

Ordered Pairs and Patterns

1. Gorp has planted some Venusian seeds in an Earth garden. Here is the chart showing how many plants have sprouted.

Day	Number of Sprouts
1	7
2	14
3	21
4	28

How many plants should Gorp expect to see on day 14?

- A) 35 B) 56 C) 91 D) 98

2. Melop, from the planet Melos, is running a test on his space craft. He does this by typing in a number and then he listens for a number of beeps to return. The number of beeps depends on the number typed in. Here are his data.

Instrument Tested	Number Typed	Beeps Returned
ignition	3	15
fuel system	8	35
climate control	2	10
power drive	5	25
boosters	6	30

Which instrument seems to be out of order compared with the other tests?

- A) ignition B) fuel system C) power drive D) boosters

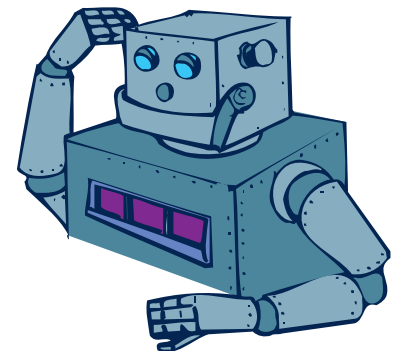
- 3) Space ships made on planet Zygon can be different sizes. Below is a chart showing the number of ship pods and the passengers they can carry.

Number of Pods	Number of Passengers
1	4
3	10
5	16
7	22

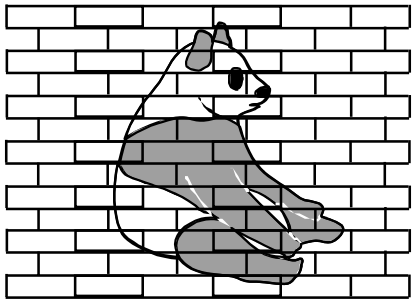
What rule determines how many passengers a ship can carry?

- A) Number of pods x 4
 B) Number of pods squared, then add 1
 C) Number of pods times 3, then add 1
 D) Number of pods times 4, then subtract 6
- 4) A dispatcher from the mother ship tells Gorp that he is carrying too much cargo. She tells him, "Cut your cargo in half and then add one ton." Which of the following indicates that he followed directions?

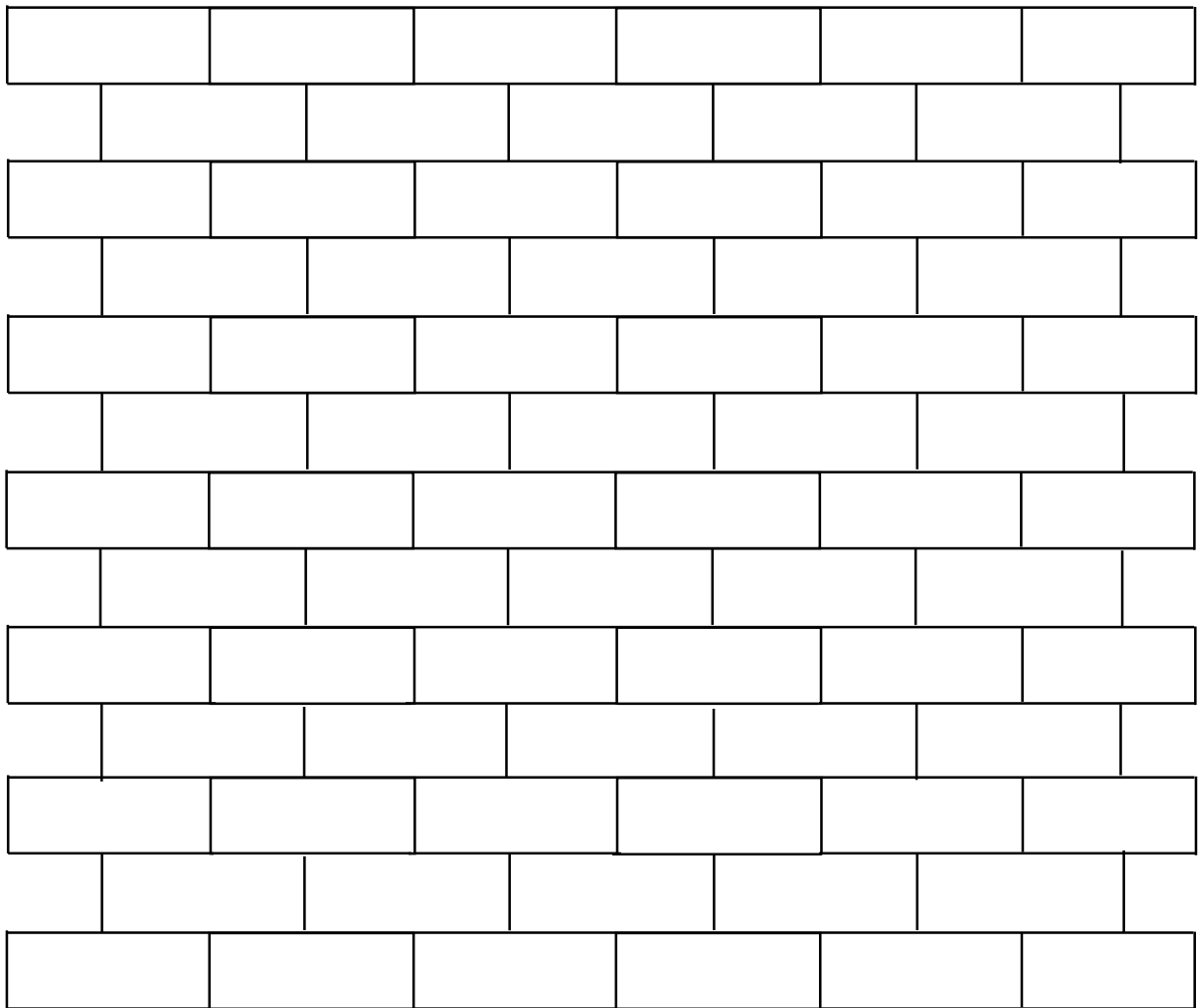
	Original Cargo (tons)	Cargo after following the rules(tons)
A)	7	4.5
B)	9	5.0
C)	12	6.5
D)	15	8.0



MASCOT PAINTING



Use the picture on the left and enlarge it by using the grid below.

