

Level 6.0 - 8.9



LEVEL:	6.0 - 8.9
STANDARD:	Any
BENCHMARK:	Any, according to skills chosen to explain
MATERIALS:	Math resources (textbooks, workbooks,etc.), paper, pencil
PROCEDURE:	Students work in groups to develop a chapter for a math textbook that will teach other students how to do a specific mathematical skill (a particular standard). Students must come up with a list of prerequisite skills necessary for learning the new skill. They must explain, define, demonstrate and assess the new skill. Therefore, they will be writing explanations, problems, quizzes and answers. After a chapter is completed, it may be distributed to other groups for feedback and can be used as a real teaching tool for students who have yet to learn the researched skill.

WRITING IN THE MATHEMATICS CLASSROOM – PORTFOLIO WORKSHEET

A portfolio is a sample of your work from a specific time. It often includes a selection of the best pieces of your work.

YOUR SELECTED WORK

Choose pieces of work from your folder that best show what you learned while working on this standard. You may want to choose an assignment that you didn't understand at the time it was assigned but can now go back and revise because of what you have learned. You may want to select an assignment you are particularly proud of or one on which you worked particularly hard. Be sure you have reasons for what you select.

THE COVER LETTER

On a separate sheet of paper, answer the following questions. You may answer them in essay format or you may list the questions and answer them individually.

1. What did you learn from each of the assignments that you selected for your portfolio?
2. Why did you choose each of these particular assignments? What do you hope they will show about what you have learned?
3. Describe the mathematics that you have used and learned in this standard. Make a list of the concepts that you explored and write a brief explanation of each of them.
4. How do you feel about your progress through this standard?
5. List two things that were particularly helpful to you or that you particularly liked while you worked through this standard. Be specific and describe what you like or how something was helpful.
6. List two things that were particularly difficult for you to master in this standard. What do you think caused the difficulty for you? What has that taught you about how you learn math?

- LEVEL:** 6.0-8.9
- STANDARD:** 30.0 Understand theories related to numbers
40.0 Understand and apply theories related to numbers
- BENCHMARK:** 30.01 Understand and apply basic number theory concepts; including primes, composites, factors, and multiples.
40.01 Use number concepts including primes, factors, and multiples to build number sequences.

MATERIALS: Hundreds Chart, Number Concept worksheet

PURPOSE: **PRIME NUMBERS**

Prime numbers, factors and multiples

Prime numbers are numbers that can only be evenly divided by itself and 1.

Example: 2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31...

FACTORS

The factors of a number are all the numbers that will divide evenly into that number.

Example: 24= {1, 24}
 {1,2, 12, 24}
 {1,2,3, 8,12,24}
 {1,2,3,4 6,8,12,24}

5 will not work and 6 is used so we are done! The factors of 24 are 1, 2, 3, 4, 6, 8, 12, 24

Have them try a few numbers like 9, 15, 20, 25, 30, 32 then discuss the results to ensure that everyone is comfortable with this activity.

MULTIPLES:

When you count by two's (2, 4, 6, 8, 10, 12,...) you are listing all the multiples of 2. You can do the same for any number.

Example: 4, 8, 12, 16, 20, . . .
 10, 20, 30, . . .
 13, 26, 39, . . .

Have the students list all the factors of 3 from 3 to 100.

3, 6, 9, 12, 15, 18, 21, 24, 27, 30, 33, 36, 39, 42, 45, 48, 51, 54, 57, 60, 63, 66, 69, 72, 75, 78, 81, 84, 87, 90, 93, 96, 99

Now have them underline the even numbers>

3, 6, 9, 12, 15, 18, 21, 24, 27, 30, 33, 36, 39, 42, 45, 48, 51, 54, 57, 60, 63, 66, 69, 72, 75, 78, 81, 84, 87, 90, 93, 96, 99

Continued

Now have them pull out all the multiples of 4 from the underlined numbers

12, 24, 36, 48, 60, 72, 84, 96 are the numbers that are factors of 3 and 4 and are even!

Now pass the Number Concept handout to the students to do individually.

Student: _____

Date: _____

Teacher: _____

Hundreds Chart

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

- Cross out all the numbers that are divisible by 2.
- Cross out all the numbers that are divisible by 3.
- Cross out all the numbers that are divisible by 4.
- Cross out all the numbers that are divisible by 5.
- Cross out all the numbers that are divisible by 6.
- Cross out all the numbers that are divisible by 7.
- Cross out all the numbers that are divisible by 8.
- Cross out all the numbers that are divisible by 9.
- Cross out all the numbers that are divisible by 10.

Highlight the numbers that are left. These are the prime numbers. They are only divisible by 1 and themselves.

Student: _____

Date: _____

Teacher: _____

Number Concept

List all the numbers that fit the requirements listed.

1. Multiples of 5 from 1 – 100 _____

2. Multiples of 3 and 5 from 1 – 100 _____

3. Prime numbers from 1 – 50 _____

4. Multiples of 2 and 3 and 4 from 1 - 100 _____

5. Factors of 100 that are divisible by 2 _____

6. Factors of 64 that are not multiples of 2 _____

7. Factors of 51 that are prime _____

8. Factors of 150 that are multiples of 2 and 3 _____

Number Concepts

1. {5,10,15,20,25,30,35,40,45,50,55,60,65,70,75,80,85,90,95,100}
2. {15,30,45,60,75,90}
3. {2,3,5,7,11,13,17,19,23,29,31,37,41,43,47}
4. {12,24,36,48,60,72,84,96}
5. {2,4,10,20,50,100}
6. {none}
7. {3,17}
8. {2,6,30,150}

LEVEL: 6.0 – 8.9

STANDARD(S): 31.0 Demonstrate proficiency in solving problems involving geometry
34.0 Demonstrate proficiency in the mastery of number sense, concepts, and operations involving ratios and proportions

BENCHMARK(S): 31.02 Recognize and apply geometric formulas for perimeter and area of squares, rectangles and triangles, cubes and rectangular solids.
31.03 Represent and apply a variety of strategies and geometric properties and formulas for 2- and 3-dimensional shapes to solve real-world and mathematical problems.

