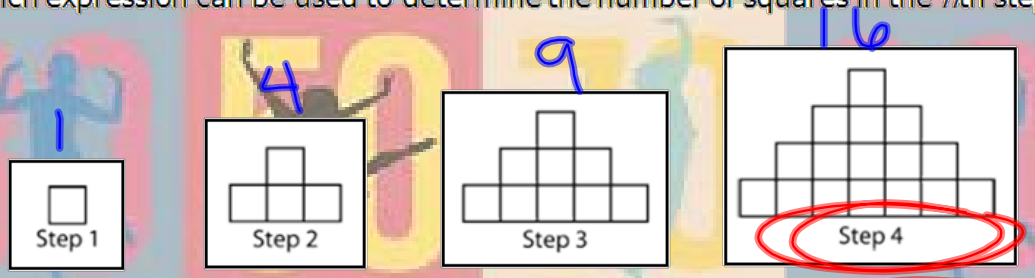
Models , Models , Everywhere !

agenda Warm-Up >>> HW Check >>> Notes >>> Practice #1-10

Warm-Up

1. The pattern of squares below continues indefinitely. More squares are added with each step, *n*. Which expression can be used to determine the number of squares in the *n*th step?



A $2n - 1$ B $3n$ C $n^2 - n + 1$ D n^2

$2 \cdot 4 - 1 = 7$ $3 \cdot 4$ $4^2 - 4 + 1$ $16 - 4 + 1$

2. The table shows the value for four terms in a sequence. If the pattern continues, what will be the value of the 10th term of the sequence?

Term	Value
1	2
4	-4
6	-8
9	-14

+3 +2 +3 +4 5 10 -2 -6 -4 -6 -2

-16

Homework Check

Answers:

1. 9, 11, 13, 15, 17 $6 \cdot 48$
2. -3, -6, -7, -6, -3
3. B
4. C
5. A
6. 13, 21, 34, 55, 89, 144
7. A. 30 cans in fourth layer; B. 328 total cans
8. D
9. 900, 1080, 1260, 1440; $s = 180n - 360$
10. C
11. A
12. B

Algebra I - Unit 2: Topic 1

Practice – Patterns (2 pages)

No Textbook Correlation

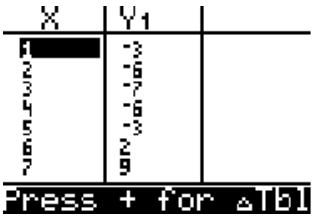
Name _____ Date _____ Per ____

If n represents a number's position in a sequence, write the first 5 terms described by each expression.

1. $2n + 7$

Find the term number when it takes 103 blocks to build.

2. $n(n - 6) + 2$



Match each sequence with its rule on the right.

3. -4, -3, -2, -1, 0

4. 6, 9, 14, 21, 30

5. 6, 7, 8, 9, 10

A $x + 5$

B $x - 5$

C $x^2 + 5$

Answer the following questions.

6. A special sequence is called the Fibonacci sequence. It is named after Leonardo Fibonacci from Italy who presented it in 1201. This sequence is very intriguing because the numbers in the sequence are often found in nature. The first six terms of the sequences are listed below. Give the next six terms of the sequence.

1, 1, 2, 3, 5, 8 ... 13, 21, 34, 55, 89, 144

7. Pam needs to make a tower of soup cans as a display in a supermarket. Each layer of the tower will be in the shape of a rectangle as shown. The length and width of each layer will be one less than the layer below it.

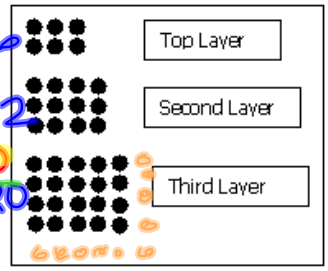
A. How many cans will be needed for the fourth layer?

30 cans

B. What is the total number of cans needed for an 8-layer tower?

6 + 12 + 20 + 30 + 42 + 56 + 72 + 90

+6 +8 +10 +12 +14 +16 +18



8. Sara planted rows of tulips in her garden, as shown in the table. Which expression best shows the number of tulips per row, r.

