DMA Toolkit

Section IV

Grade Level Resources

DMA 6th grade:

- Mathematical Terms and Vocabulary
- Practice Assessment and Prompts
- Sample Lesson Plans

Idaho Direct Mathematics Assessment
K-12 Toolkit
State Department of Education

Sixth Grade Mathematics Terms and Vocabulary

A
- acute angle
- add
- addend
- algebra
- analog
- angle
- area
- associative
- average

B
- bar graph
- budget

C
- calendar
- Celsius
- cent
- centimeter
- change (money)
- chart
- circle
- circle graph
- circumference
- column
- combination
- commutative property
- compare
- composite
- computer
- congruent
- consecutive
- convert
- coordinate plane
- coordinate points
- coordinates
- cup

D
- data
- day
- decimal
- degree (Fahrenheit)
- denominator
- diagram
- diameter
- difference
- digit
- digital
- dime
- divide
- dividend
- divisor
- dollar
- double

E
- equal
- equilateral triangle
- equation
- equivalent
- estimate
- evaluate
- even number
- expanded numeral
- expression

F
- factor
- Fahrenheit
- figures
- flip
- foot
- formula
- fraction
- fractional part
- frequency

G
- gallon
- geometric
- geometry
- gram
- graph
- greater than
- greatest common factor

H
- half dollar
- half hour
- height
- hexagon
- hour
- hour hand
- hundred
- hundredth

I
- inch

K
- kilometer

L
- less than
- length
- line
- line graph
- line segment
- liter
- lowest terms

M
- mass
- mean
- median
- meter
- measure
- metric
- mile
- millimeters
- millions
- minus sign
- minute
- minute hand
- mixed number
- mode
- more than
- multiple
- multiply

N
- nickel
- number line
- number sentence
- numeral
- numerator
- numerical expression

O
- obtuse angle
- octagon
- odd number
- operation (computations)
- order
- ordered pair
- ounce

P
- parallel
- parallelogram
- pattern
- penny
- pentagon
- per
- percent
- perimeter
- perpendicular
- pi (π)
- pictograph
- pie graph
- pint
- place value
- plane figure
- point
- polygon
- pound
- predict
- prediction
- prime
- prime factorization
- probability
- product
- properties
- protractor

Q
- quadrilateral
- quart
- quarter
- quotient

R
- radius
- range
- rational number
- ray
- rectangle
- reflection
- regroup (borrow, carry)
- remainder
- rhombus
- right angle
- right triangle
- rotation
- rounding
- row
- rule
- ruler

S
- scale
- sequence
- semi-quadrilateral
- side
- simplify
- slide
- solution
- solve
- square
- squared
- straight angle
- subtract
- sum
- symbol
- symmetry

T
- table
- tally mark
- temperature
- tenth
- thermometer
- thousand
- thousandth
- time
- total
- translation
- trapezoid
- triangle
- triple
- turn
- twice

U
- unit

V
- value
- variable
- vertex
- Venn diagram

W
- whole number

Y
- yard
- yardstick

2003-04 Idaho Sixth Grade Direct Math Assessment

Name _____

It is important that you show or explain how you solved the problems on this assessment. If you use a calculator, show how you set up the math.

1. A 6th grade class of 30 students at Sunset School earned an ice cream party. They have $45.00 to spend.

ITEM	SERVINGS	COST
Hot Fudge	6	$2.45
Whipped Cream	10	$1.30
Cherries	15	$0.85
Ice Cream	12	$8.25

a. How many containers of ice cream are needed for each student to have one serving? *Show or explain how you found your answer.*