ACTIVITY: Ben's kite is a hands-on activity to model area and perimeter and to relate the activity to history, language arts and science lessons. This activity is a scale model of a kite. Using ratio is an option.

MATERIALS: A favorite story about Ben Franklin's kite-flying experiment, several small straws and miniature marshmallows per student, ruler, calculators (optional)

PROCEDURE: ***Role of the Teacher:***
Use this activity with science, social studies or history
Read about or discuss Ben Franklin's experiment with a kite
This activity may be used independently or in small groups.
Facilitate the project
Evaluation: May use individual data sheets to determine understanding of area and perimeter, Write a journal entry about kites and the dimensions Ben may have used.

Role of the Students:
Construct a kite frame from straws and marshmallows.
Determine perimeter and area for your kite
Compare with other students

VARIATION: Students may build a kite and experiment with flying it.

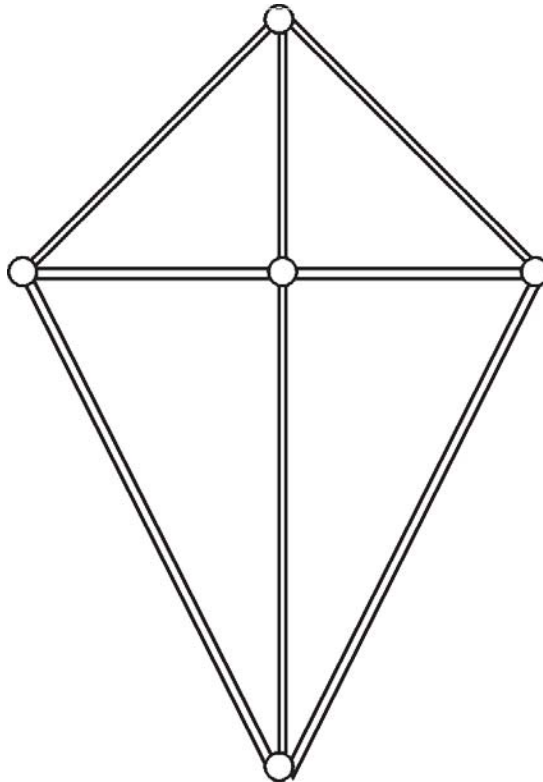
Student: _____

Date: _____

Teacher: _____

Ben's Kite

Using the small straws and marshmallows, construct the frame of a kite. You may cut the straws. Determine the perimeter and the area of your kite. Record the dimensions of your figure. Students may compare kites and discuss results. The finished product may be hung from the ceiling.



- You may note congruence or similarity.
- You may enhance kite with tissue paper to add color.

Benchmark: 31.02, 31.03, 37.07

LEVEL: 6.0 – 8.9

STANDARD: 31.0 Demonstrate proficiency in solving problems involving geometry
37.0 Demonstrate proficiency in number sense, concepts, and operations involving geometry

BENCHMARK(S): 31.02 Recognize and apply geometric formulas for perimeter and area of squares, rectangles, and triangles, and cubes and rectangular solids.
31.03 Represent and apply a variety of strategies and geometric properties and formulas for 2- and 3- dimensional shapes to solve real-world and mathematical problems.
37.07 Recognize and apply geometric formulas for volume of three-dimensional shapes including cubes, rectangular solids, and cylinders.

ACTIVITY: To evaluate the formula for the volume of a rectangular solid by using manipulatives and technology. Students will use cubes (sugar, blocks, dice or any small cube shape objects) to build a model given specific dimensions. Students will then explore to determine the number of different models (of rectangular prisms) they can build using the cubes they have, listing the dimensions and volume of each. Calculators may be used to check work and solve formulas.

MATERIALS: Cubes/unit cubes (40 or more per group), Calculators (1 per group)
Activity sheet (1 per group)

PROCEDURE: ***Role of the Teacher:***
Leader of total group discussion to initiate student thinking and involvement
Facilitator of cooperative groups
Some questions to ask are: How can we tell how many bricks would be needed to build a tower 100 bricks high, 25 bricks wide and 15 bricks deep?
Can we come up with an easy way to determine this today?
Evaluation: Viewing activity sheet
Observing group constructions
Reading journals

Role of the Students:
Evaluate the volume of a rectangular prism by modeling
Use mathematical symbols to describe the model
Calculate volume of rectangular prisms using calculators or paper/pencil
Formulate dimensions given the volume
Describe the process for finding volume in journal

Variation:
Use smaller numbers for dimensions
Use fractions, mixed numbers, or decimals for dimensions.

Student: _____

Date: _____

Teacher: _____

“Volume, Volume, Volume” V3

As you are shopping for your kitten’s favorite brand of *Kitty Cuisine*, you find the shelf is empty! Never fear, the stock boy is near! As Stan grabs a case of cat food and begins to unpack it, you notice there are 5 cans across and 4 cans back on each layer. There are 3 layers. How many cans of *Kitty Cuisine* are in a case?

Build a model with your cubes. Represent this in your journal. Label the length (5), the width (4), and the height (3). How many cans are in each layer? How many altogether? How do we label the answer? Why?

Build as many different models of rectangular prisms as you can with the blocks you have. List the dimensions and the volume of each.

