Explicit: $a_n = -10 + (n-1) \cdot -20$

17) 11, 20, 29, 38, ...
Find a_{34}

Common Difference: $d = 9$
$a_{34} = 308$
Explicit: $a_n = 11 + (n-1) \cdot 9$

18) −38, −36, −34, −32, ...
Find a_{21}

Common Difference: $d = 2$
$a_{21} = 2$
Explicit: $a_n = -38 + (n-1) \cdot 2$

19) 40, −160, −360, −560, ...
Find a_{23}

Common Difference: $d = -200$
$a_{23} = -4360$
Explicit: $a_n = 40 + (n-1) \cdot -200$

20) 14, 24, 34, 44, ...
Find a_{31}

Common Difference: $d = 10$
$a_{31} = 314$
Explicit: $a_n = 14 + (n-1) \cdot 10$

21) 22, 52, 82, 112, ...
Find a_{36}

Common Difference: $d = 30$
$a_{36} = 1072$
Explicit: $a_n = 22 + (n-1) \cdot 30$

Arithmetic and Geometric Sequences, Series … Set 1

Sequences involving repeated multiplication or division are known as Geometric. (Think of division as multiplying by a fraction and these can all be written as multiplication patterns.)

22) Go back and look at questions 1-8. Those sequences that you did not circle for question #9 should all be Geometric.

23) $-4,\ 8,\ -16,\ 32, \ldots$

a) Find the common ratio.

b) Write an explicit formula for the sequence

c) Find a_{10}

24) $32,\ 16,\ 8,\ 4, \ldots$

a) Find the common ratio.

b) Write an explicit formula for the sequence

c) Find a_{10}

Arithmetic and Geometric Sequences, Series … Set 1

Answers

Sequences involving repeated multiplication or division are known as Geometric. (Think of division as multiplying by a fraction and these can all be written as multiplication patterns.)

22) Go back and look at questions 1-8. Those sequences that you did not circle for question #9 should all be Geometric.

23) $-4,\ 8,\ -16,\ 32, \ldots$

a) Find the common ratio.

b) Write an explicit formula for the sequence

c) Find a_{10}

Common Ratio: $r = -2$

$a_{10} = 2048$

Explicit: $a_n = -4 \cdot (-2)^{n-1}$

24) $32,\ 16,\ 8,\ 4, \ldots$

Common Ratio: $r = \frac{1}{2}$

$a_{10} = \frac{1}{16}$

Explicit: $a_n = 32 \cdot \left(\frac{1}{2}\right)^{n-1}$

a) Find the common ratio.

b) Write an explicit formula for the sequence

c) Find a_{10}

Arithmetic and Geometric Sequences, Series … Set 1

Find the common ratio, the explicit formula, and the term named in the problem.

25) $-1, -2, -4, -8, \ldots$
Find a_{11}

26) $-\frac{1}{2}, -\frac{1}{4}, -\frac{1}{8}, -\frac{1}{16}, \ldots$
Find a_{10}

27) $-2, 6, -18, 54, \ldots$
Find a_{12}

28) $4, 8, 16, 32, \ldots$
Find a_{10}

29) $-0.75, -3, -12, -48, \ldots$
Find a_9

30) $0.5, -1, 2, -4, \ldots$
Find a_{11}

31) $-2, 10, -50, 250, \ldots$
Find a_9

32) $4, 16, 64, 256, \ldots$
Find a_9

33) $-0.5, 1, -2, 4, \ldots$
Find a_{12}

34) $-1, -\frac{1}{2}, -\frac{1}{4}, -\frac{1}{8}, \ldots$
Find a_{11}

Arithmetic and Geometric Sequences, Series … Set 1

Answers

Find the common ratio, the explicit formula, and the term named in the problem.

25) $-1, -2, -4, -8, \ldots$
Find a_{11}

Common Ratio: $r = 2$
$a_{11} = -1024$
Explicit: $a_n = -2^{n-1}$

26) $-\frac{1}{2}, -\frac{1}{4}, -\frac{1}{8}, -\frac{1}{16}, \ldots$
Find a_{10}

Common Ratio: $r = \frac{1}{2}$
$a_{10} = -\frac{1}{1024}$
Explicit: $a_n = -\frac{1}{2} \cdot \left(\frac{1}{2}\right)^{n-1}$

27) $-2, 6, -18, 54, \ldots$
Find a_{12}

Common Ratio: $r = -3$
$a_{12} = 354294$
Explicit: $a_n = -2 \cdot (-3)^{n-1}$

28) $4, 8, 16, 32, \ldots$
Find a_{10}

Common Ratio: $r = 2$
$a_{10} = 2048$
Explicit: $a_n = 4 \cdot 2^{n-1}$

29) $-0.75, -3, -12, -48, \ldots$
Find a_9

Common Ratio: $r = 4$
$a_9 = -49152$
Explicit: $a_n = -0.75 \cdot 4^{n-1}$

30) $0.5, -1, 2, -4, \ldots$
Find a_{11}

Common Ratio: $r = -2$
$a_{11} = 512$
Explicit: $a_n = 0.5 \cdot (-2)^{n-1}$

31) $-2, 10, -50, 250, \ldots$
Find a_9

Common Ratio: $r = -5$
$a_9 = -781250$
Explicit: $a_n = -2 \cdot (-5)^{n-1}$

32) $4, 16, 64, 256, \ldots$
Find a_9

Common Ratio: $r = 4$
$a_9 = 262144$
Explicit: $a_n = 4 \cdot 4^{n-1}$

33) $-0.5, 1, -2, 4, \ldots$
Find a_{12}

Common Ratio: $r = -2$
$a_{12} = 1024$
Explicit: $a_n = -0.5 \cdot (-2)^{n-1}$

34) $-1, -\frac{1}{2}, -\frac{1}{4}, -\frac{1}{8}, \ldots$
Find a_{11}

Common Ratio: $r = \frac{1}{2}$
$a_{11} = -\frac{1}{1024}$
Explicit: $a_n = -\left(\frac{1}{2}\right)^{n-1}$