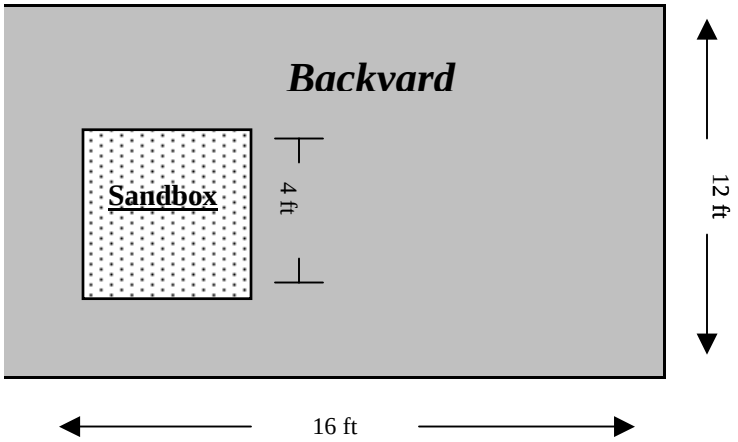
b. What is the total cost of the ice cream party if each student has ice cream, hot fudge, whipped cream and a cherry? How much change will be returned from the $45.00? *Show or explain how you found your* answer.

c. **About** how much will one serving of hot fudge cost? *Show or explain how you found your answer.*

d. When the party was over, there was ¼ of a container of ice cream left and ¼ of another container of ice cream left. What fraction of one whole container would be remaining? *Show or explain how you found your answer.*

Read problems 2, 3, 4, and 5 on this and the next two pages. Select three problems to answer. Answer ALL of the parts of the three problems you select to answer. Cross out the one problem that you do not choose to answer.

2. A family has decided to put a square sandbox in their backyard.



a. What is the perimeter of their backyard? *Show or explain how you found your answer.*

b. In order to put a wooden border around the sandbox and the backyard, how much border is needed? *Show or explain how you found your answer.*

c. The wooden border is sold in 1 yd sections. How many sections does the family need to purchase? *Show or explain how you found your* answer.

d. What is the area of the sandbox and what fraction of the total backyard area is this? *Show or explain how you found your answer.*

3. Jordan's piano practice times are shown in the table below.

Minutes Jordan Practiced						
Day	**Monday**	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**Saturday**
Minutes	30	22	45	15	26	30

a. What is her average (mean) practice time? *Show or explain how you found your answer.*

b. What is the mode of her practice times? *Show or explain how you found your answer.*

c. Using the Jordan's six practice times, find her median practice time. *Show or explain how you found your answer.*

d. The piano teacher wants Jordan to practice 30 minutes a day. How many minutes will she have to practice on Sunday to have a mean practice time of 30 minutes? *Show or explain how you found your answer.*

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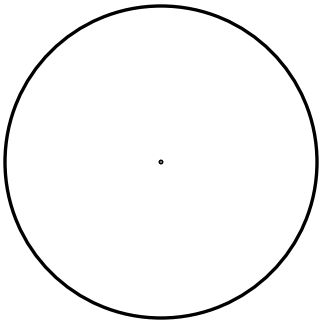
4. The circle below represents Mike's free time. Mike reads during ½ of his free time. Sports take up ¼ of his free time. He works on his computer ⅛ of his free time. The rest of his free time is spent hanging out with his friends.

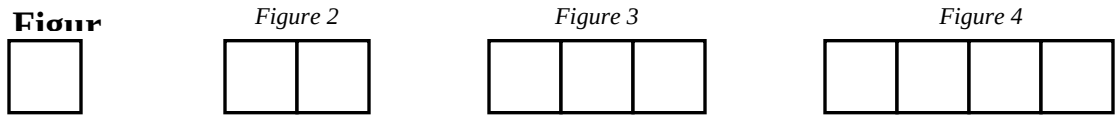
a. Use the circle at the right to graph how Mike spends his free time? *Label the graph and each section.*



b. What fraction of his free time is spent hanging out with his friends? *Show or explain how you found your answer.*

c. If he spends 60 minutes reading, how many minutes are spent working on his computer? *Show or explain how you found your answer.*

5. Terry used Popsicle sticks to make the first four figures of the pattern below.



a. Complete the table by using the pattern from the figures. *Show or explain how you found your answer.*

Figure Number	Number of Sticks
1	4
2	7
3	____
4	____

b. How many sticks are required to make figure 7 in the pattern? *Show or explain how you found your answer.*

c. How many sticks are required to make figure 25 in the pattern? *Show or explain how you found your answer.*

d. Let *n* represent the number of the figure. Write a mathematical expression or rule that explains the relationship between the number of the figure and the number of sticks needed. *Show or explain how you found your answer.*

2002-03 Idaho Sixth Grade Direct Math Assessment

Name _____

It is important that you explain and show how you solved the problems on this assessment. If you use a calculator, show how you set up the math.