Row Number	Number of Tulips
1	3
2	6
3	9
4	12

A. $3 - r$

B. $r + 3$

C. 3

D. $3r$

Algebra I - Unit 2: Topic 1

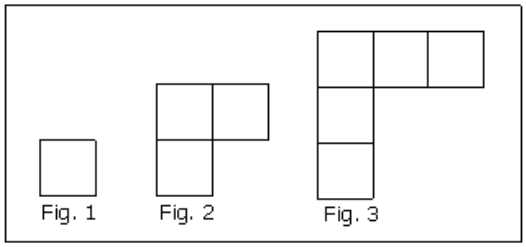
9. A geometry class was exploring the sum of the interior angles, S, of polygons as compared to the number of sides, n, that the polygon has. They recorded their data in the table below. Complete the table, and state the function rule.

n	S
3	180
4	360
5	540
6	720
7	
8	
9	
10	

Function Rule: _____

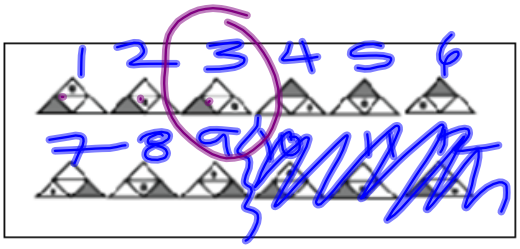
10. The top-count views of a block pattern are shown below. How many blocks does it take to build figure 10?

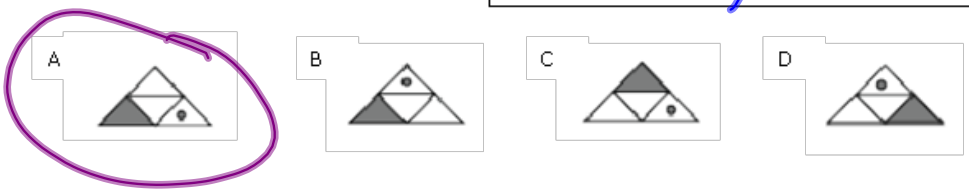
A 4
B 5
C 19
D 23



11. The figures to the right have a repeating pattern. Which shows the 57th figure in this pattern?

$9\overline{)57}$ R3
54





12. The figure below shows a partial view of Pascal's triangle. Which row of numbers best represents the seventh row in Pascal's triangle?

A 1 5 10 10 5 1

B 1 6 15 20 15 6 1

C 1 7 21 35 35 21 7 1

D 1 8 28 56 70 56 28 9 1

Pascal's Triangle

Row 1: 1
Row 2: 1 1
Row 3: 1 2 1
Row 4: 1 3 3 1
Row 5: 1 4 6 4 1

Where we ended...

	2nd	3rd	4th	5th	7th
A's	9	7	5	7	1
B's	7	5	6	3	6
C's	4	9	10	6	5
F's	2	7	8	6	15

p. 26

Algebra I - Unit 2: Topic 1 - Models, Models Everywhere

Student Notes - Models, Models Everywhere **No Textbook Correlation**

Problem 1: *1 DVD case is 1.2cm tall

A Kendra wants to stack her DVD cases on her TV shelf, and wants to know how many cases she can stack on the shelf. the Record your data in the table below.

# of DVDs	Height of Stack (cm)
0	0
1	1.2
2	2.4
3	3.6
4	4.8
n	1.2n

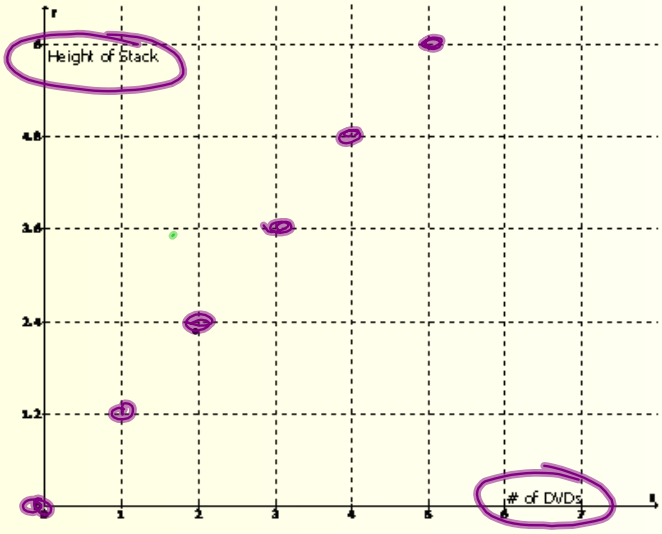
+1.2 +1.2

B Write two ordered pairs for data in your table, and explain what each ordered pair means.

