Algebra Common Core

Unit 8: Sequences and stuff

Application Day

Objectives: Students can establish:

- **Domain of Sequences must be non-zero whole numbers**

Agenda:

A) **Homework Discussion**
B) **Notes: Sequences introductions**
C) **Homework sheet. 8-4**

Homework: Worksheet 8-4.

Quest and portfolio next block

http://www.shelovesmath.com/algebra/advanced-algebra/piecewise-functions/

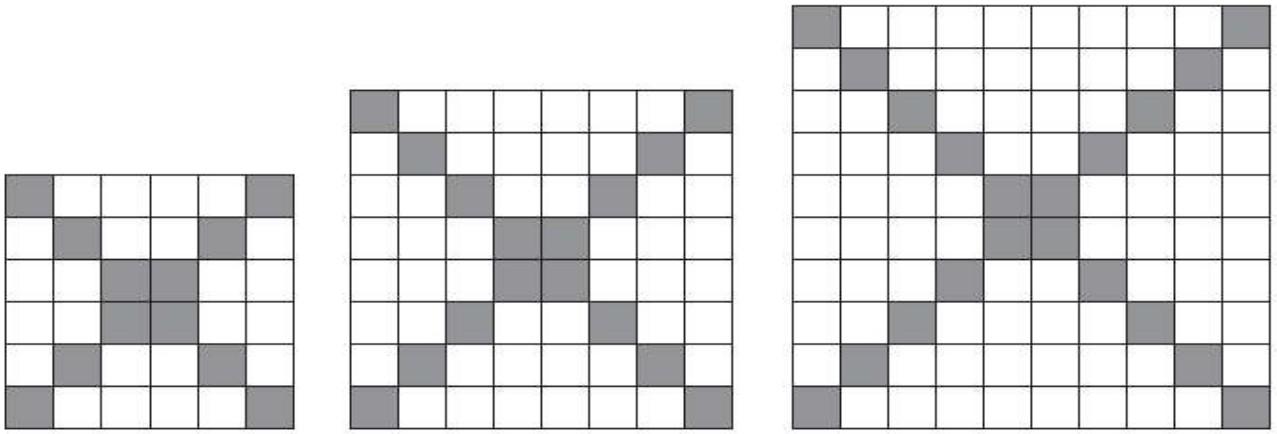
Lesson 8-4: Working with Arithmetic and Geometric Sequences Mixed

Do Now:

1) Regents Question: If a sequence is defined recursively by f(0) = 2 and f(n+1) = -2f(n)+3 for n ≥0, then f(2) is equal to

2)

The diagrams below represent the first three terms of a sequence.



Assuming the pattern continues, which formula determines a_n, the number of shaded squares in the nth term?

(1) $a_n = 4n + 12$

(2) $a_n = 4n + 8$

(3) $a_n = 4n + 4$

(4) $a_n = 4n + 2$

3)

A) Find the fourth term of the sequence $a_n = 3n$	**B)** Write the first five terms of the sequence: $a_n = n^2 - 1$

C) Find the 11th term of the sequence $a_n = n(n+2)$	**D)** Find the 9th term of the sequence $a_n = \left(\frac{1}{2}\right)^n$
E) Write a formula for the sequence 4, 8, 12, 16, 20, 24,…….	**Is the sequence linear, exponential or neither:?** **Choose A)** $a_n = 4n$ B) $a_n = 4n+1$ or C) $a_n = n+4$

4) Piecewise Function Word Problems

Problem:

Jackson's favorite dog groomer charges according to the dog's weight. If a dog is 15 pounds and under, the groomer charges $35. If the dog is between 15 and 40 pounds, she charges $40. If your dog is over 40 pounds, she charges $40, plus an additional $2 for each pound.

(a) Write a piecewise function that describes what the dog groomer charges.

$$f(x) = \begin{cases} \ldots\ldots & \text{if } 0 < x \le 15 \\ \ldots\ldots & \text{if } 15 < x \le 40\,. \\ \ldots\ldots & \text{if } x > 40 \end{cases}$$

(b) Graph the function.

(c) What would the groomer charge if your cute dog weighs 60 pounds?

Arithmetic and Geometric Sequences Mixed Practice

Now we're going to try to find explicit equations for arithmetic and geometric sequences. Start by looking for a common difference or a common ratio. Then write an equation that would produce each term using n as the input. Remember: Linear equations produce arithmetic sequences and exponential equations produce geometric sequences.

1) 3, 6, 9, 12, 15, . . .

Type of sequence: _____

Equation: _____

2) -3, -9, -27, -81, . . .

