

Bell Ringer

Wednesday 10/2

On your graphing calculator, create a scatter plot of the data in the table.

x	-4	-3	-2	-1	0	1	2	3	4
y	13	11	8	6	3	0	-4	-8	-10

Is the line $y = -3x + 2$ a good fit for the data? Hint: Graph the line with the scatter plot and check your residuals.

Yes! Resids are close to line & evenly dispersed

On your graphing calculator, create a scatter plot of the data in the table.

x	0	1	2	3	4	5	6	7	8
y	2	0	-3	-5	-7	-6	-4	-3	-1

Is the line $y = -0.5x + 1$ a good fit for the data? Hint: Graph the line with the scatter plot and check your residuals.

No, resids not evenly dispersed, form a pattern \rightarrow non-linear trend

correct Lines of Best fit ws

Name Key Hour _____ 4.4 Day 2 Lines of Best Fit

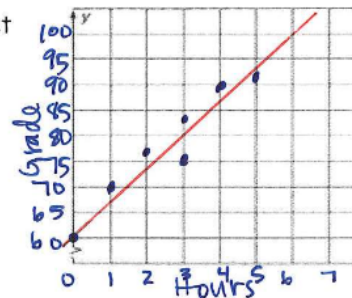
1. Explain the difference between a trend line and a line of best fit.
 Line of Best fit: Line of Best fit: The most accurate trendline. Calculated.
 Trendline: eye-balled
2. The table shows number of hours spent studying for a science test and final test score.

Study Hours	3	2	5	1	0	4	3
Grade	84	77	92	70	60	90	75

- a. Draw a scatter plot of the data and a line of fit (trend line).
- b. Write a **linear function** for the line of BEST fit and interpret the correlation coefficient. Is the line a good fit? Explain.

$$y = 6.3x + 62$$

Yes, $r = .956$ which is a strong r



- c. Predict the grade of a student who studied 6 hours.
 $y = 6.3(6) + 62 = 99.8$
- d. Is this interpolation or extrapolation?

Extrapolation - outside given data values

3. The table shows the average and maximum longevity of various animals in captivity.

Longevity (years)							
Avg.	12	25	15	8	35	40	20
Max.	47	50	40	20	70	77	54

- a. Draw a scatter plot and determine what relationship, if any, exists in the data.

positive correlation

- b. Draw a line of fit (trend line) for the scatterplot, then use your calculator to write the linear function of the line of BEST fit and interpret the correlation coefficient.

$$y = 1.22x + 22.4$$

- c. Is the line a good fit? Explain.

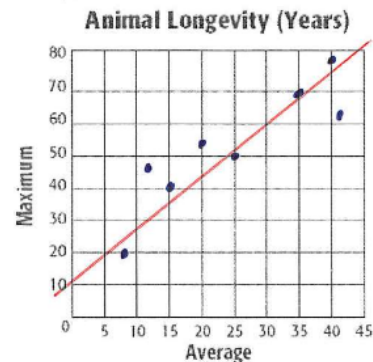
Yes, $r = .881$ which is fairly strong

- d. Predict the maximum longevity for an animal with an average longevity of 33 years.

$$y = 1.22(33) + 22.4 = 62.66$$

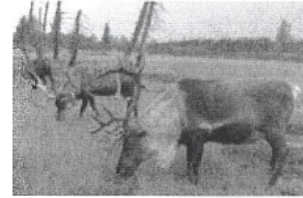
- e. Is this interpolation or extrapolation?

Interpolation - within known data values



4. A herd of caribou moved to a small remote island where they had no predators. Data on the population of the herd was collected for 6 years.

Time (years)	0	1	2	3	4	5	6
Population	24	35	51	74	104	151	225



😊 a. Write the equation for the line of best fit.

$$y = 31.7x - 0.29$$

b. Identify and interpret the correlation coefficient, r .

$$r = 0.95$$

c. Is the line a good fit for the data? Explain

Yes, high correlation coefficient (strong positive)

😊 d. Using the equation that best fits the data, predict how many caribou there will be in 9 years.

$$y = 31.7(9) - 0.29 \approx 285 \text{ caribou}$$

e. Is this interpolation or extrapolation?

Extrapolation (outside known data values)

5. Use the data in the table to answer the questions.

x	1	1	2	5	4	4	3	6
y	9	3	8	4	3	2	6	8

a. Write the equation for the line of best fit.

$$y = -0.24x + 0.17$$

😊 b. Identify and interpret the correlation coefficient, r .

$$r = -0.165, \text{ not strong - super weak!}$$

c. Is the line a good fit for the data? Explain

😊 No, weak negative correlation - almost no correlation

d. Using the equation that best fits the data, predict y when x is 3.

$$y = -0.24(3) + 0.17 = 5.45$$

e. Is this interpolation or extrapolation?