1. Mrs. Smith's class of 24 students has earned a pizza party. They have $75.00 to spend on pizza and pop.

One topping pizza = $7.50 Six pack pop = $1.25

a. If each pizza has eight slices, and each student wants 3 slices, how many pizzas will they need? *Show or explain how you found your answer.*

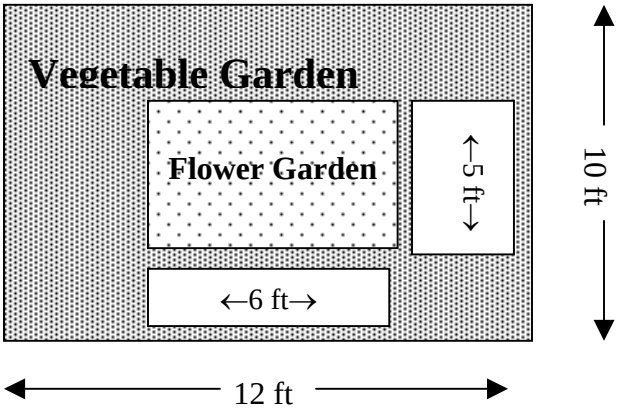
b. If each student wants one can of pop, how many six packs will they need? *Show or explain how you found your answer.*

c. The class decides to buy enough for 3 slices of pizza and one can of pop for each student. What will be the total cost for the pizza party and how much change will Mrs. Smith's class receive from the $75.00? *Show or explain how you found your answer.*

d. If there is 1/8 of one pizza left and 5/8 of another pizza left at the end of the party, what fraction of one whole pizza would be remaining? *Show or explain how you found your answer.*

Read problems 2, 3, 4 and 5 on the next few pages. Select three problems to answer. Answer ALL of the parts of the three problems you select to answer. Cross out the one problem that you do not choose to answer.

2. Lynn is going to put a flower garden in the middle of a vegetable garden.



Area = length x width

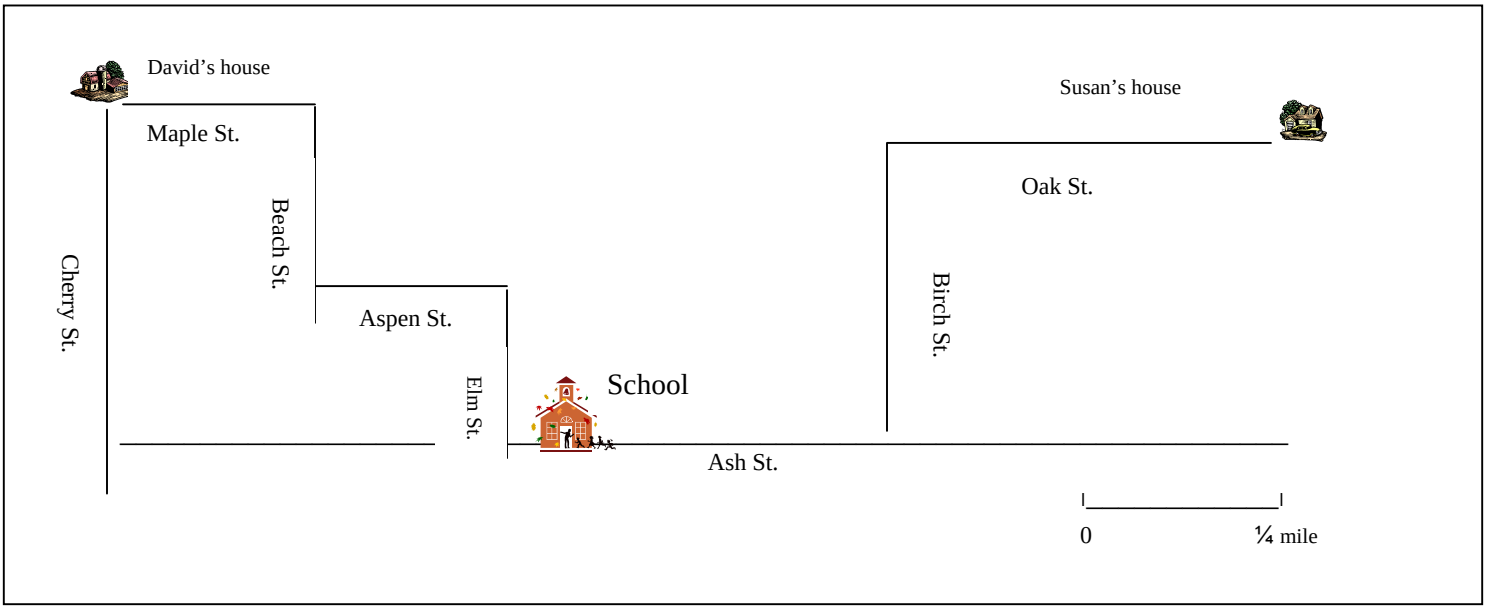
a. What is the perimeter of the vegetable garden? *Show or explain how you found your answer.*