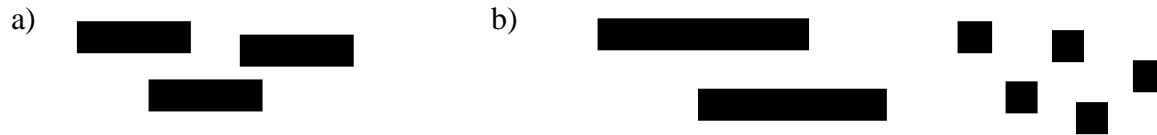


Using Rods and Squares

1. Draw a sketch to show how to represent each expression using Rods and Squares.

- a) 3 b) $3y$ c) $2y + 2$ d) $2y + 2x + 2$ e) $x + 5$ f) $4x + 3y + 1$

2. Write a way to name the collection.



3. For each example, write the algebraic expression, then combine like terms and write the simplified algebraic expression.



4. Combine like terms, and then simplify. You may represent each expression using Rods and Squares.

a) $x + x + y + y + x + 1 + 1 + x$ b) $1 + 1 + 1 + x$

c) $y + 1 + x + 1 + x + x + 1$ d) $y + 1$

5. Write an algebraic expression that equals $4x + 9$ when simplified.

Using Rods and Squares (continued)

6. For each example, write the new expression when 2 is added to the each of the following expressions. Sketch representations using Rods and Squares.

a) 2 b) $2x$ c) $2y$ d) $2y + 4$

7. For each example, write the new expression for when you multiply each of the following expressions by 3. Sketch representations using Rods and Squares.

a) 4 b) $x + 2$ c) $2y$

8. Write a simpler expression equivalent to each of the following. You may use Rods and Squares.

a) $5x + 3x + 2x$
b) $6x + 5y + x + 3y$
c) $6 + 4y + 4 + y$

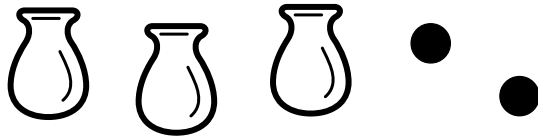
9. Identify which of the expressions a, b, c, or d are equal to the expression on the left. You may sketch representations using Rods and Squares. Explain your answer.

i. $x + (3y + 2x)$ a) $6xy$ c) $(x + 2x) + 3y$
 b) $x + (2x + 3y)$ d) $x + 5xy$

ii. $3(x + 2)$ a) $3x + 2$ c) $x + 5$
 b) $3x + 6$ d) $x + 6$

Using Bags and Balls

1. In the model below, there are three bags, each containing the same number of balls, plus two extra balls. Melissa wrote a rule for finding the total number of balls when you know the number of balls in each bag: $3s + 2$.



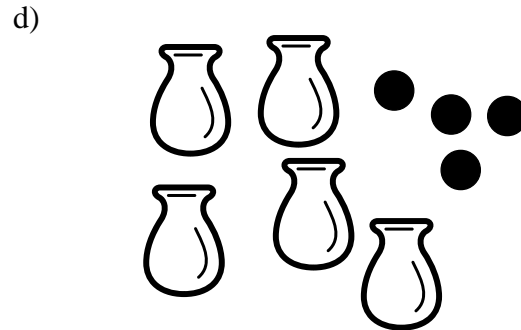
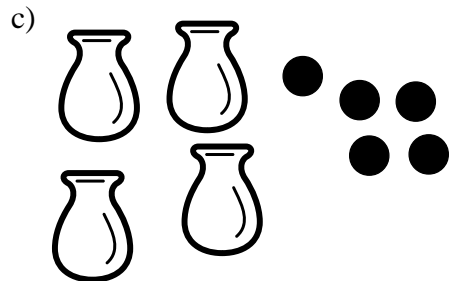
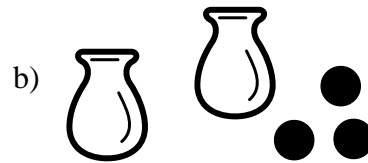
- What does the variable s stand for in Melissa's expression?
 - What does the 3 stand for?
 - What does the 1 stand for?
 - If you know how many balls are in each bag, how can you figure out how many balls there are altogether?
2. Any letter can be used to stand for the number of balls in a bag. Match each expression below with a drawing.

$2y + 3$

$5c + 4$

$3m + 2$

$4f + 5$



- To represent the number of balls in 2 bags plus 3 extra balls with the expression $2y + 3$, you need to assume that all of the bags contain the same number of balls. Why?
- The expression $4n + 1$ describes the total number of balls in 2 bags, each with the same number of Balls, plus 1 extra square.
 - Describe a bags and balls situation that can be represented by the expression: $5c + 3$.
 - Make the bags and balls drawing that matches the expression $5c + 3$.
- Make a bags and balls drawing
 - Write an expression that describes your drawing.
 - Explain how you know that your expression matches your drawing.

Using Variables

1. A car travels at 55 miles per hour. Write an expression for how far the car will have traveled:
 - a. After 3 hours
 - b. After 5 hours
 - c. After h hours

2. A plain pizza costs \$7.00. Each topping adds an extra cost of \$.50. How much does a pizza cost:
 - a. With one topping
 - b. With two toppings
 - c. With n toppings

4. Jeff uses this rule to determine how many scoops of ice cream he needs to plan for his friends.

Number of Ice Cream Scoops = $2 \times$ number of friends

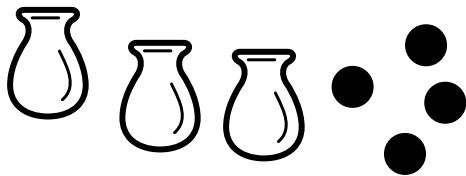
If he has 7 friends, how many scoops of ice cream does he need for his friends and himself?
 Explain your reasoning.

5.



- a. Write the expression shown by the collection of rods and squares above.
- b. If $y = 4$, what value does the collection show?
- c. If $y = 8$, what value does the collection show?
- d. If $y = 3.2$, what value does the collection show?

6.



- a. Write the expression shown by the collection of bags and balls.
- b. If $x = 3$, what value does the collection show?
- c. If $x = 12$, what value does the collection show?
- d. If $x =$ one-third, what value does the collection show?

