

10-1 Sequences as Functions

Determine whether each sequence is arithmetic
no.

1. 8, -2, -12, -22

ANSWER:

Yes

2. -19, -12, -5, 2, 9

ANSWER:

Yes

3. 1, 2, 4, 8, 16

ANSWER:

No

4. 0.6, 0.9, 1.2, 1.8, ...

ANSWER:

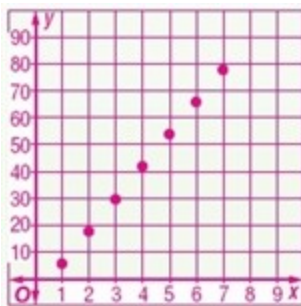
No

Find the next four terms of each arithmetic
sequence. Then graph the sequence.

5. 6, 18, 30, ...

ANSWER:

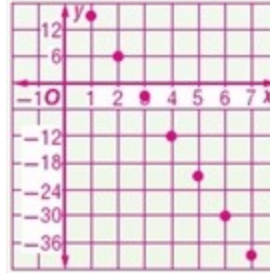
42, 54, 66, 78



6. 15, 6, -3, ...

ANSWER:

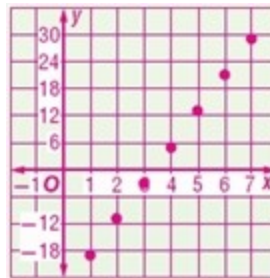
-12, -21, -30, -39



7. -19, -11, -3, ...

ANSWER:

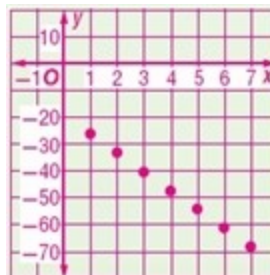
5, 13, 21, 29



8. -26, -33, -40, ...

ANSWER:

-47, -54, -61, -68



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9. **FINANCIAL LITERACY** Kelly is saving her money to buy a car. She has \$250, and she plans to save \$75 per week from her job as a waitress.

- a. How much will Kelly have saved after 8 weeks?
- b. If the car costs \$2000, how long will it take her to save enough money at this rate?

ANSWER:

a. \$850

b. 24 wk

Determine whether each sequence is geometric. Write *yes* or *no*.

10. $-8, -5, -1, 4, \dots$

ANSWER:

No

11. $4, 12, 36, 108, \dots$

ANSWER:

Yes

12. $27, 9, 3, 1, \dots$

ANSWER:

Yes

13. $7, 14, 21, 28, \dots$

ANSWER:

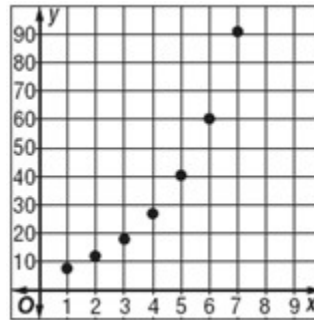
No

Find the next three terms of each geometric sequence. Then graph the sequence.

14. $8, 12, 18, 27, \dots$

ANSWER:

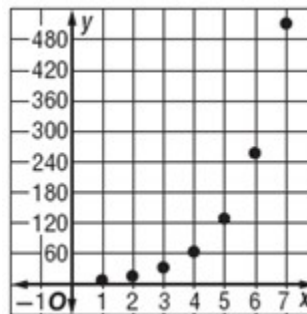
40.5, 60.75, 91.125



15. $8, 16, 32, 64, \dots$

ANSWER:

128, 256, 512

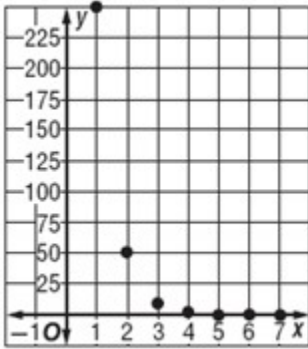


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16. 250, 50, 10, 2, ...

ANSWER:

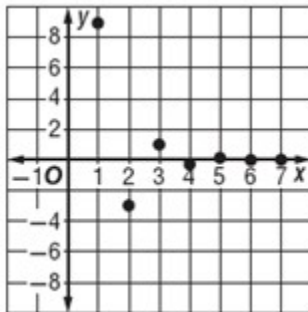
$$\frac{2}{5}, \frac{2}{25}, \frac{2}{125}$$



17. 9, -3, 1, $-\frac{1}{3}$, ...

ANSWER:

$$\frac{1}{9}, -\frac{1}{27}, \frac{1}{81}$$



Determine whether each sequence is arithmetic, geometric, or neither. Explain your reasoning.