b. What is the perimeter of the flower garden? *Show or explain how you found your answer.*

c. How much **total** fencing will Lynn need to buy to fence all around both gardens? *Show or explain how you found your* answer.

d. What is the area of the flower garden and what fraction of the total garden area is this? *Show or explain how you found your answer.*

3. The following is a map of David's and Susan's neighborhood. Use the given scale to answer the questions.



a. Would it be shorter for David to walk to school using the Cherry Street route or the Maple Street route? *Show or explain how you found your answer.*

b. About how far do David and Susan each have to walk to school? Who has the shortest walk to school? *Show or explain how you found your answer.*

c. Susan walks ¼ mile in five minutes. School starts at 8:20 AM. What time does she need to leave her house to make it to school on time? *Show or explain how you found your answer.*

4. Jan's math test scores are 93, 95, 76, 88 and 93.

a. What is her average (mean) score? *Show or explain how you found your answer.*

b. Using Jan's five test scores, find her median score. *Show or explain how you found your answer.*

c. What is the mode of her scores? *Show or explain how you found your answer.*

d. Jan really wants a mean score of 90. What is the lowest score she can earn on the next test so that she has a mean score of 90? *Show or explain how you found your answer.*

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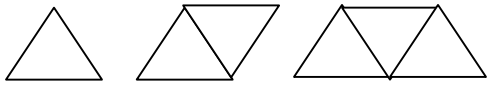
5. The first three figures of a pattern are:



a. Complete the table showing the number of triangles, and the number of sticks required to form them.

Number of Triangles	Number of Sticks
1	3
2	

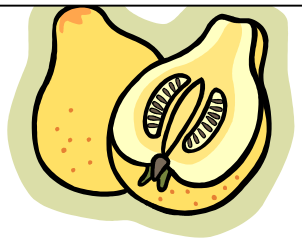
b. How many sticks would be required to make 6 triangles? *Show or explain how you found your answer.*

c. How many sticks would be needed to make 25 triangles? *Show or explain how you found your answer.*

d. Write the rule that explains the relationship between the number of triangles and the number of sticks needed.

Sixth Grade Idaho Direct Mathematics Assessment

#6-001 Sixth-Grade Practice Prompt *Number and Computation*

Mac's Grocery	Della's Grocery	
Brand A Peaches 12 oz can…….4/$1.00	Brand A Peaches 12 oz can……8/$2.00	
Brand B Pears 8 oz can……10/$2.00	Brand B Pears 14 oz can.……3/$1.00	

a. How much would one can of the Brand B pears be if you bought it at Della's Grocery? *Show or explain how you found your answer.*

b. Which brand of fruit at which store is the best buy? *Show or explain how you found your answer.*

c. At which store are the Brand A Peaches the better buy? *Show or explain how you found your answer.*

d. If you need 3 of any size can of peaches and 4 of any size can of pears, which grocery store would you go to for the best buy? *Show or explain how you found your answer.*

Sixth Grade Idaho Direct Mathematics Assessment

#6-002 Sixth-Grade Practice Prompt *Number and Computations*

The following table gives the scoring of the Chicago Bulls in the final game of the 1998 NBA playoff game against the Utah Jazz.

