RIGHTSTART™ MATHEMATICS

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with Kathleen Cotter Lawler

FIFTH GRADE LESSONS

Second Edition

Activities for Learning, Inc.

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RightStart™ Mathematics Objectives for Fifth Grade

	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Numeration				
Finds squares and square roots				
Reads, writes, rounds, and compares numbers				
Multiplication and Division				
Applies commutative, associative, and distributive properties				
Multiplies multiples of 10 and exponents				
Does division using factors				
Does long division by a two-digit divisor	N/A			
Problem Solving				
Solves two-step problems involving fractions and decimals				
Uses dimensional analysis to solve problems	N/A	N/A	N/A	
Decimals and Percents				
Rounds and compares decimals to the thousandths	N/A			
Adds and subtracts decimals to three decimal places	N/A			
Divides decimals by whole numbers and decimals	N/A			
Understands and uses simple percentages	N/A	N/A		
Solves percentage problems with a calculator	N/A	N/A		
Fractions				
Adds and subtracts mixed fractions with unlike denominators	N/A	N/A		
Converts between mixed numbers and improper fractions	N/A	N/A		
Finds equivalent fractions on the multiplication table	N/A	N/A		
Multiplies and divides various fractions	N/A	N/A		
Measurement				
Understands cubic units: cm^3, dm^3, in^3, ft^3, and yd^3	N/A	N/A		
Uses dimensional analysis to convert measurements	N/A	N/A	N/A	
Converts measurements between SI and US customary (e.g., m to ft)	N/A	N/A	N/A	
Probability and Combinations				
Calculates the probability of an event	N/A	N/A		
Calculates probabilities	N/A	N/A		
Finds probabilities using combinations	N/A	N/A		
Coordinate Systems				
Finds locations using a coordinate system	N/A	N/A	N/A	
Makes line plots and interprets data	N/A	N/A	N/A	
Finds points on a Cartesian coordinate system using ordered pairs	N/A	N/A	N/A	
Places negative points on a Cartesian coordinate system	N/A	N/A	N/A	
Plots equations on a Cartesian coordinate system	N/A	N/A	N/A	
Geometry				
Classifies shapes by attributes	N/A	N/A	N/A	
Scales figures	N/A	N/A	N/A	
Constructs regular polygons incribed in a circle	N/A	N/A	N/A	
Constructs inscribed circles in polygons	N/A	N/A	N/A	
Constructs inscribed squares in triangles	N/A	N/A	N/A	

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Lesson 75: Volume of Geometric Solids

OBJECTIVES:

1. To find the volumes of some of the geometric solids
2. To find the volume of a more complicated figure

MATERIALS:

1. Worksheet 63, Volume of Geometric Solids
2. Geometric solids, 1 set for every 3-4 children
3. 4-in-1 rulers
4. Casio SL-450S calculators

ACTIVITIES FOR TEACHING:

Warm-up. Distribute the worksheets to the children. Tell them to do just the warm-up problems. Solutions are:

45.67	76.540	76.54	17.8
+ 76.54	− 4.567	× 4.5	4.3) 76.54
122.21	71.973	38270	
		306160	
		344.430	

Worksheet 63. Distribute the geometric solids, 4-in-1 rulers, and calculators.

Tell the children that in the previous lesson they found some volumes made with geometry panels. In this lesson they will find the volumes of eight of the geometric solids.

Volume of the cube. Tell them to find the cube and to measure it in centimeters. [Each side is 5 cm.] Ask: How do you find the area of the base? [5 × 5] Tell them to write 5 × 5 in the second column of the table on their worksheets. See the figure on the next page.

Ask: What is the height? [5] Tell them to write that in the third column of the table. Ask: How do you find the volume? [multiply the base times the height] Tell them to find the volume and write it in the fourth column. [125 cm^3] Remind them to include the units.

Volume of the square prism. Tell the children to find the square prism, then to measure and record the measurements. [base: 2.5 × 2.5 and height: 7.5] Tell them to use their calculator to get the volume. [46.875] Ask: What do the instructions say about rounding? [to the nearest tenth] So, what do you write down for the volume? [46.9 cm^3]

Volume of the rectangular prism. Tell the children to calculate the volume of the rectangular prism in the table. Tell them compare with a neighbor. The solution is shown on the next page.