Ordered Pair: (1, 1.2) Means: 1 DVD is 1.2cm tall

Ordered Pair: (3, 3.6) Means: 3 DVDs are 3.6cm tall

C Create a scatterplot of your data on the grid below.



D Using information contained in either your table or your scatterplot, predict the height of a stack that contains:

h = 1.2n

6 DVDs 7.2 cm 10 DVDs 12 cm 100 DVDs 120 cm

E What if you are told that a stack of DVDs is 30 cm high? How many DVD cases would you expect to find in the stack? Explain how you got your answer.

Number of DVDs: 25 Explain: divide 30 by 1.2

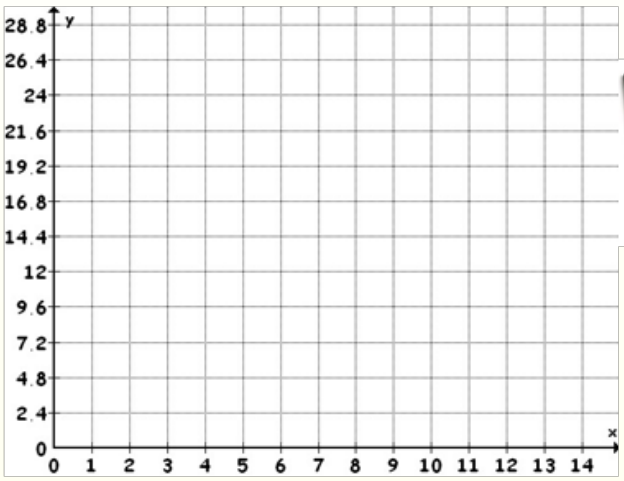
$\frac{30}{1.2} = \frac{1.2n}{1.2}$

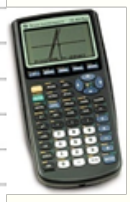
Algebra I - Unit 2: Topic 1 - Models, Models Everywhere

Problem 2:

A Mr. Crum would like to have his calculators stacked. He asked his student, Darius, to stack them for him and to record the data. Determine the height of calculators for the following. Graph your data on the grid provided. **Label** the axes appropriately.

# of Calculators	Height of Stack (cm)
5	
10	
15	





B Using information contained in your table, and your graph, predict the height of a stack that contains:

6 Calculators _____ 13 calculators _____ 20 calculators _____

C Using all the above information, write an expression to determine the height of the stack of calculators of any size.

D What if you were told that a stack of these calculators was 55.2 cm high? How many calculators would you expect to find in the stack? Explain your method of solving this problem below.

Number of calculators: _____

Explain: _____

E Describe any similarities you see between the two data sets and the scatterplots for the stacks of DVDs and calculators.

Algebra I - Unit 2: Topic 1

Practice - Models, Models Everywhere (4 pages) No Textbook

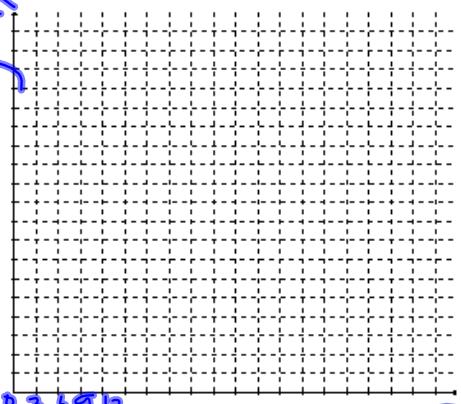
Correlation

Name _____ Date _____ Period _____

A stack of 3 nickels is 6 mm high. Fill in the table below and create a scatter plot on the graph of your data. Be sure to **label** and **scale** the axes on the graph.