Player	**Number of Field goal (2 points each)**	**Number of Field goals (3 points each)**	**Number of Free Throws (1 point each)**
Buechler	1	0	0
Jordan	15	3	12
Harper	2	0	0
Kukoc	7	1	0
Pippen	4	0	0
Rodman	3	0	1
Wennington	1	0	0

a. How many **total** points did the Bulls score in this game? *Show or explain how you found your answer.*

b. What **percent** of the total points did Jordan score? *Show or explain how you found this percent.*

c. What **fraction** of the total points did the five lowest scoring players make? *Show or explain how you found this fraction.*

Sixth Grade Idaho Direct Mathematics Assessment

#6-003 Sixth-Grade Practice Prompt *Number and Computations*

For Christmas, you saved a total of $75.50 to buy gifts. You have to buy gifts for 2 brothers and your parents. You are planning to buy your parents a clock radio that is for both of them. The clock radio costs $33.50. At this store, all sales tax is already included in their prices.

a. How much will you have left after buying the clock radio to spend on each brother? *Show or explain how you found this amount.*

b. What percent of your money do you spend on your parents? *Show or explain how you found this percent?*

c. If you find a shirt for one brother that costs $19.95 and a shirt for the other that costs $20.25, would you have enough money to buy all three gifts? *Show or explain how you found your answer.*

Sixth Grade Idaho Direct Mathematics Assessment

#6-004 Sixth-Grade Practice Prompt Geometry and Measurement

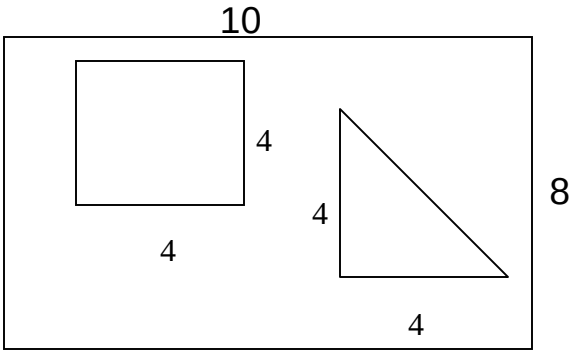
a. In the space below, draw a rectangle that has a perimeter 14 cm. Indicate the length of each side, but you do not need to draw the rectangle to scale.

b. In the space below, draw a second rectangle. Make the length of one side of this rectangle twice as long as the shorter side of the rectangle you drew in part (a), but keep the perimeter 14 cm. Indicate the length of each side of the rectangle.

c. What would be the length and width of a rectangle that has a perimeter of 14 cm and has the largest possible area? Explain how you know.

Sixth Grade Idaho Direct Mathematics Assessment

#6-005 Sixth-Grade Practice Prompt *Geometry and Measurement*



a. What is the area of the large square? *Show or explain how you found your answer.*

b. What is the combined area of the square and the triangle? *Show or explain how you found your answer.*

c. What is the ratio of the combined area of the square and rectangle to the area of the large rectangle? *Show or explain how you found your answer.*

d. What size rectangle could you draw within the large rectangle so that the three smaller shapes take up 50% of the large rectangle's area? *Show or explain how you found your answer.*

Sixth Grade Idaho Direct Mathematics Assessment

#6-006 Sixth-Grade Practice Prompt *Probability*

There are six people in a room where a checkers tournament is being held. Each person in the room will play checkers with each of the other people exactly once.

a. How many different games will be played? *Show or explain how you found your answer.*

b. Four more people enter the checkers tournament, how many games would now have to be played so that each person would play all the other players exactly once? *Show or explain how you found your answer.*

c. Predict how many games would be played if 37 people signed up for the tournament? *Show or explain how you found your answer.*

Sixth Grade Idaho Direct Mathematics Assessment

#6-007 Sixth-Grade Practice Prompt *Probability*

Suppose that there are 8 green, 5 red, and 3 blue, and 2 orange M&M's in a bowl.

a. If you reach in and grab one M&M without looking, what color is it most likely to be? *Explain how you found your answer.*

b. What is the probability that you grab a blue M&M? *Show or explain how you found your answer.*

c. Suppose that you grab two M&M's and you do not see either of them. How many different combinations could you have? *Show or explain how you found your answer.*

Sixth Grade Idaho Direct Mathematics Assessment
#6-008 Sixth-Grade Practice Prompt *Data Analysis and Number*

Mrs. Steiner's class won a doughnut party. She surveyed each student to select his/her favorite kind. 8 wanted chocolate, 14 wanted glazed, 5 wanted powdered, and 1 wanted a plain doughnut.

a. Make a frequency table with tally marks showing the results of their survey.