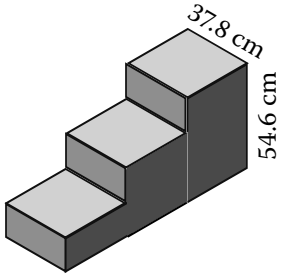
Remaining solids. Ask: why do you think the table has the bases given to you? [because we haven't learned how to calculate these yet] Tell them to complete the table.

EXPLANATIONS:

ACTIVITIES FOR TEACHING CONTINUED:

	Base (B)	Height (H)	Volume (V)
Cube	**5 × 5**	**5**	**125 cm^3**
Square prism	**2.5 × 2.5**	**7.5**	**46.9 cm^3**
Rectangular prism	**3 × 3.6**	**4.5**	**48.6 cm^3**
Triangular prism	**$\frac{1}{2}$ × 2.5 × 2.1**	**7.5**	**19.7 cm^3**
Hexagonal prism	5.2 cm^2	**7.5**	**39 cm^3**
Octagonal prism	5.9 cm^2	**7.5**	**44.3 cm^3**
Small cylinder	4.7 cm^2	**7.5**	**35.3 cm^3**
Large cylinder	17.6 cm^2	**5**	**88 cm^3**

Problem 2. Tell the children to complete the second problem. One way is to find the volume of one step, then multiply by 6 for all the steps.



The height of 1 step is 54.6 ÷ 3 = 18.2
***V* for one step = 37.8 × 37.8 × 18.2 = 26004.889 cm^3**
***V* for 6 steps = 26004.889 × 6 = 156,000 cm^3**

Another way is to realize that the first and second steps equals the third step. So find volume of third step and double it.

***V* of third step = 37.8 × 37.8 × 54.6 = 78014.664 cm^3**
***V* for 6 steps = 78014.664 × 2 = 156,029 cm^3**
***V* for 6 steps = 156,000 cm^3**

In conclusion. Ask: How do you find the volume of a box? [Multiply the area of the base by the height.] Does it matter which part of the box is the base? [no]

EXPLANATIONS CONTINUED:

Measurements may vary.

If there is additional time following this lesson, play Slower Multiplication Card Speed game, found in *Math Card Games* book, P30.

5.MD.C.5.A, 5.MD.C.5.C

Name: _____

Date: _____

Warm-Up

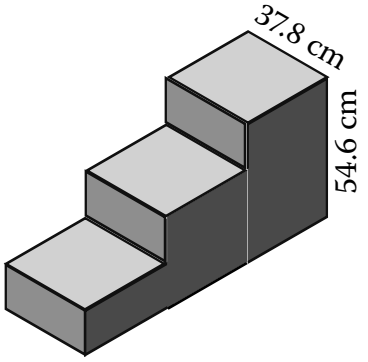
Do the calculations.

45.67 + 76.54 76.54 − 4.567 76.54 × 4.5 76.54 ÷ 4.3

1. Find the volume of the geometric solids listed below, using a calculator. Measure to the nearest tenth of a centimeter. Round the volumes to the nearest tenth of a cubic centimeter.

	Base (B)	Height (H)	Volume (V)
Cube			
Square prism			
Rectangular prism			
Triangular prism			
Hexagonal prism	5.2 cm^2		
Octagonal prism	5.9 cm^2		
Small cylinder	4.7 cm^2		
Large cylinder	17.6 cm^2		

2. Find the volume of the group of identical square steps. Round the volume to the nearest thousands of cubic centimeters.



Lesson 85: Equivalent Fractions on Multiplication Table

OBJECTIVES:

1. To use the multiplication table to simplify fractions
2. To practice simplifying fractions

MATERIALS:

1. Fraction charts
2. Worksheet 68, Multiplication Table
3. *Math Card Games* book, F23.1

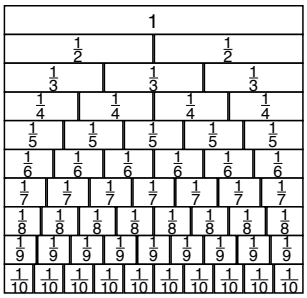
ACTIVITIES FOR TEACHING:

Warm-up. Ask: Two thirds plus what equals one? [one third] Two thirds plus what equals two? [four thirds] Nine eighths minus what equals one? [one eighth]

Fractions on the multiplication table. Distribute the fraction charts. Have the children refer to Worksheet 68, Multiplication Table from the previous lesson. Tell them that the multiplication table can be used for simplifying fractions.