Using Variables (continued)

11. Consider the expression $6y + 3$
- Create an input-output flowchart for the expression.
 - What is the output when the input is 4?
 - What are the outputs for three more values of y ?
12. In a game of *Think of a Number*, Charles said to Lakeshia:
- Think of a number.*
 - Subtract 1 from your number.*
 - Multiply the result by 2.*
 - Add 6*
- Draw an input-output flowchart to represent this game.
 - Write an algebraic expression that matches the flowchart.
13. Write these expressions algebraically.
- 15 subtracted from x
 - x subtracted from 15
 - twice the sum of a number and 6
 - the product of m and 5 increased by 7
 - the quotient of t and 3, decreased by 2
14. Write each algebraic expression in words:
- $k - 3$
 - $3k$
 - $k/3$
 - $2(k + 3)$
 - $2k + 3$
15. Toni gets paid \$5.25 per hour to babysit.
- How much would she get paid to babysit for 12 hours?
 - How much would she get paid for y hours?
16. Bill plans to take two sacks on his flight next week. One sack weighs 35 pounds.
- If the maximum baggage allowance is 66 pounds, how much can his second bag weigh?
 - If the maximum baggage allowance is w pounds, how much can his second bag weigh?
17. A fried-chicken dealer makes special orders of boxes of chicken with as many pieces as the buyer wants. He charges 55 cents for each piece of chicken. He also charges 80 cents for the box, napkins, and handling.
- How much would you pay for a 9 – piece box?
 - How much would you pay for an 11- piece box?
 - Write an expression for the number of cents charged for a box containing x pieces of chicken.
 - Suppose someone paid \$12.35 for a box of chicken. How many pieces of chicken did the box contain?

Using Variables (continued)

18. Consider the expression $4n + 5$
- Draw a bags-and-balls picture for this expression.
 - If there are 7 balls in each bag, how many balls are there altogether?
 - If there are 2 balls in each bag, how many balls are there altogether?
 - Copy and complete the table for the expression $4n + 5$.

N	0	1	2	3	7	66	
$4N + 5$	5						321

- Create and label an input-output flowchart that could be used to calculate the total number of squares for $4n + 5$ when n represents the input.
19. Read the expression $3a + 7$
- Draw a bags and balls picture to match the expression.
 - If there are 3 balls in each sack, how many squares are there altogether?
 - If $a = 8$, what is the value of $3a + 7$
 - Draw and label an input-output flowchart that could be used to calculate the number of balls where a represents the input.
20. Jenny, Lauren, and Molly are each holding one bag and two extra balls.
- Draw a bags and balls picture to represent this problem.
 - Find the total number of balls if each bag contains
 - 6 balls
 - 20 balls
 - 100 balls
 - b balls
 - How did you find your answers?
 - Show two ways of finding the total number of squares the girls have.

Mental Math Using Properties

$\frac{3}{8} + \frac{5}{9} + \frac{5}{8} + \frac{2}{9}$ $\left(\frac{3}{8} + \frac{5}{8}\right) + \left(\frac{5}{9} + \frac{2}{9}\right)$	$1 \frac{7}{9}$ Associative/Commutative Properties for Addition
$15 \cdot \frac{1}{8} \cdot \frac{1}{5} \cdot 16$ $\left(\frac{1}{8} \cdot 16\right) \left(\frac{1}{5} \cdot 15\right)$	6 Associative/Commutative Properties for Multiplication
$\left(\frac{1}{8} + \frac{1}{6}\right) 24$ $\left(\frac{1}{8} \cdot 24\right) + \left(\frac{1}{6} \cdot 24\right)$	7 Distributive Property
$\left(\frac{24 \cdot 599}{24 \cdot 599}\right) \cdot 5942$ $1 \cdot 5942$	5942 Substitution

Mental Math Using Properties

$24 + 17 + 95 + 13 + 26 + 5$	180
$(95 + 5) + (24 + 26) + (17 + 13)$	Associative/Commutative Properties for Addition
$25 \cdot 22 \cdot 3 \cdot 4$	6600
$(25 \cdot 4) (22 \cdot 3)$	Associative/Commutative Properties for Multiplication
$\frac{1}{6} (42 + 54)$	16
$\left(\frac{1}{6} \cdot 42\right) + \left(\frac{1}{6} \cdot 54\right)$	Distributive Property
$24 \cdot 599 \cdot 0 \cdot 278 \cdot 92$	0
$0 (24 \cdot 599 \cdot 278 \cdot 92)$	Associative/Commutative Properties for Multiplication

Mental Math Using Properties

$$\frac{1}{7} + \frac{1}{9} + \frac{2}{9} + \frac{6}{7}$$

$$1 \frac{1}{3}$$

$$\left(\frac{1}{7} + \frac{6}{7} \right) + \left(\frac{1}{9} + \frac{2}{9} \right)$$

**Associative/Commutative
Properties for Addition**

$$9 \cdot \frac{1}{7} \cdot \frac{2}{3} \cdot 50 \cdot 7$$

$$300$$

$$\left(\frac{2}{3} \cdot 9 \cdot 50 \right) \left(\frac{1}{7} \cdot 7 \right)$$

**Associative/Commutative
Properties for Multiplication**

$$29 \cdot 74 + 29 \cdot 26$$

$$2900$$

$$29(74 + 26)$$

Distributive Property

$$19(21)$$

$$399$$

$$19(20 + 1)$$

Distributive Property

Mental Math Using Properties

$75 + (-16) + 25 + (-4)$ $\left(75 + 25 \right) + \left(-16 + (-4) \right)$	80 Associative/Commutative Properties for Addition
$4 \cdot \frac{1}{3} \cdot \frac{1}{10} \cdot 25 \cdot 6$ $\left(\frac{1}{10} \cdot 25 \cdot 4 \right) \left(\frac{1}{3} \cdot 6 \right)$	20 Associative/Commutative Properties for Multiplication
$36 \left(\frac{1}{4} + \frac{2}{9} \right)$ $\left(\frac{1}{4} \cdot 36 \right) + \left(\frac{2}{9} \cdot 36 \right)$	17 Distributive Property Commutative Property for Multiplication
15% of \$40 $(10\% + 5\%)40$	6 Substitution

Mental Math Using Properties

$399 + 407 + 201 + 393$ $(399+201) + (407 + 393)$	1400 Associative/Commutative Properties for Addition
$\frac{1}{9} \cdot 45 \cdot 2 \cdot 0.1 \cdot 6$ $(45 \cdot 2 \cdot \frac{1}{9} \cdot 0.1)(6)$	6 Associative/Commutative Properties for Multiplication
$36 (70 \cdot \frac{1}{4})$ $(36 \cdot \frac{1}{4})(70)$	630 Associative /Commutative Properties for Multiplication
$12(49)$ $12(50 - 1)$	588 Substitution