(Example: _____ x _____ x _____ = cm^3)

Using your calculator, paper and pencil, or mental math, solve the following problems:

1. If a box was 24 cm long, 36 cm wide, and 50 cm high, how many cubes 1 cm (on each side) could the box contain?
2. If the volume of a rectangular prism is 500 cubic feet, what could the dimensions be? List as many possibilities as you can. What about fractions? decimals?
3. How many different shaped rectangular prisms can be made using 20 cubes? (Model and put their dimensions in your journal.)

Challenge: What happens to the volume of a cube if the dimension is doubled? (Model and put the dimensions in your journal.)

Benchmark: 31.01, 31.03, 31.05, 37.08

LEVEL: 6.0 – 8.9

STANDARD(S): 31.0 Demonstrate proficiency in solving problems involving geometry.
37.0 Demonstrate proficiency in number sense, concepts, and operations involving geometry

BENCHMARK(S): 31.01 Understand the concepts of spatial relationships, symmetry, reflections, congruency, and similarity,
37.03 Recognize types of triangles (equilateral, right, scalene, isosceles).
37.05 Use appropriate geometric vocabulary (parallel, perpendicular, similar, and congruent) to write a description of a figure or a picture composed of geometric figures
37.08 Represent and apply a variety of strategies and geometric properties and formulas for 2 - and 3 - dimensional shapes to solve real-world and mathematical problems.

ACTIVITY: Construct congruent triangles; investigate symmetry of that triangle; choose a pattern block and communicate geometric properties and relationships between pattern block and a constructed triangle.

MATERIALS: Ruler, Compass, Pencil and paper, Activity Sheet, Pattern Blocks

PROCEDURE:

Role of the Teacher:
Group students in pairs
Facilitator of pairs
Guide discussion to enhance communications of geometric properties and relationships. (Ask for and list vocabulary words)
Evaluation: Cut out the triangle drawn using a ruler and lay it on the original triangle to see if they are congruent.
Monitoring of discussion on properties and relationships

Role of the Students:
Follow directions on the activity sheet.
Discuss properties and relationships of pattern block and constructed triangle.
Cut out constructed triangle and investigate symmetry.

Variation:
Construct similar shapes
Have small groups of students to write riddles about properties and relationships

Student: _____

Date: _____

Teacher: _____

Drawing Congruent Triangles

1. Draw an equilateral triangle or trace a pattern block triangle. Label the vertices A, B, and C.
2. Use a straightedge to draw a line. Put a point on the line. Label it X.
3. Use your ruler to measure the lengths of \overline{AB} , \overline{BC} , and \overline{AC} .
4. Use your compass to record the measurements of LA, LB, and LC.
5. Use the ruler and compass to draw line segments that form the same angle measurements and are the same lengths as line segments AB, BC, and AC.
6. Label the points of intersections, y, z.
7. Check to see if: $\angle A = \angle X$; $\angle B = \angle Y$; $\angle C = \angle Z$; $\overline{AB} = \overline{XY}$; $\overline{AC} = \overline{XZ}$; $\overline{BC} = \overline{YZ}$

Use the table below to record your results.

ANGLE MEASUREMENTS		LENGTHS OF LINE SEGMENTS	
$\angle A$		\overline{AB}	
$\angle B$		\overline{AC}	
$\angle C$		\overline{BC}	
$\angle X$		\overline{XY}	
$\angle Y$		\overline{XZ}	
$\angle Z$		\overline{YZ}	

- LEVEL:** 6.0 – 8.9
- STANDARD:** 31.0 Demonstrate proficiency in solving problems involving geometry
37.0 Demonstrate proficiency in number sense, concepts, and operations involving geometry
- BENCHMARK:** 31.02 Recognize and apply geometric formulas for perimeter and area of squares, rectangles and triangles, and cubes and rectangular solids
37.01 Recognize and understand the basic properties of the following geometric shapes in two and three dimensions: circle, square, rectangle, triangle, parallelogram, pentagon, cube, rectangular solid, pyramid, cone, and cylinder.
- ACTIVITY:** Construct a model for the development of a formula for surface area of a rectangular prism. Students will use greeting cards, such as Christmas cards, to construct a box to use as a model for discovering formulas for the surface area of a rectangular prism.
- MATERIALS:** The classroom should be set up with working areas for cooperative groups, 2 average sized (4"x6" or larger) or one large sized (6"x 8" or larger) greeting card or tag board cut to size, Scissors, ruler, pencil, Record sheet for data, Calculators and/or appropriate technology; Provide an example of a finished box for each cooperative group; Copy of the instructions for the construction of the box, Overhead transparency of box instruction diagrams
- PROCEDURE:**
- Role of the Teacher***
Evaluation: View the finished model of the rectangular prism
Compare and discuss the formulas generated by the groups
Apply the formula to check other groups' surface area
The teacher should listen to the reasoning the students used to generate the formula and pay close attention to their attempts to verbalize the concept.
- Role of the Students***
Read and follow the instructions to construct the box
Record the measurements of the sides
Generate a formula for surface area of a rectangular prism
Write a journal entry about the development of the formula and construction of the box.
- VARIATION:** Use the models to generate formulas for volume of a rectangular prism
Make other sizes and shapes of boxes and apply the formula

Continued

Write about the experience of constructing a model and generating a mathematical formula in student journals

Discuss appropriate uses of the model other than to generate formulas for a rectangular prism. A connection could be made to recycling projects because the boxes are decorative and useful as gift boxes and keepsake boxes.

To extend the lesson, the teacher may lead a discussion of applicable properties in the writing of the formula.

The cards could be measured and cut by metric standards and the surface area found in centimeters

Student: _____ Date: _____

Teacher: _____

Greeting Card Box - Student Record Sheet

Please record the length and width in customary measurements for each of the 6 sides of your box. From these measurements try to find the total surface area of the box. Working with your cooperative group, write a mathematical formula for the Surface Area of a Rectangular Prism. Be prepared to share your results with the class.