Chocolate	**Glazed**	**Powdered**	**Plain**

b. How many students are in Mrs. Steiner's class? *Show or explain how you found your answer.*

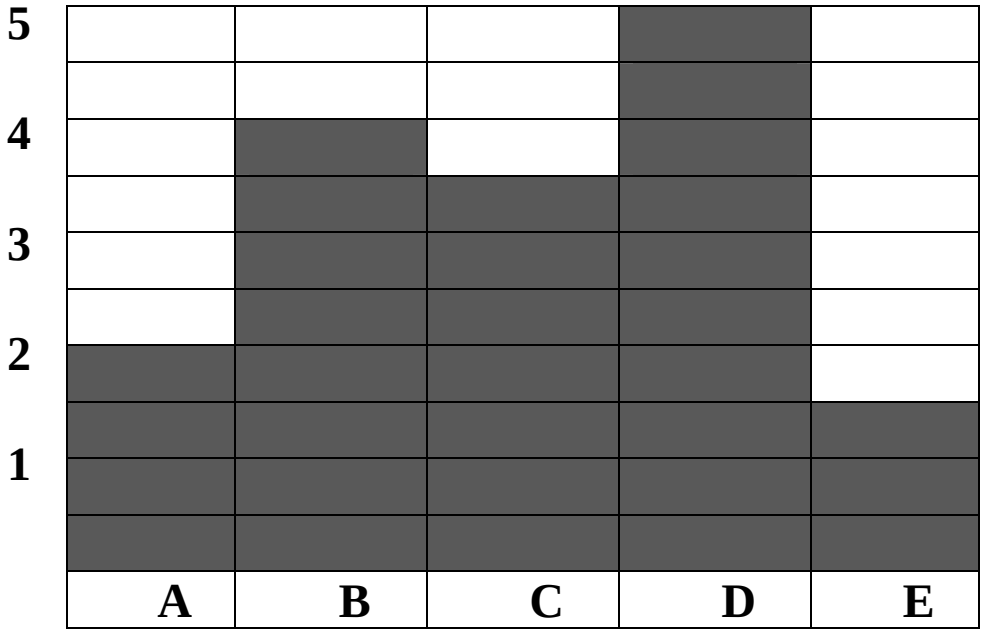
c. What fraction of students wanted glazed doughnuts? *Show or explain how you found your answer.*

Sixth Grade Idaho Direct Mathematics Assessment

#6-009 Sixth-Grade Practice Prompt Data Analysis, Number, & Algebra

1. The following bar graph represents values between 0 – 5 on a scale:

Table of Scale Values



a. Which bar represents a value of 5? *Explain your answer.*

b. What is the value of bar E? Write as a mixed number and a decimal. *Show or explain how you found your answer.*

c. List the names of the bars by the values they represent in order from least to greatest. *Show or explain how you found your answer.*

d. What is the difference between bar A and bar E? *Show or explain how you found your answer.*

e. Write an equation to find the value of 2 times the value of bar C, then solve. *Show or explain how you found your answer.*

Sixth Grade Idaho Direct Mathematics Assessment

#6-010 Sixth-Grade Practice Prompt *Algebra and Functions*

A booth at the circus is offering elephant rides. The table below shows the relationship between the number of rides a person takes and the cost of the rides.