18. 5, 1, 7, 3, 9, ...

ANSWER:

Neither; there is no common difference or ratio.

19. 200, -100, 50, -25, ...

ANSWER:

Geometric; the common ratio is $-\frac{1}{2}$.

20. 12, 16, 20, 24, ...

ANSWER:

Arithmetic; the common difference is 4.

Determine whether each sequence is arithmetic. Write *yes* or *no*.

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

ANSWER:

No

22. -9, -3, 0, 3, 9

ANSWER:

No

23. 14, -5, -19, ...

ANSWER:

No

24. $\frac{2}{9}, \frac{5}{9}, \frac{8}{9}, \frac{11}{9}, \dots$

ANSWER:

Yes

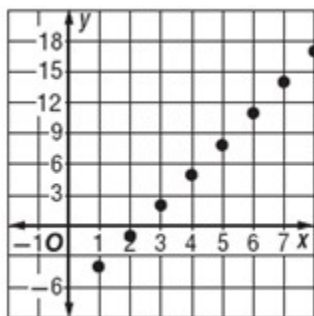
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Find the next four terms of each arithmetic sequence. Then graph the sequence.

25. $-4, -1, 2, 5, \dots$

ANSWER:

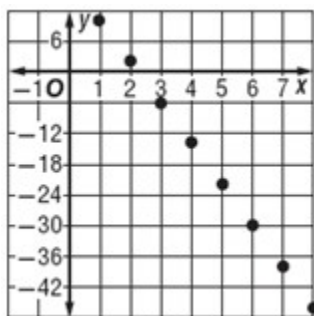
$8, 11, 14, 17$



26. $10, 2, -6, -14, \dots$

ANSWER:

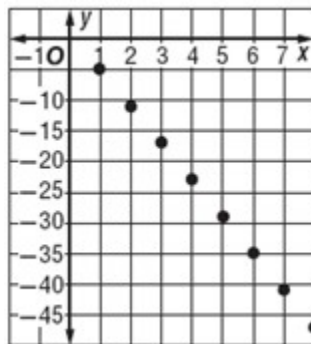
$-22, -30, -38, -46$



27. $-5, -11, -17, -23, \dots$

ANSWER:

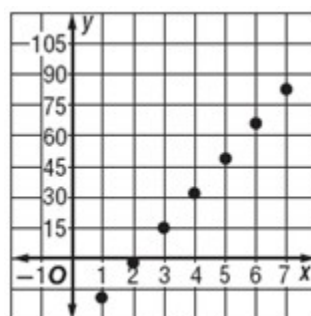
$-29, -35, -41, -47$



28. $-19, -2, 15, \dots$

ANSWER:

$32, 49, 66, 83$

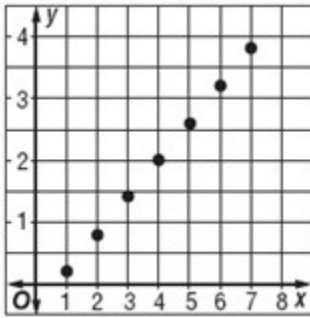


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29. $\frac{1}{5}, \frac{4}{5}, \frac{7}{5}, \dots$

ANSWER:

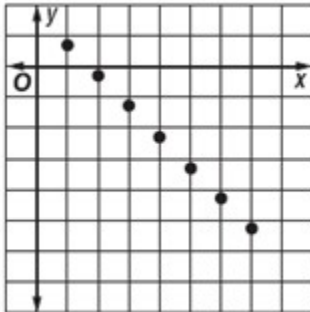
$$2, \frac{13}{5}, \frac{16}{5}, \frac{19}{5}$$



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

ANSWER:

$$\frac{7}{3}, -\frac{10}{3}, -\frac{13}{3}, -\frac{16}{3}$$



31. **THEATER** There are 28 seats in the front row of a theater. Each successive row contains two more seats than the previous row. If there are 24 rows, how many seats are in the last row of the theater?

ANSWER:

74

32. **CCSS SENSE-MAKING** Mario began an exercise program to get back in shape. He plans to row 5 minutes on his rowing machine the first day and increase his rowing time by one minute and thirty seconds each day.

a. How long will he row on the 18th day?

b. On what day will Mario first row an hour or more?

c. Is it reasonable for this pattern to continue indefinitely? Explain.

ANSWER:

a. 30 minutes and 30 seconds

b. on the 38th day

c. Sample answer: It is unreasonable because there are only so many hours in the day that can be dedicated to rowing.

Determine whether each sequence is geometric. Write *yes* or *no*.