Mental Math Using Properties

$$3x + 2y + 4x + 9y$$

$$\left(3x + 4x \right) + \left(2y + 9y \right)$$

$$7x + 11y$$

**Associative/Commutative
Properties for Addition**

$$4x \cdot 2y$$

$$\left(4 \cdot 2 \right) \left(xy \right)$$

$$8xy$$

**Associative/Commutative
Properties for Multiplication**

$$36 (x + 2y)$$

$$\left(36 \cdot x \right) + \left(36 \cdot 2y \right)$$

$$36x + 72y$$

Distributive Property

$$75x + 25x$$

$$x(75 + 25)$$

$$100x$$

**Distributive Property
Commutative Property
for Multiplication**

Mental Math Using Properties

$$5x + 2x^2 + 3x + 5x^2$$

$$\left(5x + 3x \right) + \left(2x^2 + 5x^2 \right)$$

$$8x + 7x^2$$

**Associative/Commutative
Properties for Addition**

$$\frac{1}{2}(4x \cdot y)$$

$$\left(\frac{1}{2} \cdot 4 \right) \left(xy \right)$$

$$2xy$$

**Associative Property
for Multiplication**

$$\frac{1}{2} (4 + 2y)$$

$$\left(\frac{1}{2} \cdot 4 \right) + \left(\frac{1}{2} \cdot 2y \right)$$

$$2 + y$$

Distributive Property

$$7x + (-5x) + 13x + (-15x)$$

$$(7x + 13x) + (-5x + (-15x))$$

$$0$$

**Associative /Commutative
Properties for Addition**

Alien Math

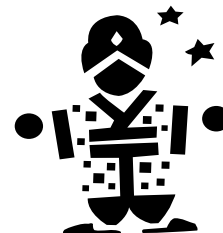
+	\$	*	#	@	!
\$	@	#	\$!	*
*	#	!	*	\$	@
#	\$	*	#	@	!
@	!	\$	@	*	#
!	*	@	!	#	\$

X	\$	*	#	@	!
\$	@	!	#	*	\$
*	!	@	#	\$	*
#	#	#	#	#	#
@	*	\$	#	!	@
!	\$	*	#	@	!

Wow! A family of aliens just had lunch in your back yard, and one of their kids left his homework for you to find. It seems they use the same symbols for addition and multiplication that we do, but different symbols for the numbers.

Use the addition and multiplication tables above to discover something about the alien math.

- Is there an additive identity? If so, what is it? How do you know?
- Is there a multiplicative identity? If so, what is it? How do you know?
- Is addition commutative? How do you know?
- Is multiplication commutative? How do you know?
- Make up some alien addition and multiplication problems to see whether the associative properties hold for this number system.
- Make up some problems to see whether the distributive property works in this system.
- What is the additive inverse of each number?
- Do all the numbers have a reciprocal? What is the reciprocal of each number?
- Can you figure out the Earth number that matches each symbol? How do these aliens do math?



Matching Game

Associative Property for Addition	$(4 + \frac{3}{5}) + \frac{2}{5} =$ $4 + (\frac{3}{5} + \frac{2}{5})$	$(a + b) + c =$ $a + (b + c)$
Associative Property for Multiplication	$(52 \times 4) \times 25 =$ $52 \times (4 \times 25)$	$a(bc) = (ab)c$
Additive Identity	$0 + 56 = 56$	$a + 0 = a$
Multiplicative Identity	$1 \cdot 75 = 75$	$1 \cdot a = a$
Additive Inverse	$3 + (-3) = 0$	$-a + a = 0$

Matching Game

Multiplicative Inverse	$3 \left(\frac{1}{3} \right) = 1$	$\left(\frac{1}{a} \right) \cdot a = 1$ for $a \neq 0$
Distributive Property	$\left(\frac{1}{3} \right) (6 + 300) =$ $\left(\frac{1}{3} \right) 6 + \left(\frac{1}{3} \right) (300)$	$a(b+c) = ab + ac$
Commutative Property for Addition	$25 + 62 = 62 + 25$	$a + b = b + a$
Commutative Property for Multiplication	$14 \cdot 5 = 5 \cdot 14$	$ab = ba$
Multiplicative Property of Zero	$7564 \cdot 0 = 0$	$a \cdot 0 = 0$

Matching Game

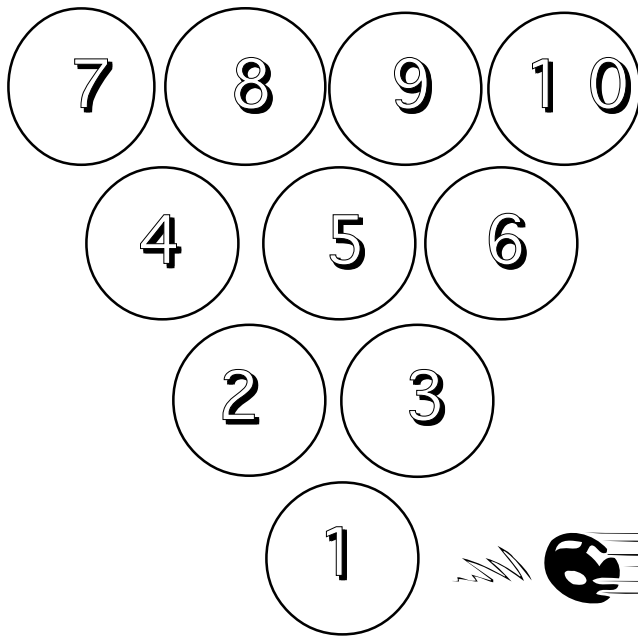
Associative Property for Addition	$(17 + 89) + 1 =$ $17 + (89 + 1)$	$(x + 2y) + 3y =$ $x + (2y + 3y)$
Distributive Property	$24(\frac{1}{3} + \frac{1}{8}) =$ $24(\frac{1}{3}) + 24(\frac{1}{8})$	$3(x+y) = 3x + 3y$
Additive Identity	$95 + 0 = 95$	$-4 + 0 = -4$
Multiplicative Identity	$1 \cdot 16 = 16$	$1 \cdot x = x$
Additive Inverse	$5 + (-5) = 0$	$-a + -(-a) = 0$

Matching Game

Multiplicative Inverse	$7 \left(\frac{1}{7} \right) = 1$	$\left(\frac{1}{x} \right) \cdot x = 1$ for $x \neq 0$
Associative Property of Multiplication	$\frac{1}{2} (4 \cdot \frac{1}{3}) =$ $(\frac{1}{2} \cdot 4) \cdot \frac{1}{3}$	$\frac{1}{5} (10x) =$ $(\frac{1}{5} \cdot 10)x$
Commutative Property of Addition	$16 + 40 = 40 + 16$	$x + x^2 = x^2 + x$
Commutative Property of Multiplication	$7 \cdot 22 = 22 \cdot 7$	$x(2) = 2x$
Multiplicative Property of Zero	$91 \cdot 0 = 0$	$x \cdot 0 = 0$