Interpolation (within known data values)

Essential Question

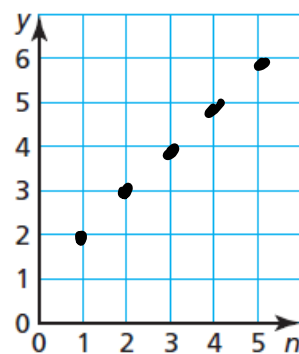
How can you use an arithmetic sequence to describe a pattern?

Use the figures to complete the table. Plot the points given by your completed table. Describe the pattern of the y-values.

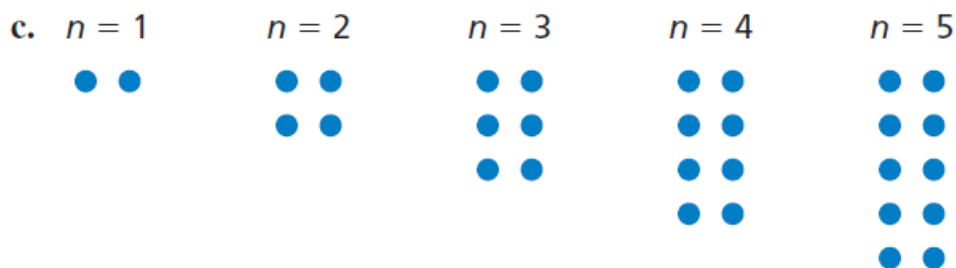
b. $n = 1$ $n = 2$ $n = 3$ $n = 4$ $n = 5$



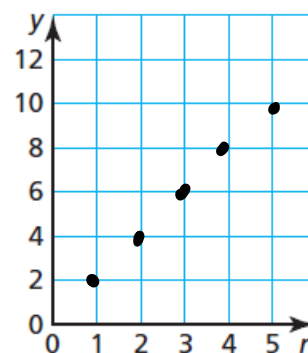
n	1	2	3	4	5
Number of circles, y	2	3	4	5	6



Use the figures to complete the table. Plot the points given by your completed table. Describe the pattern of the y-values.



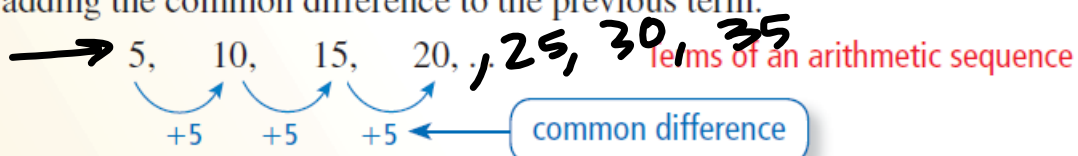
Number of rows, n	1	2	3	4	5
Number of dots, y	2	4	6	8	10



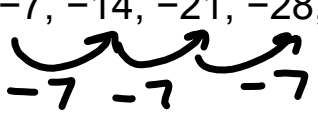
Core Concept

Arithmetic Sequence

In an **arithmetic sequence**, the difference between each pair of consecutive terms is the same. This difference is called the **common difference**. Each term is found by adding the common difference to the previous term.



Write the next three terms of the arithmetic sequence.

1. $-7, -14, -21, -28, \dots, -35, -42, -49, \dots$ $d = -7$


2. $-12, 0, 12, 24, \dots, 36, 48, 60$ $d = 12$

3. $0.2, 0.6, 1, 1.4, \dots, 1.8, 2.2, 2.6$ $d = 0.4$

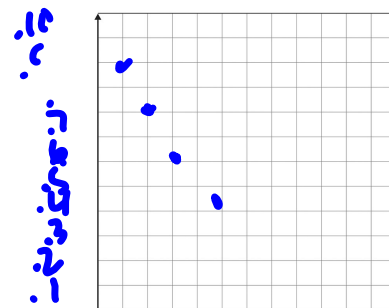
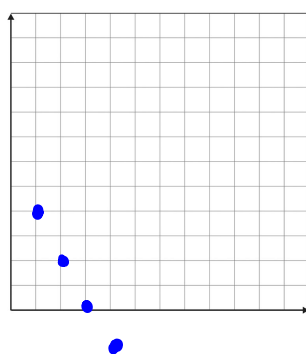
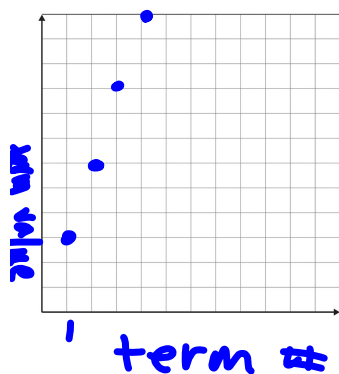
4. $4, 3\frac{3}{4}, 3\frac{1}{2}, 3\frac{1}{4}, \dots, 3, 2\frac{3}{4}, 2\frac{1}{2}, \dots$ $d = -\frac{1}{4}$

Graph each arithmetic sequence. What do you notice?