33. 21, 14, 7, ...

ANSWER:

No

34. 124, 186, 248, ...

ANSWER:

No

35. -27, 18, -12, ...

ANSWER:

Yes

10-1 Sequences as Functions

36. 162, 108, 72, ...

ANSWER:

Yes

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

ANSWER:

No

38. -4, -2, 0, 2, ...

ANSWER:

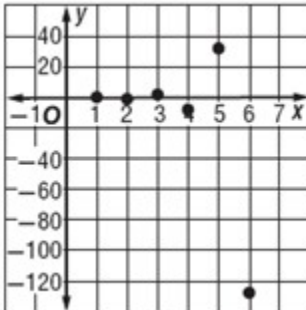
No

**Find the next three terms of the sequence.
Then graph the sequence.**

39. 0.125, -0.5, 2, ...

ANSWER:

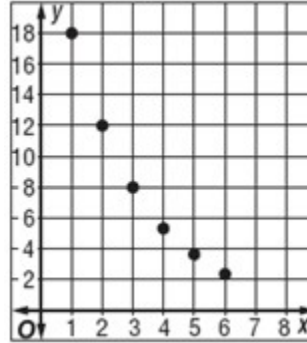
- 8, 32, -128



40. 18, 12, 8, ...

ANSWER:

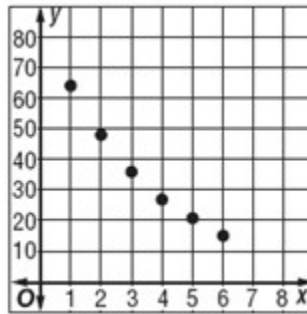
$$\frac{16}{3}, \frac{32}{9}, \frac{64}{27}$$



41. 64, 48, 36, ...

ANSWER:

$$27, \frac{81}{4}, \frac{243}{16}$$

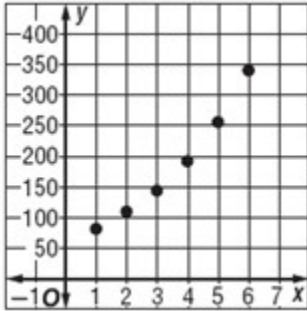


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42. 81, 108, 144, ...

ANSWER:

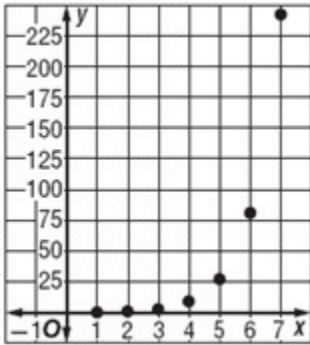
$$192, 256, \frac{1024}{3}$$



43. $\frac{1}{3}, 1, 3, 9, \dots$

ANSWER:

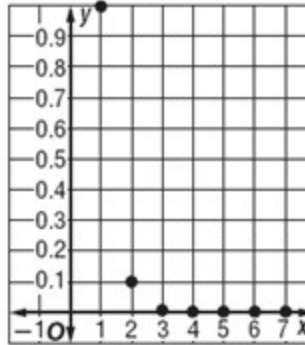
27, 81, 243



44. 1, 0.1, 0.01, 0.001, ...

ANSWER:

0.0001, 0.00001, 0.000001



Determine whether each sequence is arithmetic, geometric, or neither. Explain your reasoning.

45. 3, 12, 27, 48, ...

ANSWER:

Neither; there is no common difference or ratio.

46. 1, -2, -5, -8, ...

ANSWER:

Arithmetic; the common difference is -3.

47. 12, 36, 108, 324, ...

ANSWER:

Geometric; the common ratio is 3.

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48. $-\frac{2}{5}, -\frac{2}{25}, -\frac{2}{125}, -\frac{2}{625}, \dots$

ANSWER:

Geometric; the common ratio is $\frac{1}{5}$.

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

ANSWER:

Arithmetic; the common difference is $\frac{1}{2}$.

50. 6, 9, 14, 21, ...

ANSWER:

Neither; there is no common difference or ratio.

51. **READING** Sareeta took an 800-page book on vacation. If she was already on page 112 and is going to be on vacation for 8 days, what is the minimum number of pages she needs to read per day to finish the book by the end of her vacation?

ANSWER:

86 pg/day

52. **DEPRECIATION** Tammy's car is expected to depreciate at a rate of 15% per year. If her car is currently valued at \$24,000, to the nearest dollar, how much will it be worth in 6 years?

ANSWER:

\$9052

53. **CCSS REGULARITY** When a piece of paper is folded onto itself, it doubles in thickness. If a piece of paper that is 0.1 mm thick could be folded 37 times, how thick would it be?