3 # of nickels in a stack	6 Height of the stack (mm)
6	
9	
12	
	36
24	
32	
	70

height (mm)



3 6 9 12

#ofnickels

1. What is the height of a single nickel? 2mm

2. Create a rule that represents your data. Make sure to state what your variables represent.

3. Use your formula model to predict values for the following: (Show your calculations!)

   a. The height of a stack of 65 nickels. _____

   b. The height of a stack of 120 nickels. _____

   c. If a stack of nickels is 90 mm high, how many nickels are in the stack? _____

   d. If a stack of nickels is 300 mm high, how many nickels are in the stack? _____

4. What does the ordered pair (25, 50) mean for this situation?

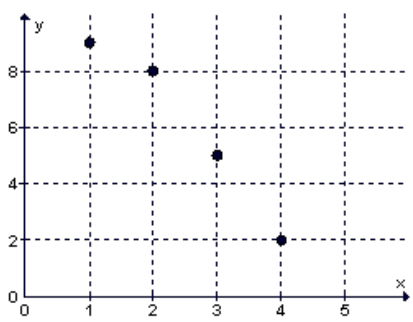
Algebra I - Unit 2: Topic 1

5. The table below shows how the weight of an ice cube changes as it melts in the sun.

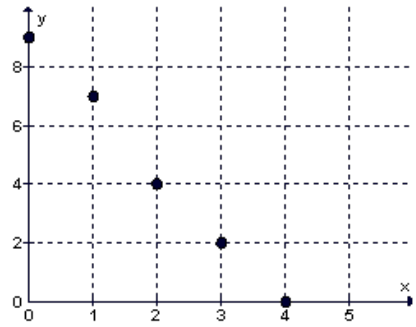
Time (min)	0	1	2	3	4
Weight (g)	9	8	5	2	0

Which graph below best represents the data in the table?

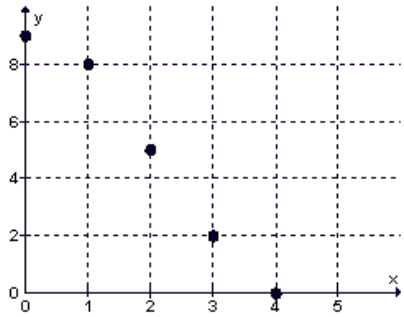
A



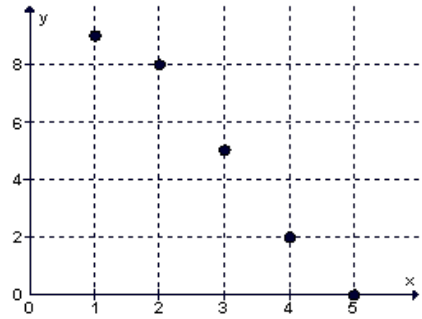
C



B



D



6. John delivers newspapers every morning in his neighborhood. He gets paid based on the number of hours, x, that he works. This table reflects John's pay scale.

Number of Hours Worked	Wages
1	\$10
2	\$18
3	\$26
4	\$34

Which equation represents the number of dollars, w, he will be paid for doing x hours of work?

A $w = 2x + 8$
B $w = 10 + 8x$
C $w = 34 - 8x$
D $w = 2 + 8x$

Algebra I - Unit 2: Topic 1

7. The table below indicates a linear relationship between x and y.

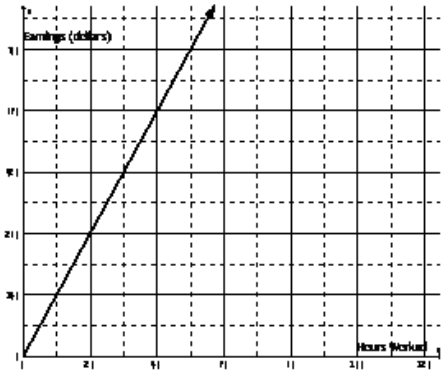
x	y
2	5
4	9
6	13
12	25

Which equation would generate the values in this table?

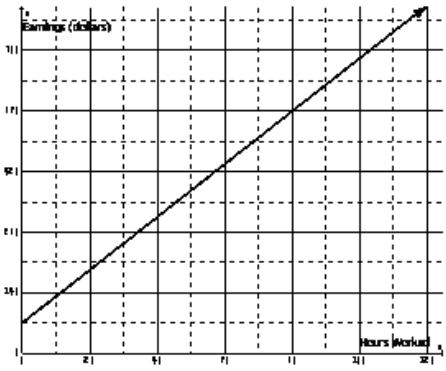
A $y = x + 3$
B $y = 3x - 1$
C $y = 2x + 1$
D $y = 7 - x$

8. Roberto earns $7.00 an hour working at a grocery store. If he works 20 hours each week, which of these graphs best represents Roberto's earnings?