Elephant Rides

Number	Cost
1	$2.00
2	$2.50
3	$3.00
4	$3.50
5	?
10	?

a. If the pattern continues in the same way, what would be the cost for 5 rides and the cost for 10 rides? *Show or explain how you found your answer.*

b. Tyler had $5.50 to spend. What is the greatest number of rides he could take? *Show or explain how you found your answer.*

Sixth Grade Idaho Direct Mathematics Assessment

#6-011 Sixth-Grade Practice Prompt *Algebra and Functions*

a. Complete the function table. *Show or explain how you found your answers.*

a	**4a – 3**
3	?
4	?
5	?
12	?
?	65

b. Look at the following function table. Write the rule for the table. *Show or explain how you found your answer.*

b	**?**
2	12
6	32
9	47
15	77
18	92

Sixth Grade Sample Lesson Plan:
Algebra and Functions

Focus: Algebra/Functions

Standards: 320.01.a, 320.01.b, 320.03.a

Objectives: The student will be able to do the following:

A. Evaluate an expression to complete a function table;
B. Use a function table and manipulatives to find an algebraic rule.

Materials:

A. (Optional) Hands-on Equations
B. Any of the following would work: Unifix Cubes, Beans, Plastic chips

Explanation of Instructional Activity:

Objective A:

1. Review definitions of variable and expression.

2. Write the expression substituting the different values for the variable.
For example, 4a – 3 = 4(3) – 3.

a	**4a – 3**
3	?
4	?
5	?
12	?
?	65

3. Solve for the first four variables.

4. Using the equation 4a – 3 = 65, teach the process of using opposite operations to get the "a" by itself.

Add 3 to both sides:

$$\begin{aligned} 4a - 3 &= 65 \\ \underline{+3} \quad & \underline{+3} \\ 4a \quad &= 68 \end{aligned}$$

Divide both sides by 4:

$$\frac{4a}{4} = \frac{68}{4}$$

$$a = 27$$

Objective B:
Using manipulatives to find an algebraic rule

1. Divide class into small groups and give each a set of about 50 manipulatives.

2. Count out 12 of the manipulatives.

O O O
O O O
O O O
O O O

b	?
2	12
6	32
9	47
15	77
18	92

3. Using the value in the variable column, explore different ways of dividing the set in the right column of the function table into groups. (The groups may not come out evenly.) A probable response: 2 x 6 = 12

O O O O O O
O O O O O O

At this point, the students may think the rule is: b times 6.

4. Test this rule with 32 manipulatives and groups of six:

O O O O O O
O O O O O O
O O O O O O
O O O O O O
O O O O O O
O O

5. Since this does not come out evenly and the rule does not work (6 x 6 ≠ 32), have students go back to the set of 12 and try to regroup (example: 2 x 5 + 2 = 12).

O O O O O O O O O O O O

6. Test this new rule "b x 5 + 2" with the 32 manipulatives: 6 x 5 + 2 = 32. Since this does work, test it with 47 manipulatives: 9 x 5 + 2 = 47. Again, this does work.

7. With a paper and pencil, test the other numbers in the function table.

8. When students are satisfied that the rule "b x 5 + 2" will continue to work, tell them that it can also be written as: 5b + 2.

Feel free to modify, add to, or change this to make it work for your students!

Sixth Grade Sample Lesson Plan:
Finding Area and Perimeter of Rectangles

Focus: **Measurement**

Concept: **Area & Perimeter of Rectangles**

Objectives: **Students will be able to do the following:**

- Recognize the difference between area and perimeter
- Devise a method to calculate both area and perimeter

Idaho Achievement Standards: 319.01 Concepts and Principles of Measurement

Content Knowledge and Skills: 319.01.d. Solve problems involving time, length, perimeter, area, weight/mass, and temperature

Procedure for Teaching:

1) Arrange some student desks in a rectangle (i.e. two rows of five)
2) Have the students count how many desk edges are visible. Explain that the distance around an object or shape is its perimeter.
3) Have the students count the number of desk tops. Explain that the space an object takes us is its area.
4) Try other desk arrangements and have the students determine the area and perimeter.
5) Lead a discussion that allows the students to discover that if the add up all the sides they will have the perimeter. Some students may even be able to devise the formula: $P = 2 (l + w)$.
6) Lead a discussion that allows the students to discover the formula for area. $A = l \times w$.

Materials and Resources: Student desks

Follow-up Activities:

- Use geoboards to create and measure the area and perimeter of rectangles.
- Find other rectangles in the classroom, measure them with rulers, and calculate the area and perimeter.
- Use graph paper to draw, them measure the area and perimeter of rectangles.

Feel free to modify, add to, or change this to make it work for your students!