Tell them to look at their fraction chart and name the fractions that are equal to one half. [$\frac{1}{2}$, $\frac{2}{4}$, $\frac{3}{6}$, $\frac{4}{8}$, $\frac{5}{10}$]

Now tell the children to look on their multiplication table and find a 1 and a 2 in the same column. This represents $\frac{1}{2}$. See the right figure below.



The fraction chart.

1	2	3	4	5	6	7	8	9	10
2	4	6	8	10	12	14	16	18	20
3	6	9	12	15	18	21	24	27	30
4	8	12	16	20	24	28	32	36	40
5	10	15	20	25	30	35	40	45	50
6	12	18	24	30	36	42	48	54	60
7	14	21	28	35	42	49	56	63	70
8	16	24	32	40	48	56	64	72	80
9	18	27	36	45	54	63	72	81	90
10	20	30	40	50	60	70	80	90	100

Showing one half on the multiplication table.

Ask: Can you find two fourths? Touch the 2 and 4 cells with your index finger and thumb. See left figure below.

1	2	3	4	5	6	7	8	9	10
2	4	6	8	10	12	14	16	18	20

Showing two fourths.

1	2	3	4	5	6	7	8	9	10
2	4	6	8	10	12	14	16	18	20

Showing three sixths.

Continue with three sixths. See the right figure above. Tell them to keep going to the tenths. See figures below.

1	2	3	4	5	6	7	8	9	10
2	4	6	8	10	12	14	16	18	20

Showing four eighths.

1	2	3	4	5	6	7	8	9	10
2	4	6	8	10	12	14	16	18	20

Showing five tenths.

EXPLANATIONS:

A Multiplication Table can also be found in Appendix p. 2.

ACTIVITIES FOR TEACHING CONTINUED:

Tell them to name and touch more fractions in the top two rows that are equivalent to one half. See below.

1	2	3	4	5	6	7	8	9	10
2	4	6	8	10	12	14	16	18	20

More fractions equivalent to one half.

Next tell them to use the multiplication table to find three fifths and some equivalent fractions. See below.

3	6	9	12
4	8	12	16
5	10	15	20

3	6	9	12
4	8	12	16
5	10	15	20

3	6	9	12
4	8	12	16
5	10	15	20

3	6	9	12
4	8	12	16
5	10	15	20

Showing equivalent fractions for three fifths.

Simplifying fractions. Tell the children that they can also use the multiplication table to simplify fractions. It is just the opposite. Say: To simplify $\frac{3}{9}$, first find a column with both 3 and 9. [3s column] Then slide all the way to the left. Ask: What does $\frac{3}{9}$ simplify to? [$\frac{1}{3}$] See below.

1	2	3	4	5
2	4	6	8	10
3	6	9	12	15
4	8	12	16	20

1	2	3	4	5
2	4	6	8	10
3	6	9	12	15
4	8	12	16	20

Simplifying three ninths to one third.

Repeat for $\frac{12}{16}$. Ask: What column has both 12 and 16? [4s column] Then slide all the way to the left. Ask: What does $\frac{12}{16}$ simplify to? [$\frac{3}{4}$] See the two left figures below.

1	2	3	4
2	4	6	8
3	6	9	12
4	8	12	16

1	2	3	4
2	4	6	8
3	6	9	12
4	8	12	16

Simplifying twelve sixteenths to three fourths.

1	2
2	4
3	6
4	8
5	10
6	12
7	14
8	16

1	2
2	4
3	6
4	8
5	10
6	12
7	14
8	16

Ask: Supposing you had used the 2s column for the 12 and 16, what would it simplify to? [$\frac{6}{8}$] Say: Since $\frac{6}{8}$ is not simplified, put it into the 2s column again, to be simplified to $\frac{3}{4}$. See the two right figures above.