Type of sequence: _____

Equation: _____

Below are explicit equations that describe either **arithmetic, geometric**, or other types of sequences. Use the equation to create the sequence and identify whether it is an arithmetic sequence, a geometric sequence, or neither. Pay close attention:

- In the arithmetic sequences and equations, where do you see the common difference?

  _____

- In the geometric sequences and equations, where do you see the common ratio?

  _____

3) $a_n = 5n + 1$ What type of sequence is this? _____

Write the first 7 terms of the sequence:

_____

4) $a_n = 4(2)^{n-1}$ What type of sequence is this? _____

Write the first 6 terms of the sequence:

_____

Work with the given information to write the sequence.

5) $a_1 = 10$ and the common difference of this arithmetic sequence is 6.

Write the first 4 terms of the sequence:

Write the explicit equation of this sequence:

6) **Use your stat plots to** identify the type of each function below then write a function of each.

A)

x	y
1	5
2	7
3	9
4	11
5	13

B)

x	y
1	6
2	9
3	13.5
4	20.25
5	30.375

Name: _____ **Date:** _____

Homework: 8-4 **Geometric + Arithmetic Sequence Mixed**

Write an equation that would produce each term using n as the input.

1) 3, 9, 27, 81, . . .

Type of sequence:
_____

Equation:
_____

2) -1, -2, -3, -4, -5, . . .

Type of sequence:
_____

Equation:
_____

Use the equation to create the sequence and identify whether it is an arithmetic sequence, a geometric sequence, or neither

3) $a_n = 400(0.5)^n$ What type of sequence is this? _____

Write the first 5 terms of the sequence:
_____

4) $a_n = (-1)^n(n+1)$ What type of sequence is this? _____

Write the first 4 terms of the sequence:
_____

6) $a_1 = 10$ and the common ratio of this <u>geometric</u> sequence is 6.

Write the first 3 terms of the sequence:

Write the explicit equation of this sequence:

7) Given the sequence $3, 5, 7, 9, 11, \ldots$, find a_{20}.

8) Given the sequence $8, 24, 72, 216, \ldots$, find the 12th term.

9) If $a_1 = 44$ and $a_2 = 40$ in an arithmetic sequence, find the 8th term.

10) If $t_3 = 90$ and $t_4 = 135$ in a geometric sequence, find the 15th term.

11) If $a_5 = 20$ and $a_8 = 38$ in an arithmetic sequence, find the 10th term.

Regents Rev Up

1)Given the following three functions, put them in ascending order (meaning least to greatest) based on their values at x = -3.

F(x) = 3x + 2 and $G(x) = x^2 - 4x + 3$ and $H(x) = .6(3)^x$

2. Calculate the domain of the function, f(x) = $\sqrt{14 - 7x}$ Show all work algebraically, graphically and provide a sketch.

3. The function f(x) = $\sqrt{x}$, Which function represents a shift of the graph left 3 units?

A) $f(x-3) = \sqrt{x-3}$

B) $f(x+3) = \sqrt{x+3}$

C) $f(x)+3 = \sqrt{x}+3$

D) $f(x)-3 = \sqrt{x}-3$

4. A) Calculate the equation of the least-squares line AKA Line of best fit relating cost to time. (Indicate slope to the nearest tenth and y-intercept to the nearest whole number.)

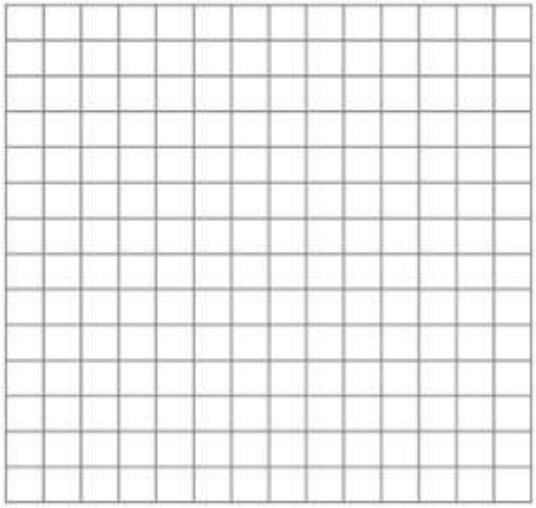
Time (minutes)	Cost ($)	Predicted value ($)	Residual
14	1,510		
80	6,170		
84	5,910		
118	9,184		
149	8,855		
192	11,020		

B) Calculate the residuals to the nearest tenth.

C) Suppose that a surgery took 100 minutes. What does the least-squares line predict for the cost of this surgery to the nearest dollar?

D) Find the value of the correlation coefficient between Time spent and cost of a surgery. Round to the nearest tenth.(AKA: r value, turn diagnostics on)

E) Plot the residuals in a well labeled graph.



F) A pattern (curve) in the residual plot indicates that the relationship in the original data set is :_____