Order of Operations Square Puzzle

51 $3 \cdot 5 + (3 \cdot 2)^2$	6 $16 - 3^2 + 7$	15 $27 - (18 + 4)$	12 $16 + (23 - 5) \div 3$
14 $4^2 - (8 + 8)$	81 $16 - (5^2 + 2) \div 3$	7 $24 - 11 - 4$	6 $16 \div (4 \cdot 2 - 6)$
44 $16 - 14 + 2$	24 $16 - 3^2 - 7$	31 $5 \cdot (3 - 9)$	8 $3 \cdot (24 \div 2 + 6)$
10 $4^2 + 3(71 - 51)$	22 $4^2 + 3$	3 $43 - 8(5)$	20 $3 \cdot 9 \cdot 4 + 21$
1 $5^2 + 5 \cdot 5$	19 $5 \div 5 - 4 + 9$	3 $9 - 2 \cdot 7 \div 9$	26 $26 + (3 \cdot 2)^2 \div 3$
17 $14 - (3 + 8) + 5^2$	28 $8 - (50 - 71) + 43$	56 $9 - 2 \cdot 7 \div 9$	40 $12 \cdot 9 \cdot 4 + 21$
89 $16 - 14 + 2$	0 $16 - 3^2 - 7$	32 $9 - 2 \cdot 7 \div 9$	29 $26 + (3 \cdot 2)^2 \div 3$



Score:

Round 1 Round 2 Round 3 Round 4 Round 5 Round 6

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Round 7 Round 8 Round 9 Round 10 Total:

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Score:

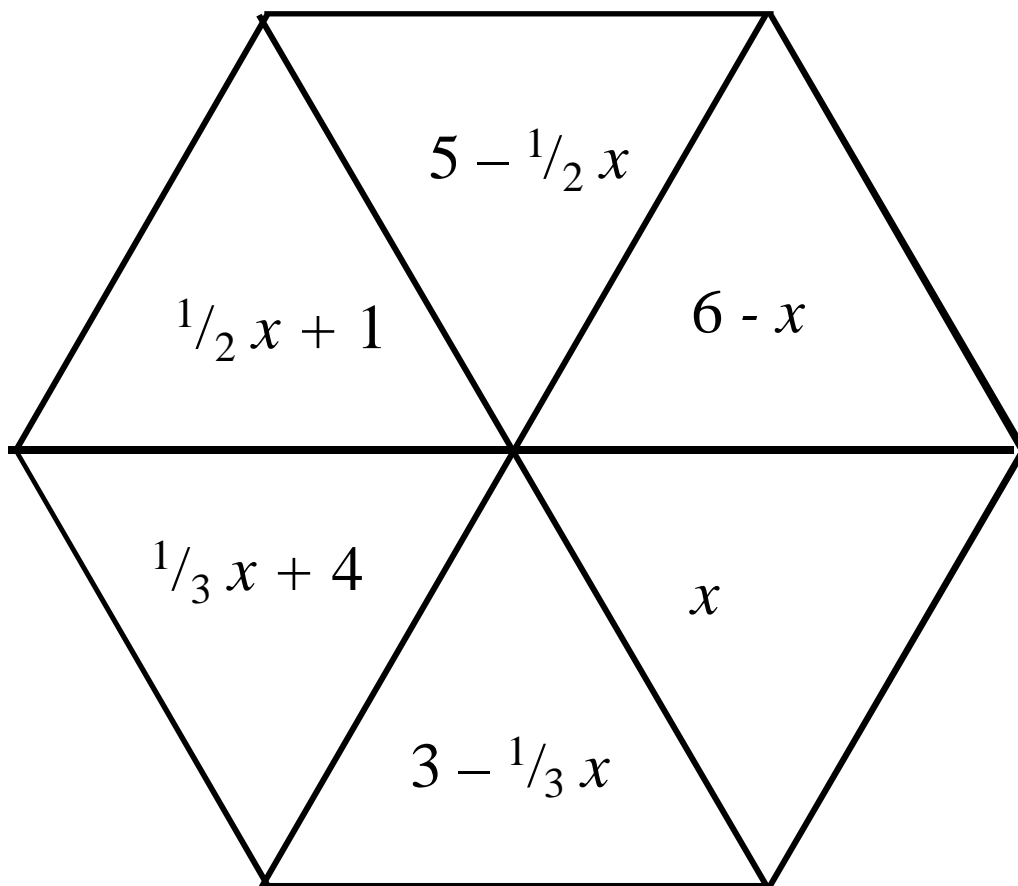
Round 1 Round 2 Round 3 Round 4 Round 5 Round 6

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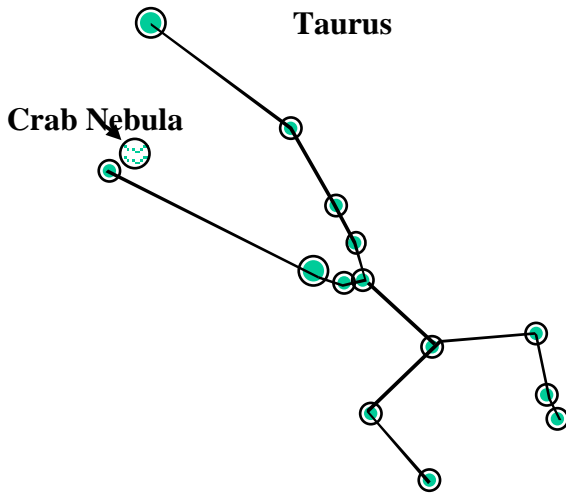
Round 7 Round 8 Round 9 Round 10 Total:

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Function War



Star Travel



The constellation looks like a picture on a flat page, and you might think the stars are all about the same distance from us, but that is not true.

If we move around the bull's horns starting near the Crab Nebula, the stars are at the following distances from Earth.

- 1 520 light years
- 2 65 light years
- 3 320 light years
- 4 160 light years
- 5 -----
- 6 150 light years
- 7 250 light years
- 8 150 light years

The star where the two legs of the bull join (Lambda Tauri) is estimated to be 1600 light years away from Earth.

Alien Commander Zorp has a super dooper space ship that can get him to the stars in Taurus quickly, as shown in the chart below. Can you complete the chart?

Star Number	Distance	Time needed by Commander Zorp
1	520	_____
2	65	_____
3	320	_____
4	160	32 months (2 years 8 months)
6	150	30 months (2.5 years)
7	250	50 months (over 4 years)
8	150	30 months
Lambda Tauri	1600	_____

His brother, Colonel Zoom, has an even faster ship. Here is his table:

Star Number	Distance	Time needed by Col. Zoom
1	520 years	52 days
2	65 years	6.5 days
3	320 years	32 days
4	160 years	_____
6	150 years	_____
7	250 years	_____
8	150 years	_____
Lambda Tauri	1600 years	_____

Which rule does Zoom use to calculate the time it will take to go to the stars?