ANSWER:

about 13,744 km

54. **REASONING** Explain why the sequence 8, 10, 13, 17, 22 is not arithmetic.

ANSWER:

Sample answer: The consecutive terms do not share a common difference. For instance, $22 - 17 = 5$, while $17 - 13 = 4$.

55. **OPEN ENDED** Describe a real-life situation that can be represented by an arithmetic sequence with a common difference of 8.

ANSWER:

Sample answer: A babysitter earns \$20 for cleaning the house and \$8 extra for every hour she watches the children.

56. **CHALLENGE** The sum of three consecutive terms of an arithmetic sequence is 6. The product of the terms is -42 . Find the terms.

ANSWER:

$-3, 2, 7$

10-1 Sequences as Functions

57. **ERROR ANALYSIS** Brody and Gen are determining whether the sequence $8, 8, 8, \dots$ is *arithmetic, geometric, neither, or both*. Is either of them correct? Explain your reasoning.

<p>Brody</p> <p>The sequence has a common difference of 0. The sequence is arithmetic.</p>
<p>Gen</p> <p>The sequence has a common ratio of 1. The sequence is geometric.</p>

ANSWER:

Sample answer: Neither; the sequence is both arithmetic and geometric.

58. **OPEN ENDED** Find a geometric sequence, an arithmetic sequence, and a sequence that is neither geometric nor arithmetic that begins $3, 9, \dots$.

ANSWER:

Sample answer: geometric: $3, 9, 27, 81, 243, \dots$
arithmetic: $3, 9, 15, 21, 27, \dots$ neither geometric nor arithmetic: $3, 9, 21, 45, 93, \dots$

59. **REASONING** If a geometric sequence has a ratio r such that $|r| < 1$, what happens to the terms as n increases? What would happen to the terms if $|r| \geq 1$?

ANSWER:

Sample answer: If a geometric sequence has a ratio r such that $|r| < 1$, as n increases, the absolute value of the terms will decrease and approach zero because they are continuously being multiplied by a fraction. When $|r| \geq 1$, the absolute value of the terms will increase and approach infinity because they are continuously being multiplied by a value greater than 1.

60. **WRITING IN MATH** Describe what happens to the terms of a geometric sequence when the common ratio is doubled. What happens when it is halved? Explain your reasoning.

ANSWER:

Sample answer: When the value of r is doubled, a_2 doubles, a_3 quadruples, a_4 is multiplied by 8, a_5 is multiplied by 2^4 or 16, and so on. So, the new terms are $a_n = a_n \cdot 2^{n-1}$. When the value of r is halved, the new terms are $a_n = a_n \cdot \left(\frac{1}{2}\right)^{n-1}$.

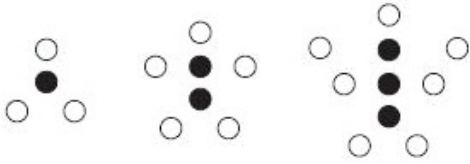
61. **SHORT RESPONSE** Mrs. Aguilar's rectangular bedroom measures 13 feet by 11 feet. She wants to purchase carpet for the bedroom that costs \$2.95 per square foot, including tax. How much will it cost to carpet her bedroom?

ANSWER:

\$421.85

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62. The pattern of filled circles and white circles below can be described by a relationship between two variables.



Which rule relates w , the number of white circles, to f , the number of dark circles?

A $w = 3f$

B $f = \frac{1}{2}w - 1$

C $w = 2f + 1$

D $f = \frac{1}{3}w$

ANSWER:
C

63. **SAT/ACT** Donna wanted to determine the average of her six test scores. She added the scores correctly to get T , but divided by 7 instead of 6. Her average was 12 less than the actual average. Which equation could be used to determine the value of T ?

F $6T + 12 = 7T$

G $\frac{T}{7} = \frac{T-12}{6}$

H $\frac{T}{7} + 12 = \frac{T}{6}$

J $\frac{T}{6} = \frac{T-12}{7}$

K $\frac{T}{6} = 12 - \frac{T}{7}$

ANSWER:
H

64. Find the next term in the geometric sequence $8, 6, \frac{9}{2}, \frac{27}{8}, \dots$.

A $\frac{11}{8}$

B $\frac{27}{16}$

C $\frac{9}{4}$

D $\frac{81}{32}$

ANSWER:
D

Solve each system of equations.