Length	Width
Side 1	
Side 2	
Side 3	
Side 4	
Side 5	
Side 6	

What is the surface area of your box?

Write the formula for the surface area your group discovered.

Student: _____

Date: _____

Teacher: _____

Greeting Card Box Instructions

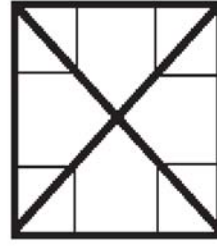
- For each box, you will need 2 medium to large sized greeting cards (5"x7" or larger), or 1 extra large greeting card (7" x 9" or larger) If two cards are used, a prettier box will result if the cards are color matched. If an extra large card is used you may be able to get 2 squares from the same card.
- Open the first card so it lies flat and measure a 7" square from the decorative side of the card. You may need to use a small part of the back of the card to get the full 7" square, but this part will not show on your finished box. This 7" square will become the top of your box.
- After marking the 7" square with your ruler and pencil, cut carefully so that you have straight edges.
- From the 2nd card, measure carefully a square 1/4 inch smaller — So if your box top is 7", your 2nd card should measure 6 and 3/4 inches square. This will become the bottom of the box. (Making the bottom of the box smaller will allow the top to slide easily over the bottom.)
- Cut carefully so that you have straight edges on all 4 sides of the 6 and 3/4 inch card.
- You are now ready to construct the top of your box. Using a ruler, draw a straight line from opposite corners to form a large **X** on the back of the card.
- Now fold one corner of the square so that it touches the intersection of the two diagonal lines of the X (see drawing A).
- Next, fold the opposite corner to the center (as pictured in drawing B).
- Continue folding so that finally all 4 corners of the 7" square have been folded into the center of the X (see drawings C and D). Press down firmly along all the folds.
- You now have a smaller square with four folds. The four corners of the square you just folded should also be folded in toward the center over top of the first 4 folds.
- Press firmly on the fold lines of the double folds you have made. Then unfold the card back to the 7" original square.
- In each corner of the 7" square you will see the fold lines for a small, one inch square as shown in drawing E. Place a dot at the vertex of each corner square as indicated in drawing F.
- With your scissors, cut on the lines shown on drawing G. (Do not cut beyond the dot.)
- Fold outer edges toward the center to the first fold line as shown in drawing H.
- Fold the edge one more time toward the center to form the sides of the box. Tuck the flaps formed by the folds under the edges as shown in drawing I.
- Repeat these steps for the smaller square—then form the box by sliding the top over the bottom of the box.
- Using the box you made, you are now ready to record the measurements on the Student Record Sheet.

Student: _____ Date: _____

Teacher: _____



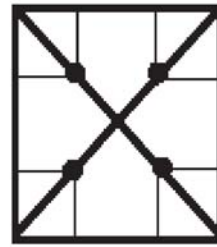
E.



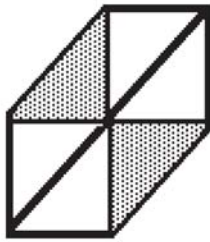
A.



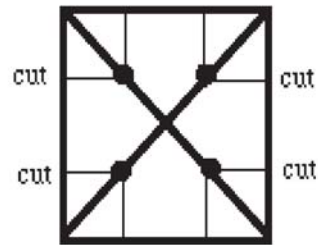
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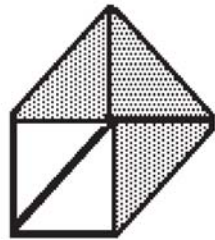
B.



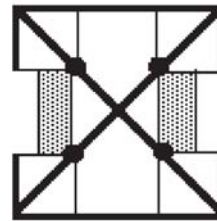
G.



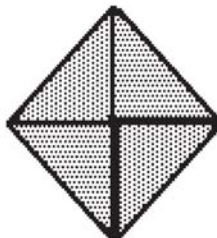
C.



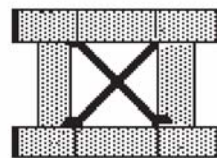
H.



D.



I.



Benchmark: 31.02, 31.03, 37.01, 37.06, 37.08

- LEVEL:** 6.0 – 8.9
- STANDARD:** 31.0 Demonstrate proficiency in solving problems involving geometry
37.0 Demonstrate proficiency in number sense, concepts, and operations involving geometry
- BENCHMARK:** 31.02 Recognize and apply geometric formulas for perimeter and area of squares, rectangles and triangles, and cubes and rectangular solids.
31.03 Represent and apply a variety of strategies and geometric properties and formulas for 2- and 3- dimensional shapes to solve real-world and mathematical problems.
37.01 Recognize and understand the basic properties of the following geometric shapes in two and three dimensions: circle, square, rectangle, triangle, parallelogram, pentagon, cube, rectangular solid, pyramid, cone, and cylinder.
37.06 Recognize and apply geometric formulas for perimeter, area, and circumference.
37.08 Represent and apply a variety of strategies and geometric properties and formulas for 2- and 3- dimensional shapes to solve real-world and mathematical problems.
- ACTIVITY:** To use pentominoes to investigate perimeter and area
- MATERIALS:** Sets and/or copies of pentominoes (per individual and/or group)
One copy of record sheet per group or individual
3-4 sheets of one inch graph paper per group or individual student
Overhead, transparency of one inch graph paper, overhead set of pentominoes
Scissors and storage containers for pentominoes
- PROCEDURE:** ***Role of the Teacher:***
Guide discussion on what constitutes a pentomino and what is not a pentomino
Facilitator of group or individual activity
Guide a discussion of the origin of the term “pentominoes”
Evaluation:
View record sheets
Give feedback on individual and/or group participation
- Role of the Students***
Individual or cooperative groups estimate and record perimeter, then area, of each of the twelve pentominoes.
Discuss findings in groups and share with entire class.