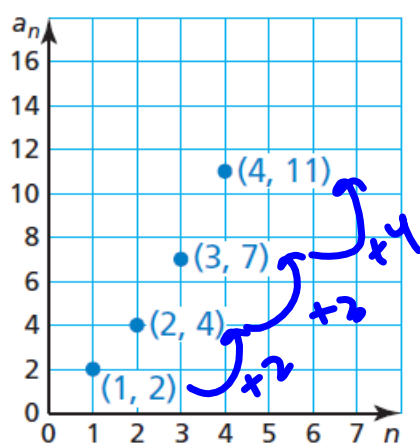
3, 6, 9, 12, ...

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

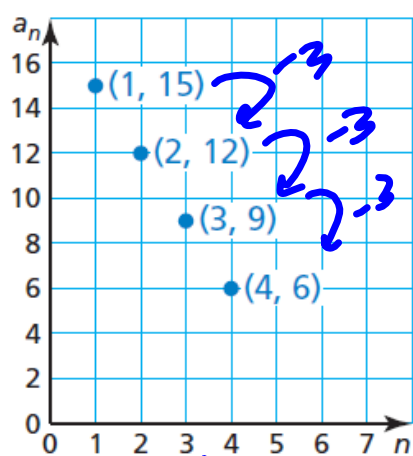
1, 0.8, 0.6, 0.4, ...



Do the graphs shown represent arithmetic sequences? Explain.



no



yes $d = -3$

Core Concept

Equation for an Arithmetic Sequence

Let a_n be the n th term of an arithmetic sequence with first term a_1 and common difference d . The n th term is given by

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

Explicit Formula (Eqn)

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

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

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

1st term "slope"

Write an equation for the n th term of the arithmetic sequence

$n: 1, 2, 3, 4$
 $a_n: 14, 11, 8, 5, \dots$

Then find a_{50} .

$$a_n = 14 + (n-1)(-3)$$

$$a_n = 14 - 3(n-1)$$

$$a_n = 14 - 3n + 3$$

$$a_n = -3n + 17$$

$$a_{50} = 14 - 3(50-1)$$

$$= 14 - 147$$

$$a_{50} = -133$$

$$a_1 = 14$$

$$a_2 = 11$$

$$a_3 = 8$$

$$a_4 = 5$$

n	a_n
1	14
2	11
3	8
4	5
⋮	
50	

$$\underline{a_n} = \underline{a_1} + \underline{(n-1)d}$$

explicit

Write an equation for the n th term of the arithmetic sequence.

Then find a_{25}

4, 5, 6, 7, ...



a_1 sub
 a_1

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

$$\boxed{a_n = 4 + 1(n-1)}$$

$$a_{25} = 4 + 1(25-1)$$

$$4 + 1(24)$$

$$a_{25} = 28$$

n	a_n
1	4
2	5 = 4 + 1
3	6 = 4 + 1 + 1
4	7 = 4 + 1 + 1 + 1
...	...
25	28 4 + 1(24)

$a_1 + d(2)$
 $a_1 + d(3)$

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

Write an equation for the n th term of the arithmetic sequence.

Then find a_{18}

8, 16, 24, 32, ...



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

or

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

$$a_{18} = 8 + (18-1)(8)$$

$$= 8 + (17)(8)$$

$$= 8 + 136$$


$$a_{18} = 144$$

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

Write an equation for the n th term of the arithmetic sequence.

Then find a_{31}

1, 0, -1, -2, ...


 $d = -1$

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

$$\begin{aligned} a_{31} &= 1 + (31-1)(-1) \\ &= 1 + (-30) \\ &= -29 \end{aligned}$$

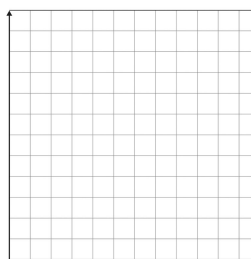
Online bidding for a purse
increases by \$5 for each bid
after the \$60 initial bid.



Bid Number	1	2	3	4
Bid Amount	\$60	\$65	\$70	\$75

a. Write a function that represents the arithmetic sequence.

b. Graph the function.



c. The winning bid is \$105. How many bids were there?

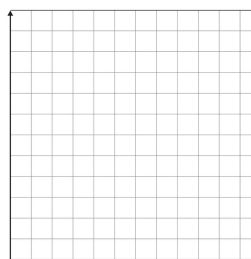
A carnival charges \$2 for each game after you pay a \$5 entry fee.

Games	1	2	3	4
Total Cost	\$7	\$9	\$11	\$13



a. Write a function that represents the arithmetic sequence.

b. Graph the function.



c. How many games can you play when you take \$29 to the carnival?

4.6 hw pg 204-206 #s 1, 2, 3-25 odd, skip #21,
33-39 odd, 45