65.
$$\begin{aligned} y &= 5 \\ y^2 &= x^2 + 9 \end{aligned}$$

ANSWER:
 $(\pm 4, 5)$

66.
$$\begin{aligned} y - x &= 1 \\ x^2 + y^2 &= 25 \end{aligned}$$

ANSWER:
 $(-4, -3), (3, 4)$

67.
$$\begin{aligned} 3x &= 8y^2 \\ 8y^2 - 2x^2 &= 16 \end{aligned}$$

ANSWER:
no solution

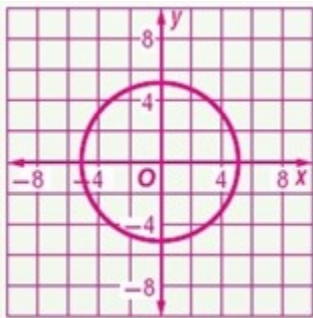
10-1 Sequences as Functions

Write each equation in standard form. State whether the graph of the equation is a *parabola*, *circle*, *ellipse*, or *hyperbola*. Then graph the equation.

68. $6x^2 + 6y^2 = 162$

ANSWER:

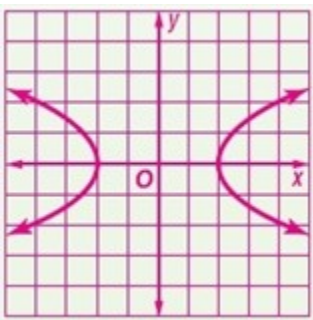
circle; $x^2 + y^2 = 27$



69. $4y^2 - x^2 + 4 = 0$

ANSWER:

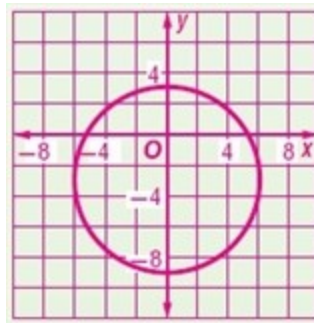
hyperbola; $\frac{x^2}{4} - \frac{y^2}{1} = 1$



70. $x^2 + y^2 + 6y + 13 = 40$

ANSWER:

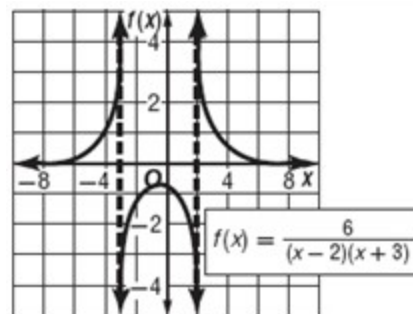
circle; $x^2 + (y + 3)^2 = 36$



Graph each function.

71. $f(x) = \frac{6}{(x-2)(x+3)}$

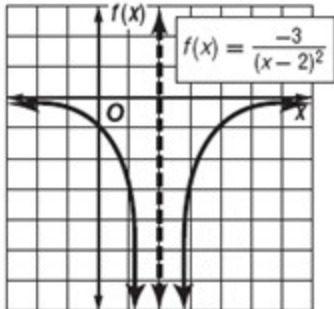
ANSWER:



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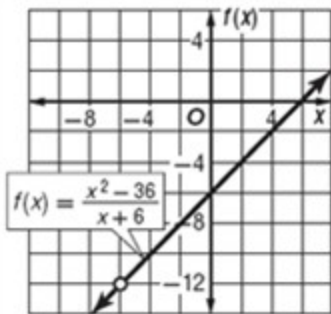
72. $f(x) = \frac{-3}{(x-2)^2}$

ANSWER:



73. $f(x) = \frac{x^2 - 36}{x + 6}$

ANSWER:



74. **HEALTH** A certain medication is eliminated from the bloodstream at a steady rate. It decays according to the equation $y = ae^{-0.1625t}$, where t is in hours. Find the half-life of this substance.

ANSWER:

about 4.27 hours

Write an equation of each line.

75. passes through (6, 4), $m = 0.5$

ANSWER:

$$y = 0.5x + 1$$

76. passes through $(2, \frac{1}{2})$, $m = -\frac{3}{4}$

ANSWER:

$$y = -\frac{3}{4}x + 2$$

77. passes through (0, -6), $m = 3$

ANSWER:

$$y = 3x - 6$$

78. passes through (0, 4), $m = \frac{1}{4}$

ANSWER:

$$y = \frac{1}{4}x + 4$$

79. passes through (1, 3) and $(8, -\frac{1}{2})$

ANSWER:

$$y = -\frac{1}{2}x + \frac{7}{2}$$

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80. passes through $(-5, 1)$ and $(5, 16)$

ANSWER:

$$y = \frac{3}{2}x + \frac{17}{2}$$