Simplifying with the Multiplication Table game. Play the Simplifying with the Multiplication Table game, found in *Math Card Games* book, F23.1.

In conclusion. Ask: If two fractions are equivalent, what do we call the fraction with the lower numbers? [simplified] What does 10 twentieths simplify to? [one half] What does 20 fortieths simplify to? [one half]

EXPLANATIONS CONTINUED:

Both the numerator and denominator of the fraction must be in the same column, but they need not be adjacent.

Some children may benefit from seeing these fractions on the fraction chart.

5.NF.A.1

Name: _____

Date: _____

Fill in the multiplication table as instructed in the lesson.

Multiplication Table

1	2	3	4	5	6	7	8	9	10
2									
3									
4									
5									
6									
7									
8									
9									
10									

Lesson 122: Analyzing Patterns

OBJECTIVES:

1. To generate data from a mathematical relationship
2. To graph the patterns
3. To analyze the patterns

MATERIALS:

1. Warm Up Practice 14
2. Worksheet 103, Analyzing Patterns
3. 4-in-1 rulers or other straightedges

ACTIVITIES FOR TEACHING:

Warm-up. Distribute the warm-up practice sheets. Tell the children to complete the second section. Solutions are on the right.

Worksheet 103. Distribute the worksheets and straightedges. Tell the children that today's lesson is about plotting relationships on a graph.

Problems 1 and 2. Tell the children to complete the first two problems on the worksheet.

1. Ari plays three math card games every week. Jordan plays six math games every week and Cy plays two. Fill in the table to represent the number of games that they played.

The completed table is shown below.

	Total Number of Math Games Played		
Weeks	Ari	Jordan	Cy
0	0	**0**	**0**
1	3	**6**	**2**
2	6	**12**	**4**
3	**9**	**18**	**6**
4	**12**	**24**	**8**
5	**15**	**30**	**10**
6	**18**	**36**	**12**

2. How much did you add to each week's sum for:
Ari **3** Jordan **6**
Cy **2**

Problem 3. Tell the children to complete the third problem, plotting the points and connecting them. The completed graphs are shown on the next page.

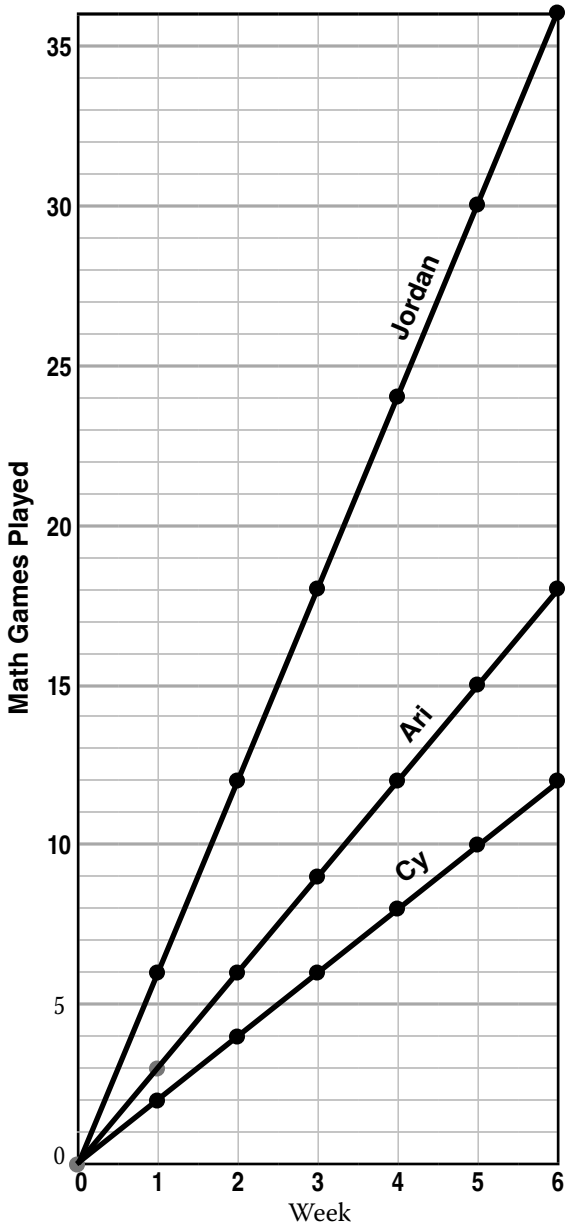
Problem 4. Tell them to answer the questions. The solutions are shown on the next page.