Measure and record area and perimeters.
Draw 20 or more shapes on grid paper having an area of 6 units and estimate, then measure perimeter of each and record.

Variation:

To simplify: use 4 shapes or units

More difficult: Add 7 or 8 units and record data on spreadsheet to look for a pattern of how many shapes can be made from varying amounts of square units.

Penticubes—use interlocking cubes.


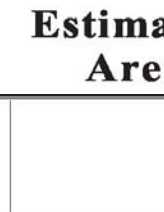
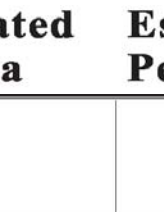
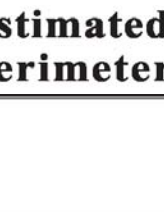
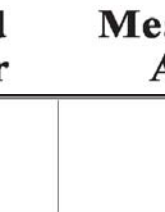
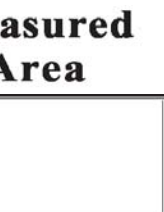
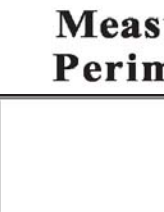
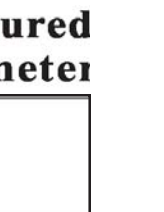

Increase the area to 6 sq. inches or units and discuss what term could describe the six inch area.

Benchmark: 31.02, 31.03, 37.01, 37.06, 37.08

Student: _____ Date: _____

Teacher: _____

Pentominoes Record Sheet

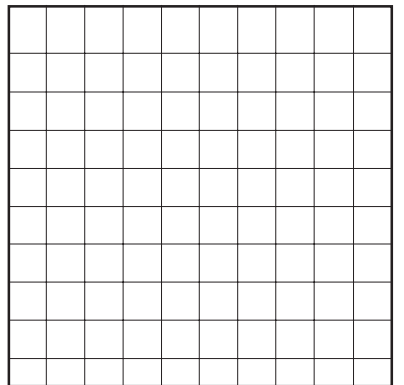
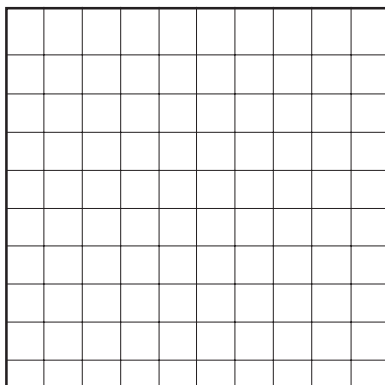
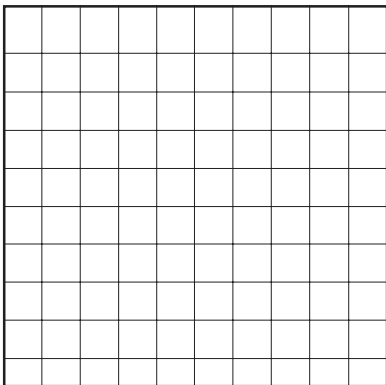
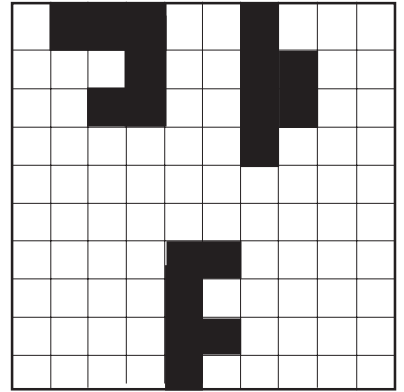
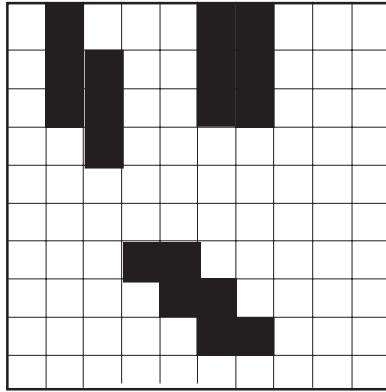
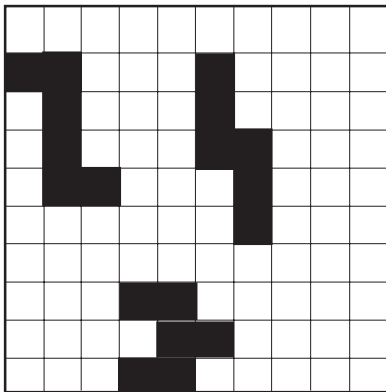
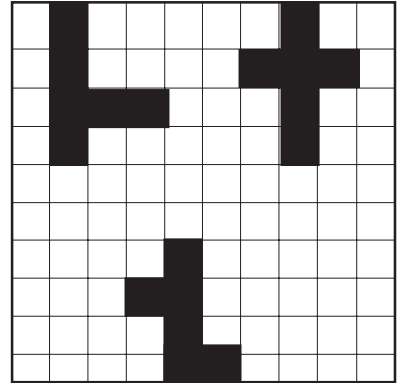
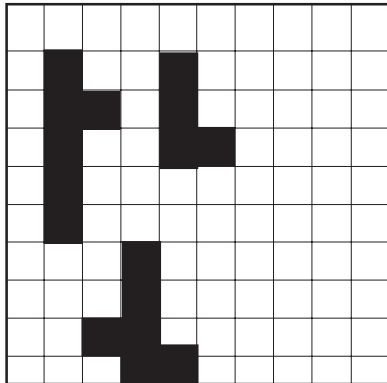
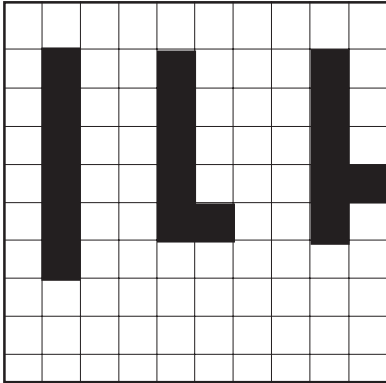
	Figure	Estimated Area	Estimated Perimeter	Measured Area	Measured Perimeter
1					
2					
3					
4					
5					
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10					
11					
12					