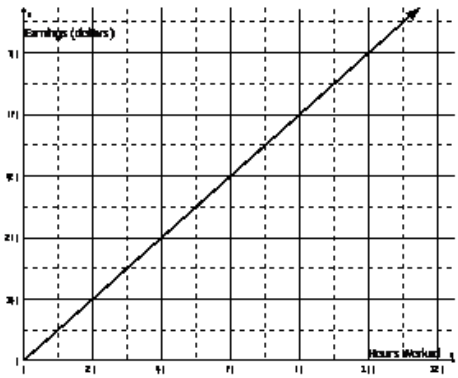
A



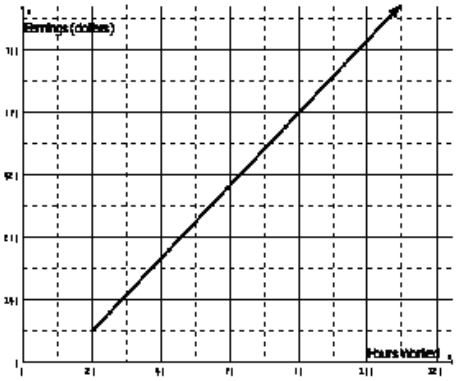
C



B



D



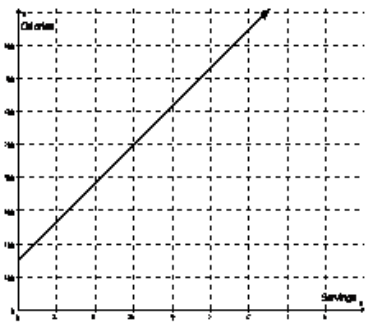
Algebra I - Unit 2: Topic 1

9. The table below lists the amount of calories for each of the different servings of one bag of potato chips.

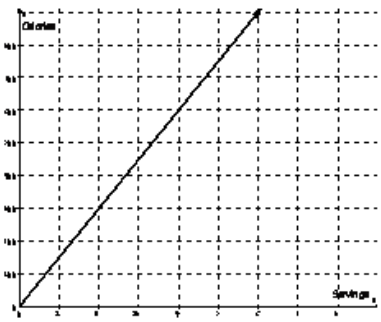
Number of Servings (n)	Calories (c)
2	300
4	600
6	900
8	1,200

Which of the following graphs best represents the data in the table?

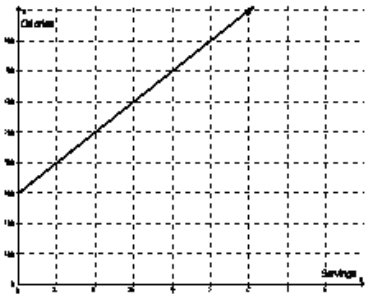
A



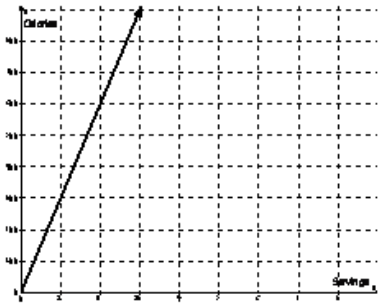
C



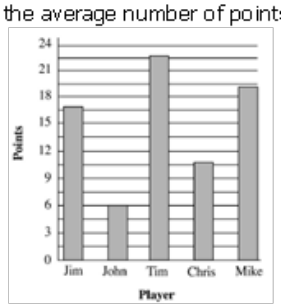
B



D



10. The chart below shows the average number of points per game for the five starting players on the boy's basketball team.



Which of the following tables best represents the information in the graph?

A

Player	Points
Jim	16.5
John	6.0
Tim	22.5
Chris	10.5
Mike	18.0

B

Player	Points
Jim	17.5
John	6.0
Tim	22.5
Chris	11.0
Mike	20.0

C

Player	Points
Jim	16.5
John	6.0
Tim	23.0
Chris	10.5
Mike	19.0

D

Player	Points
Jim	17.3
John	6.0
Tim	23.3
Chris	11.3
Mike	18.8