EXPLANATIONS:

4.68 **(0)**
× 42 **(6)**
936
18720
196.56 (0)
× 27 **(0)**
137592
393120
42: 7)**5307.12** **(0)**
6)**758.16** **(0)**
27: 9)126.36 **(0)**
3) 14.04 **(0)**
4.68

(8)
1.07
23)24.61 **(4)**
(5) 23
161
161

ACTIVITIES FOR TEACHING CONTINUED:



What is the shape of the three graphs? **straight lines**

At Week 2, Jordan has played how many times more games than Ari? **two times more**

At each week, Ari has played what fraction of the number of games that Jordan has played? $\frac{1}{2}$

At each week, Cy has played what fraction of the number of games that Jordan has played? $\frac{1}{3}$

At what week has Jordan played 12 games? **2**

At what week has Ari played 12 games? **4**

At what week has Cy played 12 games? **6**

In conclusion. Ask: Which makes it easier to see data, tables or graphs? [Answers may vary.]

EXPLANATIONS CONTINUED:

If time remains, play ??? game found in *Math Card Games* book, S10 or S11.

If there is additional time following this lesson, play the One Hundred Percent game, found in *Math Card Games* book, F50.

5.OA.B.3

Name: _____

Date: _____

1. Ari plays three math card games every week. Jordan plays six math games every week and Cy plays two. Fill in the table to represent the number of games that they played.

2. How much did you add to each week's sum for:

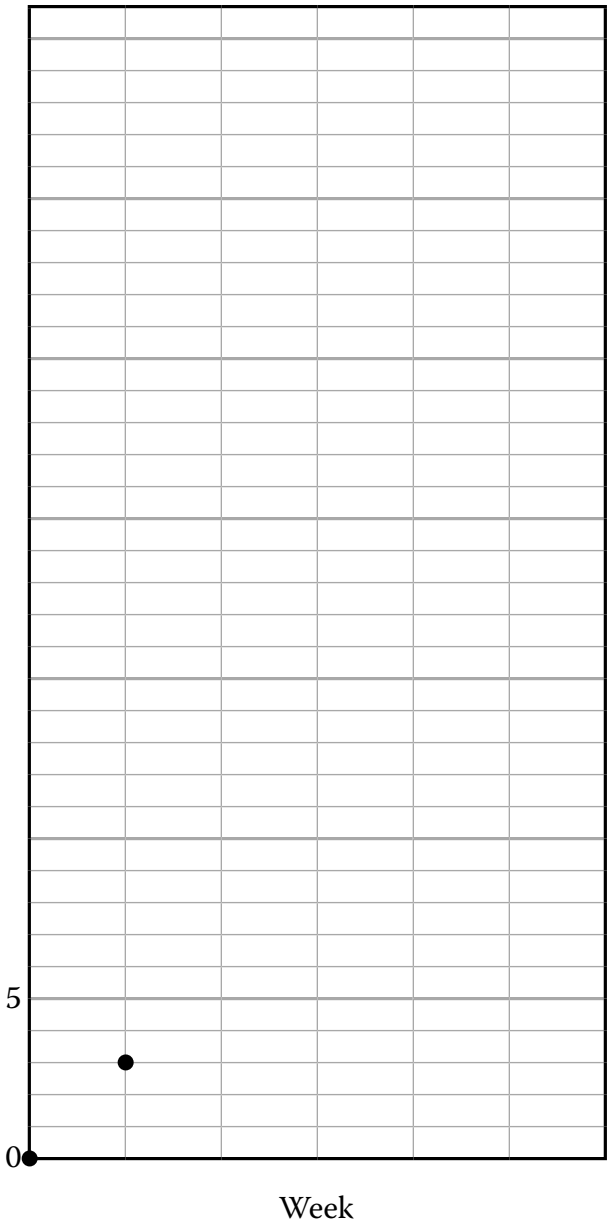
Ari _____ Jordan _____

Cy _____

	Total Number of Math Games Played		
Weeks	Ari	Jordan	Cy
0	0		
1	3		
2	6		
3			
4			
5			
6			

3. Label the graph with numbers and titles. Along the bottom, write the number of weeks from 0 to 6. Along the left side, write the number of games played.