Student: _____

Date: _____

Teacher: _____

Shapes with an area of 6 units
Add other shapes on the blank grids

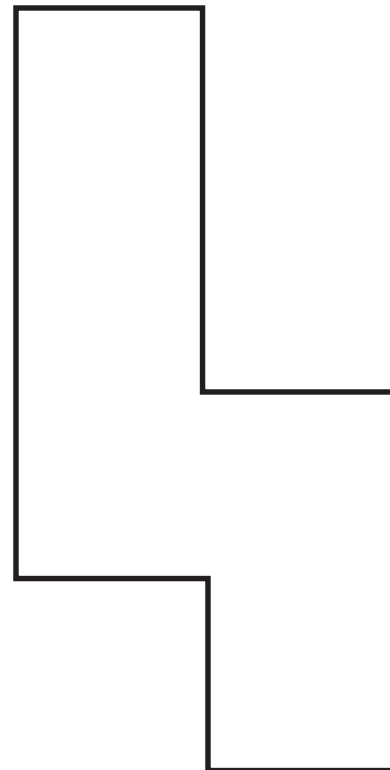
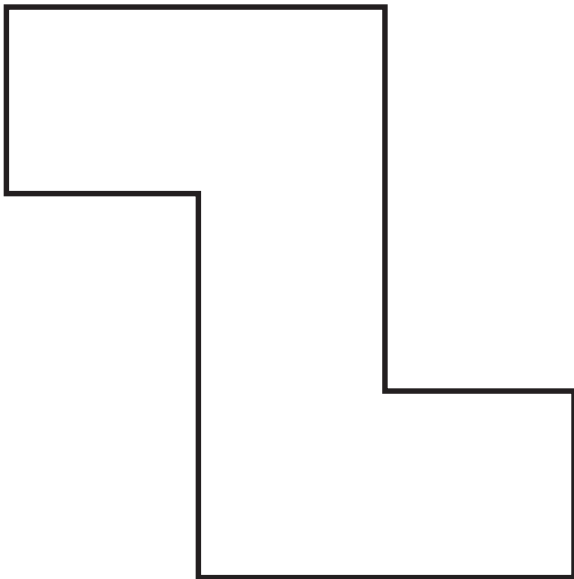
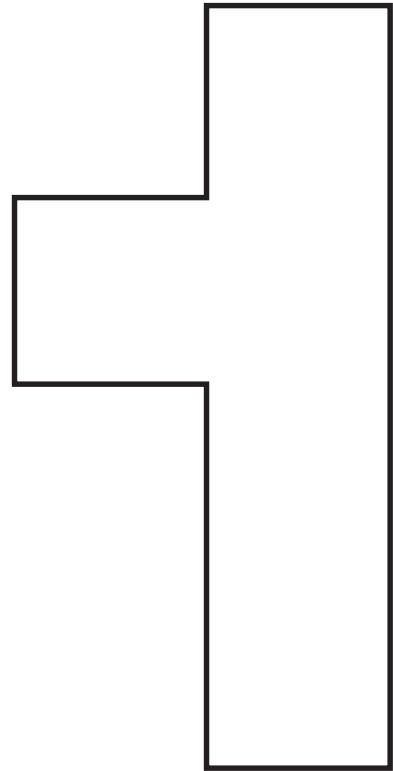
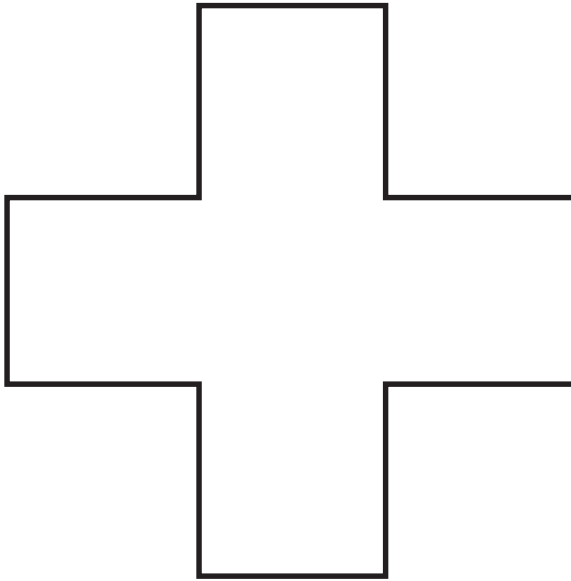