(D = star distance)

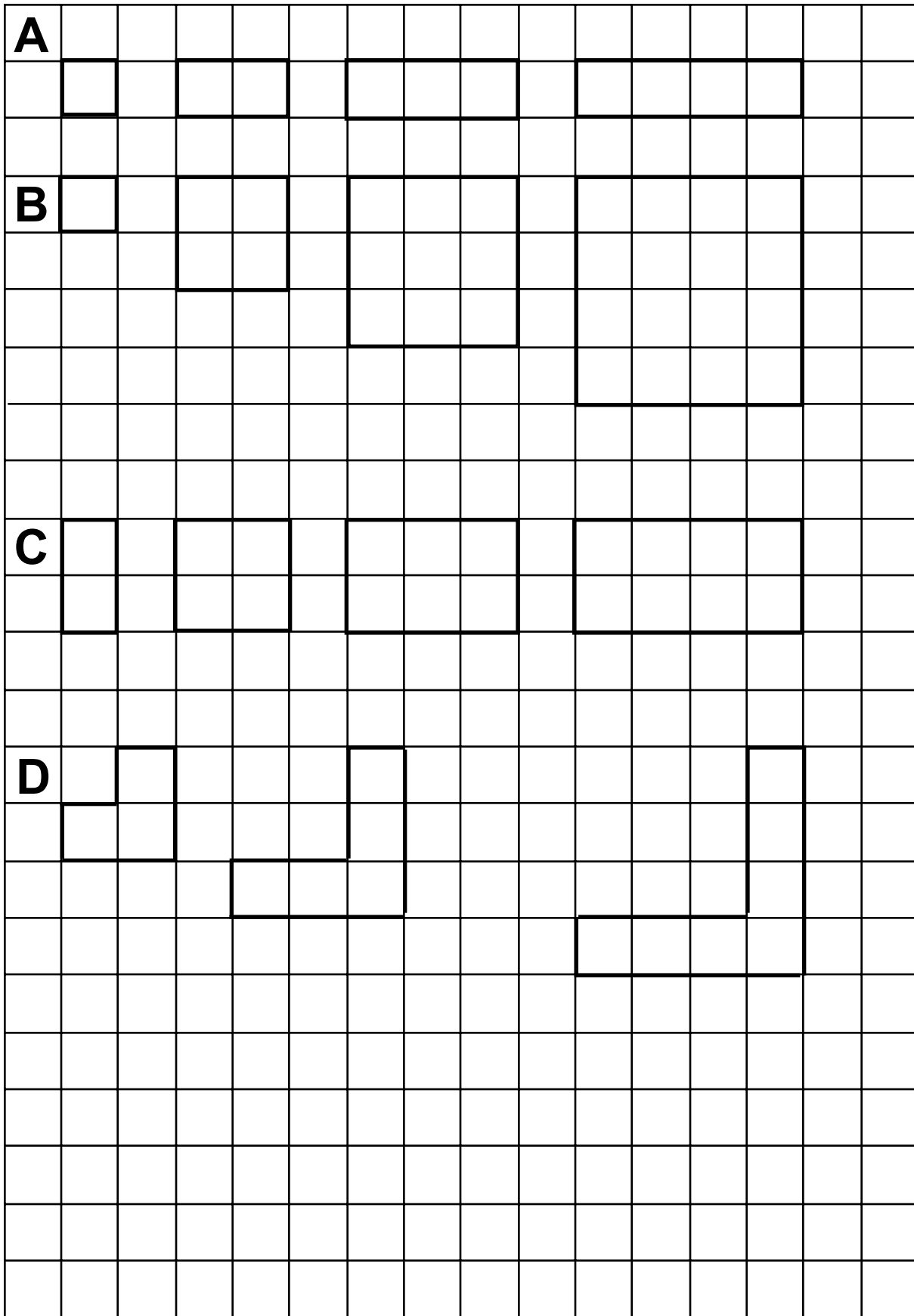
Zoom says: Time = ...

- 1) $100 + D$
- 2) $10 \times D$
- 3) $D \div 10$
- 4) $D - 100$

Name _____

Date _____

Perimeter and Area Patterns

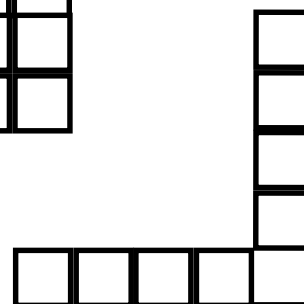
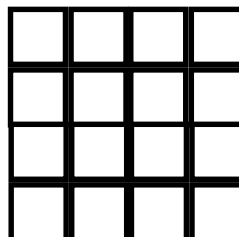
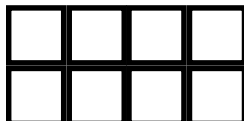


Perimeter and Area Pattern Recording Page

Complete the charts below for the four geometric patterns on the Perimeter and Area page. Can you predict the areas and perimeters for the figures not shown? Can you find a formula for the n th figure in the pattern? That is, can you find a formula with n as a variable that will help you calculate the area or perimeter when you plug in a number for n , the figure number in the pattern?

Pattern	Number	Perimeter	Area	Pattern	Number	Perimeter	Area
A	1	_____	_____	B	1	_____	_____
A	2	_____	_____	B	2	_____	_____
A	3	_____	_____	B	3	_____	_____
A	4	_____	_____	B	4	_____	_____
A	5	_____	_____	B	5	_____	_____
A	10	_____	_____	B	10	_____	_____
A	100	_____	_____	B	100	_____	_____
A	1000	_____	_____	B	1000	_____	_____
A	n	_____	_____	B	n	_____	_____

Pattern	Number	Perimeter	Area	Pattern	Number	Perimeter	Area
C	1	_____	_____	D	1	_____	_____
C	2	_____	_____	D	2	_____	_____
C	3	_____	_____	D	3	_____	_____
C	4	_____	_____	D	4	_____	_____
C	5	_____	_____	D	5	_____	_____
C	10	_____	_____	D	10	_____	_____
C	100	_____	_____	D	100	_____	_____
C	1000	_____	_____	D	1000	_____	_____
C	n	_____	_____	D	n	_____	_____



Block Patterns

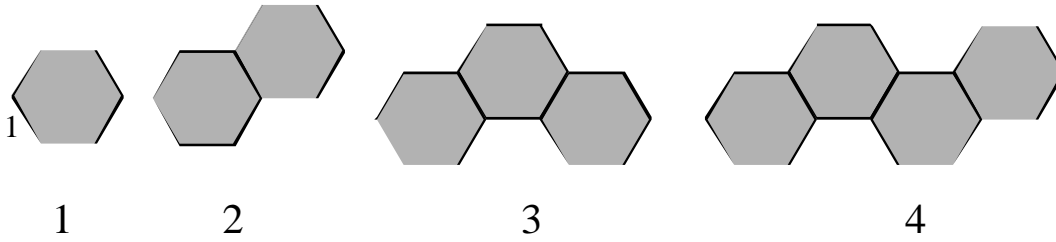


Figure Number	Perimeter
1	6
2	_____
3	_____
4	_____
5	_____
6	_____
10	_____
100	_____
<i>n</i>	_____