Then plot the total number of games each person played from the table above. Connect the points for each player and label with the player's name.



4. What is the shape of the three graphs?

_____

At Week 2, Jordan has played how many times more games than Ari?

_____

At each week, Ari has played what fraction of the number of games that Jordan has played? ____

At each week, Cy has played what fraction of the number of games that Jordan has played? ____

At what week has Jordan played 12 games? ____

At what week has Ari played 12 games?

____

At what week has Cy played 12 games?

____

Lesson 129: Solving for Unknowns on the Math Balance

OBJECTIVES:

1. To understand that the two sides of an equation are equal
2. To physically solve for an unknown in an equation using the math balance

MATERIALS:

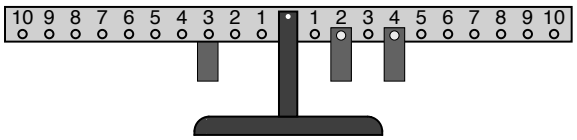
1. Math Balances, one for every 2 to 4 children
2. Worksheet 110, Solving for Unknowns on the Math Balance

ACTIVITIES FOR TEACHING:

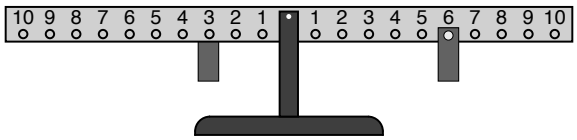
Warm-up. Ask: What is the most important property of an equation? [The two sides are equal.] What does the word equation means? [equal] If you add a weight on the 4-peg, what must be done to the other side to make it balance? [add a weight on the 4-peg] What is a second way you could do this? [add two weights to the 2-peg]

Mystery 1. Tell the children that today's lesson is about finding a mystery number on the math balance.

Set a math balance where the children can see only the front. Place two weights on the right side, one at 2 and one at 4. Also place two weights on the back side at the left. Do not tell them how many weights are on the 3. See the left figure below.



$3x = 2 + 4$



$3x = 6$

Say: We want to find out how many weights are on the 3. Ask: If you replace the weights at 2 and 4 with one weight, where would you put it? [at the 6] See the right figure above.

Ask: Now can you tell the number of weights at 3? [6 ÷ 3 = 2] Show them the two weights from the back of the left 3-peg.

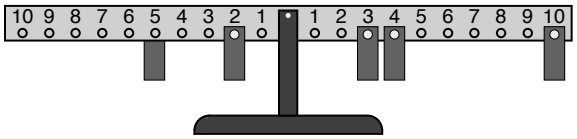
Say: Let's write the equations from each step. We will use an x for the mystery number. If necessary, repeat the math balance activity while writing the equations.

$$3x = 2 + 4$$
$$3x = 6$$
$$x = 2$$

Mystery 2. Put weights at the 3, 4, and 10 on the right side of the math balance. On the left side put a weight at the 2-peg and three weights behind 5-peg. Again, do not let the children see the number of weights on the 5-peg. See the figure on the next page.

EXPLANATIONS:

ACTIVITIES FOR TEACHING CONTINUED:

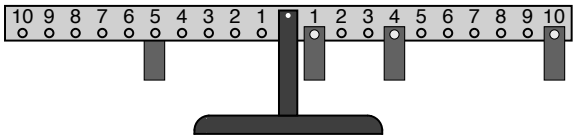


$5x + 2 = 3 + 4 + 10$

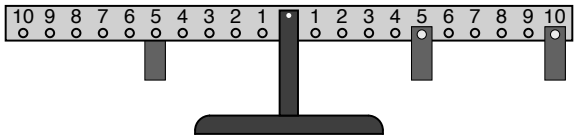
Ask: What is the equation? Write it together:

$$5x + 2 = 3 + 4 + 10$$

Ask: How can we remove the weight at 2 and still stay in balance? [Remove the 2 from the left side. Remove 2 on the right side by subtracting 2 from 3, resulting in moving the weight on the 3-peg to the 1-peg.] See the left figure below.