Benchmark: 31.02, 31.03, 37.01, 37.06, 37.08

Student: _____

Date: _____

Teacher: _____

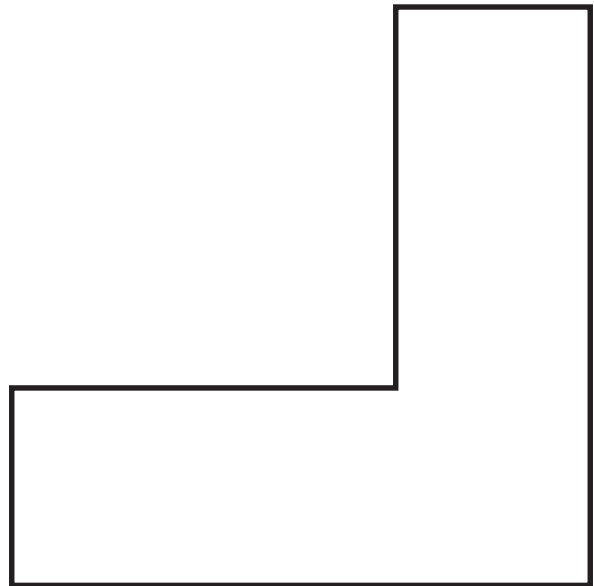
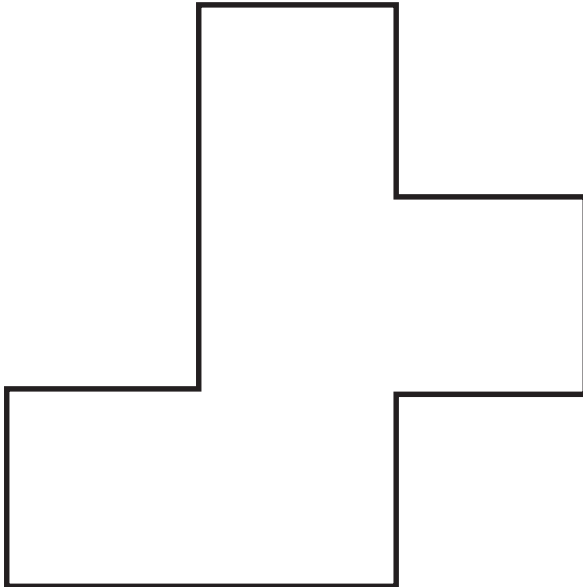
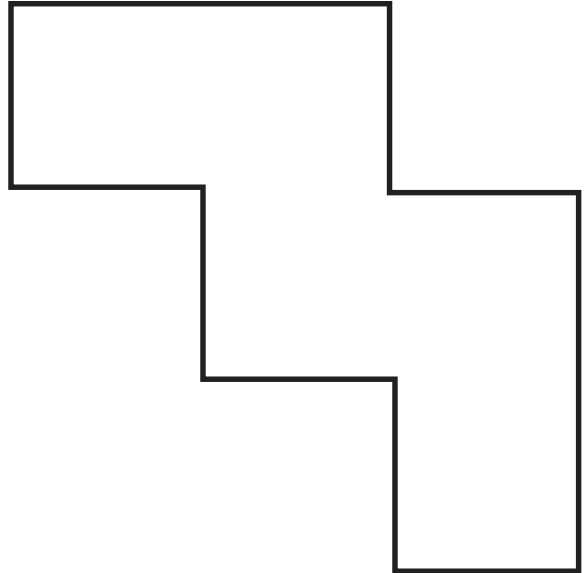
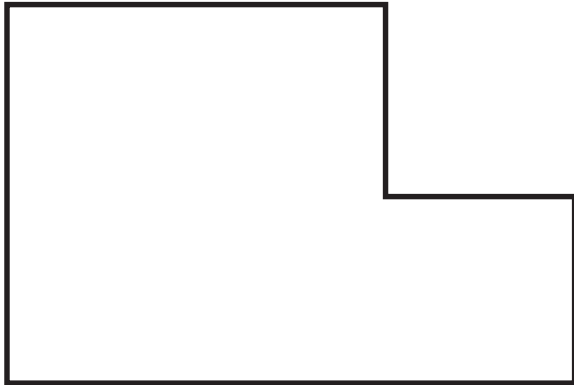