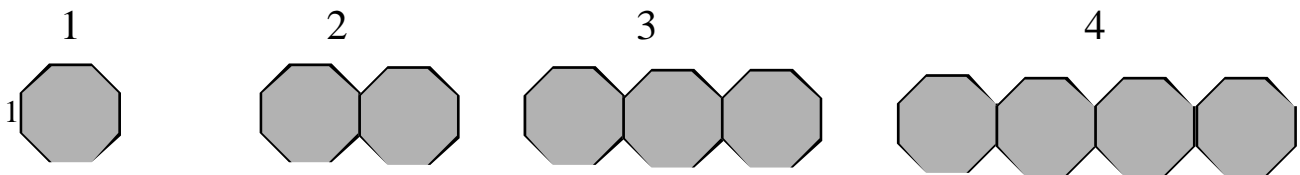


Figure Number	Perimeter
1	8
2	_____
3	_____
4	_____
5	_____
6	_____
10	_____
100	_____
<i>n</i>	_____



Block Patterns

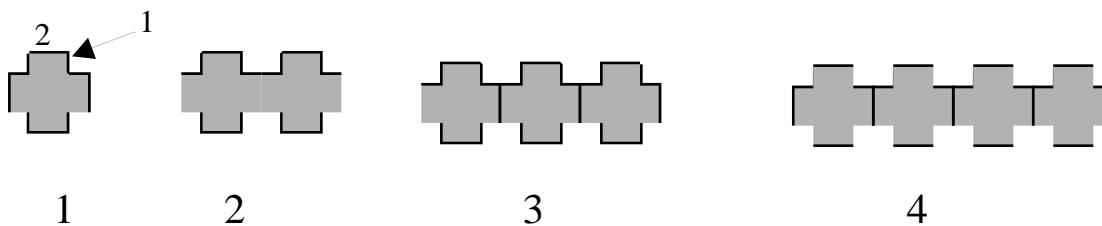


Figure Number	Perimeter
1	16
2	_____
3	_____
4	_____
5	_____
6	_____
10	_____
100	_____
<i>n</i>	_____

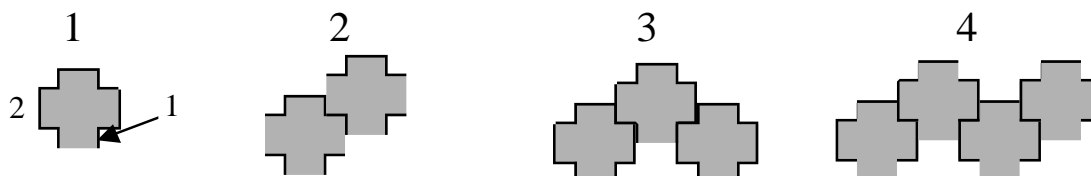
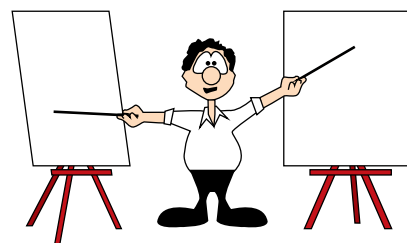


Figure Number	Perimeter
1	16
2	_____
3	_____
4	_____
5	_____
6	_____
10	_____
100	_____
<i>n</i>	_____



X in the Mix

Variables are used to describe the following recipe for Chocolate Brownies.

S = number of servings

B = cups of butter

C = cups of cocoa

X = cups of oil

G = cups of sugar

V = teaspoons of vanilla

E = number of eggs

F = cups of flour

N = cups of nuts



If the recipe requires $\frac{1}{4}$ cup of oil, use the formulas below to determine the remaining ingredients for the brownies.

$$B = X + C$$

$$C = 3 \times X$$

$$G = 8 \times X$$

$$V = X + C + B$$

$$E = G + V$$

$$F = E \div 3$$

$$N = \frac{1}{2} \times V$$

$$S = 2 \times (E^3 \div V^3)$$

This recipe makes _____ servings.

B = _____ cups butter

C = _____ cups cocoa

$\frac{1}{4}$ cup oil

G = _____ cups sugar

V = _____ tsp. Vanilla

E = _____ eggs

F = _____ cups self-rising flour

N = _____ cups nuts

Heat oven to 350° . Grease and lightly flour bottom of 8 or 9 inch square pan. In large saucepan, melt butter over low heat. Add cocoa and oil once butter is melted, stirring until completely blended. Blend sugar and vanilla. Beat in eggs, one at a time. Lightly spoon flour into measuring cup; level off. Stir in flour and remaining ingredients. Spread into pan. Bake 20-25 minutes, or until set in center. Cool completely. Cut into bars.

If the pan is 8 x 8 inches, how big would each bar be?

Mini Review - Patterns

Write the next 3 terms in the pattern. Describe the rule that each pattern follows.

1. 7.3, 8.0, 8.7, 9.4, ...

2. 40, 20, 10, 5,

3. 360, 36, 3.6, .36, ...

4. 4.5, 4.55, 4.555, 4.5555, ...

Use the rule given in each problem below to write 3 ordered pairs (x, y) .

5. The sum of x and y is 1.

6. The first number is one more than the second number.

7. The product of x and y is 1.

8. $y = 2x + 1$

9. $x - y = 4$



Pattern Problem- Discussion Cards

Problem 1

A frog is stuck at the bottom of a well. Each day, the frog can climb up five feet but each night he slides back down 2 feet. The table below lists his distance from the bottom of the well.

Day 1	5 feet	Night 1	3 feet
Day 2	8 feet	Night 2	6 feet

and so on ...

If the well is 65 feet deep, when will the frog get out of the well and join his sweetheart?



Problem 2

Mark has a small business selling plants. The greater his profit, the more plants he can produce for the next year. He always pays the same amount to rent his greenhouses. Here is a chart of his profits for the first four years.

Year 1: \$400
 Year 2: \$700
 Year 3: \$1300
 Year 4: \$2500

What will his profit be for Year 5? What do you think he pays to rent his greenhouse?



Problem 3

The following chart shows the price of an item and the sales tax required on the item.

Cost	Tax
\$7.50	\$0.75
\$112.00	\$11.20
\$0.60	\$0.06
\$2,450	\$245



What is the tax on an item costing \$25.30?

If an item requires a tax of \$35.20, how much did it cost originally?

If an item costs \$350.60, how much will you have to pay for it including tax?