$5x = 1 + 4 + 10$



$5x = 15$

Ask: What is the next equation? Write it together:

$$5x = 1 + 4 + 10$$

Ask: What is the next step? [Combine the weights on the right side.] See the figure above on the right. The equations are:

$$5x = 15$$
$$x = 3$$

Worksheet 110, Problem 1. Distribute the worksheets and math balances. Tell the children to read the instructions on the worksheet. Ask: How can you use your math balance to check your answers? [Put weights on according to the figure and the extra weights on the back side according to your answer.] Tell them to complete the worksheet. Solutions are below.

1. **$9 + 2x = 5 \times 3$**
   $2x = 6$
   $x = 3$

2. **$6 \times 4 + 2x = 6 + 10 \times 2$**
   $24 + 2x = 26$
   $2x = 2$
   $x = 1$

3. **$3 \times (6 + 4) = 5x + 10$**
   $30 = 5x + 10$
   $20 = 5x$
   $x = 4$

4. **$9 \times 2 + 6x = 2 + 8 \times 4 + 10 \times 2$**
   $18 + 6x = 54$
   $6x = 36$
   $x = 6$

5. **$10 \times 2 + 5 + 2x = 10 \times 3$**
   $25 + 2x = 30$
   $2x = 5$
   $x = \frac{5}{2}$

6. **$4 \times 4 + x(2 + 1) = 1 + 3 \times (3 + 5)$**
   $16 + 3x = 25$
   $3x = 9$
   $x = 3$

In conclusion. Ask: What do you call two expressions that are equal? [equation] What does it mean when checking an equation if the two sides are not equal? [A mistake was made.]

EXPLANATIONS CONTINUED:

The children's equations may vary slightly.

If time remains, play either the Negative Corners game or Top and Bottom Corners game found in *Math Card Games* book, S10 or S11.

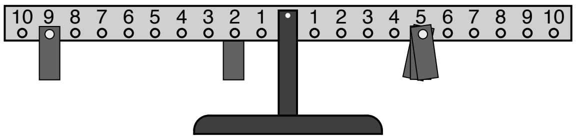
This lesson exceeds the Fifth Grade CCSS.

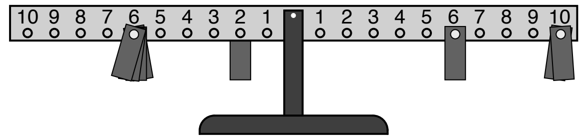
Name: ____________________

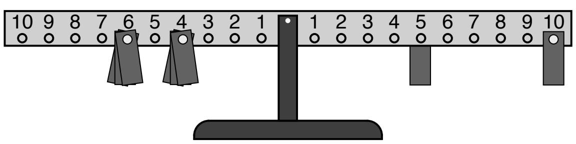
Date: ____________________

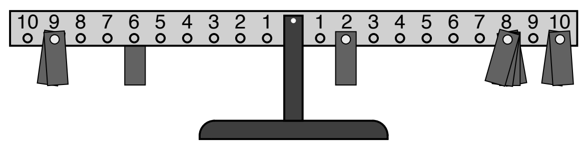
Find the mystery number, the number of weights on the back side of the math balance, in each figure. Write out the equations as you solve them.

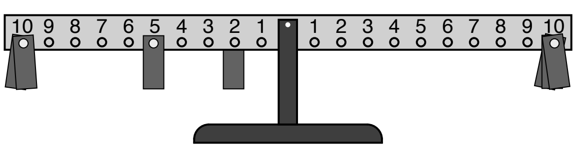
Use your math balance to check your work. If *x* is greater than 5, lay the extra weights across the 5 weights as shown on the right.



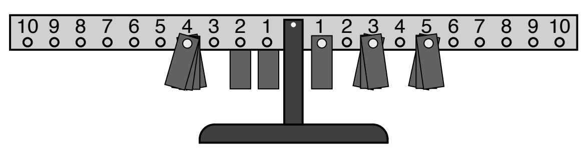








The answer will be a fraction. It cannot be verified with the math balance.



The same number of weights are on both the left 2-peg and the left 1-peg.