Problem 4

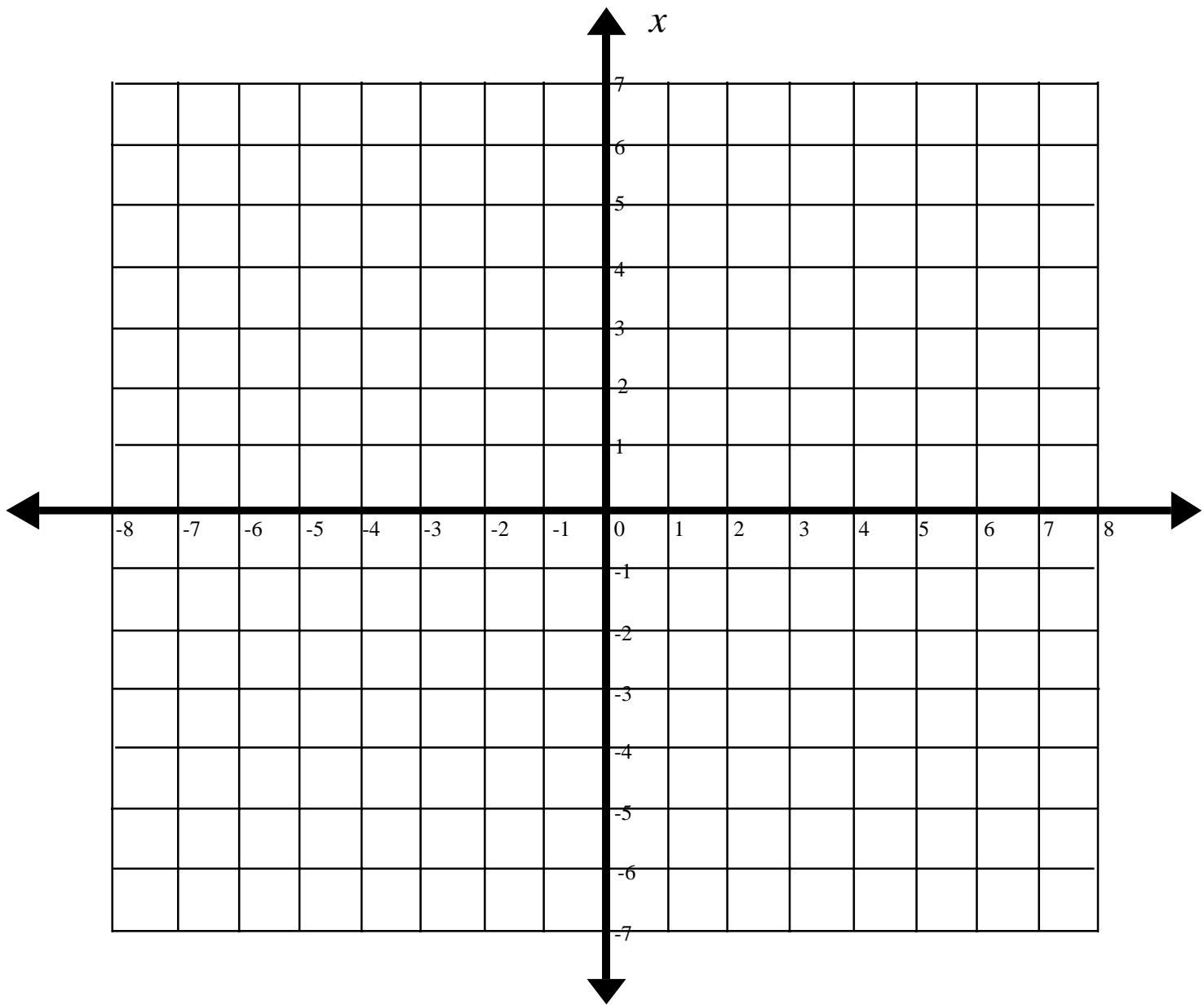
The following chart lists calories in a serving of chicken tenders based on how many pieces are eaten.

Number eaten	Calories
4	168
5	210
6	252
8	336

How many calories are in 17 chicken tenders?



Four in a Row



Algebraic Expression

Suggested expressions: $x + y$ $x - y$ $-x + 2y$ $|x - y|$ $-(x + y)$ $2x - 3y$ $y + \frac{1}{2}$

$y - xz$	$y(x + z)$	$-x + yz$	$\frac{x}{z - y}$	Finish	Start ↓
$x(y - z)$	<u>X-Racing</u>				$x - y$
	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; width: 60px; height: 60px; margin: 0 auto;"></div> <div style="border: 1px solid black; width: 60px; height: 60px; margin: 0 auto;"></div> <div style="border: 1px solid black; width: 60px; height: 60px; margin: 0 auto;"></div> </div>				
$x - y - z$	<div style="display: flex; justify-content: space-around; align-items: center;"> X Y Z </div>				$x + y + z$
$\frac{x}{y}$					$x(y + z)$
$x + y$					$x - yz$
$xy + z$					$x + yz$
$z - xy$	$z(x - y)$	$-y - xz$	$z(x + y)$	$\frac{x - y}{z}$	$y(x - z)$

-1	2	3	-4	4	5	-5	6	-10	12
----	---	---	----	---	---	----	---	-----	----

				Finish	Start ↓
<u>Inequality Race</u>					

He Grew and He Grew!

Age	Height (cm)	Weight (kg)
Birth	51	3.4
3 months	60	5.7
6 months	66	7.6
9 months	71	9.1
12 months	75	10.1
15 months	79	10.8
18 months	82	11.4
2 years	88	12.6
2.5 years	92	13.6
3 years	96	14.6
4 years	103	16.5

He Grew and He Grew!

Situation: Mrs. Parker, a sixth-grade mathematics teacher, kept records of her son James' height and weight from birth to age four years. We will use these numbers to learn about the *rate of change*.

1. Make a graph to represent height as a function of age. (*Note that the ages given are not evenly spaced.*)

2. What is the increase in height between:
 - a. birth and three months?
 - b. 15 months and 18 months?
 - c. birth and one year?
 - d. three years and four years?

3. Did Joshua's height grow faster or more slowly as he grew older? Explain your answer by referring to:
 - a. the answers to problem 2
 - b. the shape of the graph

4. If Joshua had grown the same number of centimeters every month, what would his average rate of growth be, in centimeters per month, between:
 - a. birth and three months
 - b. 15 months and 18 months
 - c. birth and one year
 - d. three years and four years

5. What was Joshua's average rate of growth in centimeters per month during his first four years? Compare this average with the averages you found in problem 4.

6. Write a short paragraph summarizing the relationship between Joshua's age, his height, and the rate of this growth. In particular, explain the idea of average rate of growth and how it changed with his age.