Benchmark: 31.02, 31.03, 37.01, 37.06, 37.08

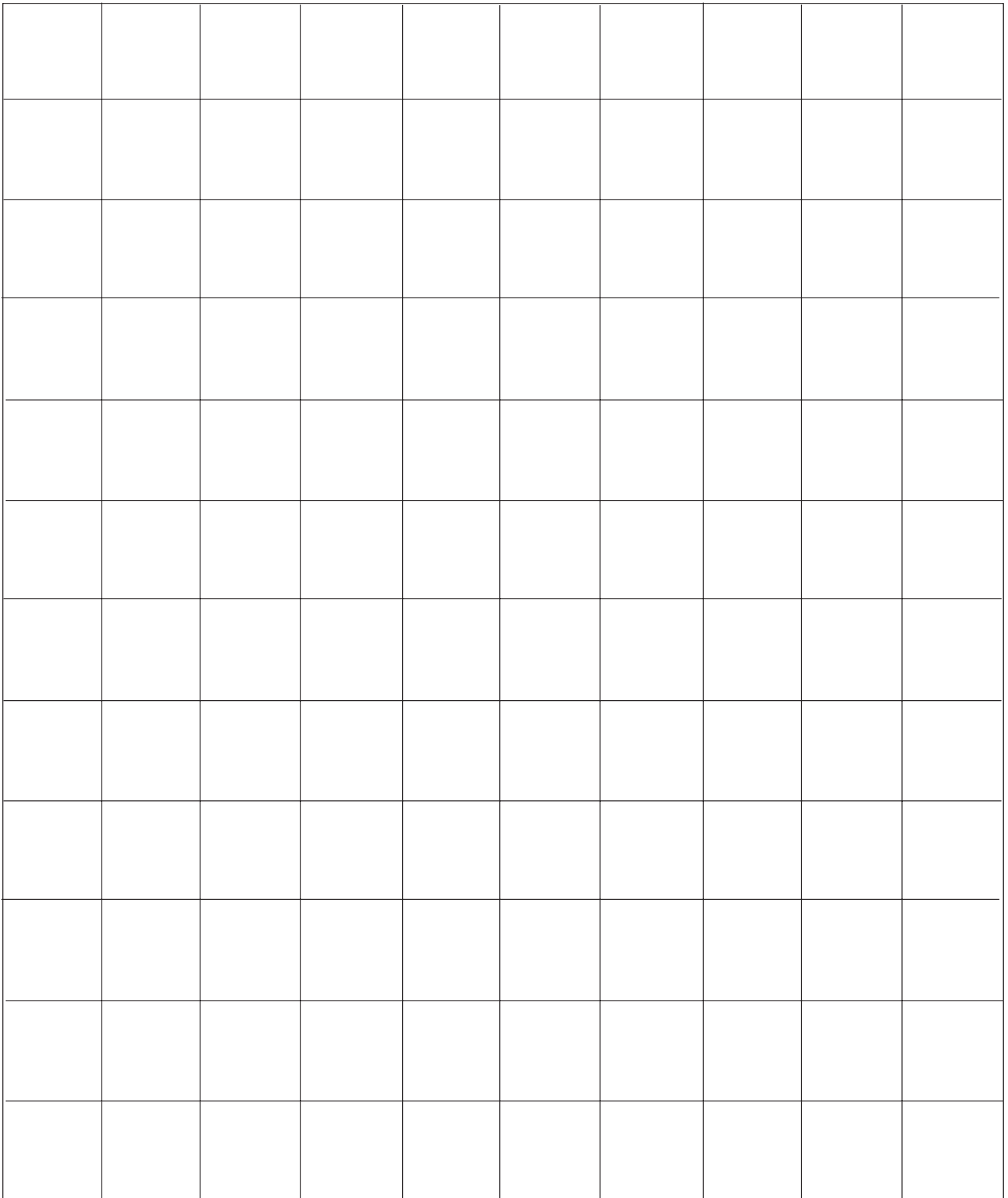
Student: _____

Date: _____

Teacher: _____



Benchmark: 31.02, 31.03, 34.05



Benchmark: 36.03, 36.06, 36.07, 36.11

LEVEL: 6.0 – 8.9

STANDARD: 36.0 Demonstrate proficiency in number sense, concepts, and operations involving integers

BENCHMARK(S): 36.03 Locate integers on a number line.
36.06 Solve simple problems by applying the algebraic order of operations.
36.07 Select the appropriate operation to solve specific problems involving integers.
36.11 Write algebraic expressions, e.g., $2x$; $2m - 10$.

ACTIVITY: To use informal methods (game format) to solve linear inequalities. Students will determine what numbers satisfy the inequality by substituting the number rolled on the number cube for the variable.

MATERIALS: Number cube or die per group
Student activity sheet
Notebook paper or journal

PROCEDURE: ***Role of the Teacher:***
Leader of the class discussion to initiate student thinking and involvement. The teacher may begin discussion by asking students to articulate what they know about equations and the process for solving an equation for a variable. This can be extended to reviewing the idea of an inequality and finding all the numbers that would “satisfy” or make an inequality true.
Facilitator of cooperative groups
Evaluation: View modeling, Informal Observation of group discussions, read journals

Role of the Students:
Read directions found on activity sheet
Play game
Graph answers
Record Journal Entries

Variation:
Use negative numbers
Use fractions
Use 2 die (dice) or number cubes to give larger numbers
Let students devise a game board and additional inequalities
Use as classroom activity by having 2 teams and showing the cube toss and inequalities on the overhead. Students can “tell” their reasoning to the class.

Student: _____

Date: _____

Teacher: _____

**“Rolling On”
or
“A Number Cube by Any Other Name Is a Die”**

Materials: Notebook, paper/pencil or journal, and student activity sheet Goal: To determine what number satisfies the inequality. Rules of the Game:

- Each person rolls the number cube to determine the high roller who goes first.
- Substitute the number rolled for the variable
- Compare to see if the answer satisfies the inequality. If so, the player receives one point.
- Graph the answer on the number line.
- Continue until each player has rolled the dice and found a substitute for the variable.
- Move on to the next inequality.
(Example: $4x < 9$; player rolled a 5; substitute 5 for x ; is 20 less than 9? Is this a solution?)

READY...SET...ROLL ON!

1. $y + 6 > 5$



2. $x - 3 < 4$



3. $x + y > 8$



4. $2f < 6$



5. $3c > 10$



6. $12/d > 3$



7. $16 - g < 12$



8. $20 - b < 15$



9. $24/h < 7$



10. $8/c + 5 > 5$











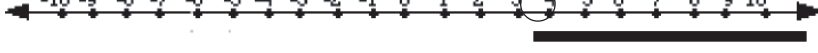

Now, tally your points! What conclusions can you make when you find a number that makes your inequality true? Record in your journal.

**“Rolling On”
or
“A Number Cube by Any Other Name Is a Die”**

Materials: Notebook, paper/pencil or journal, and student activity sheet Goal: To determine what number satisfies the inequality. Rules of the Game:

- Each person rolls the number cube to determine the high roller who goes first.
 - Substitute the number rolled for the variable
 - Compare to see if the answer satisfies the inequality. If so, the player receives one point.
 - Graph the answer on the number line.
 - Continue until each player has rolled the dice and found a substitute for the variable.
 - Move on to the next inequality.
- (Example: $4x < 9$; player rolled a 5; substitute 5 for x ; is 20 less than 9? Is this a solution?)

READY...SET...ROLL ON!

1. $y + 6 > 5$	$y > -1$	
2. $x - 3 < 4$	$x < 7$	
3. $x + y > 8$	two variables	
4. $2f < 6$	$f < 3$	
5. $3c > 10$	$3 > 3.\overline{3}$	
6. $12/d > 3$	$d < 4$	
7. $16 - g < 12$	$g > 4$	
8. $20 - b < 15$	$b > 5$	
9. $24/h < 7$	$h < 3\frac{3}{7}$	
10. $8/c + 5 > 5$	$c > 0$	

Now, tally your points! What conclusions can you make when you find a number that makes your inequality true? Record in your journal.

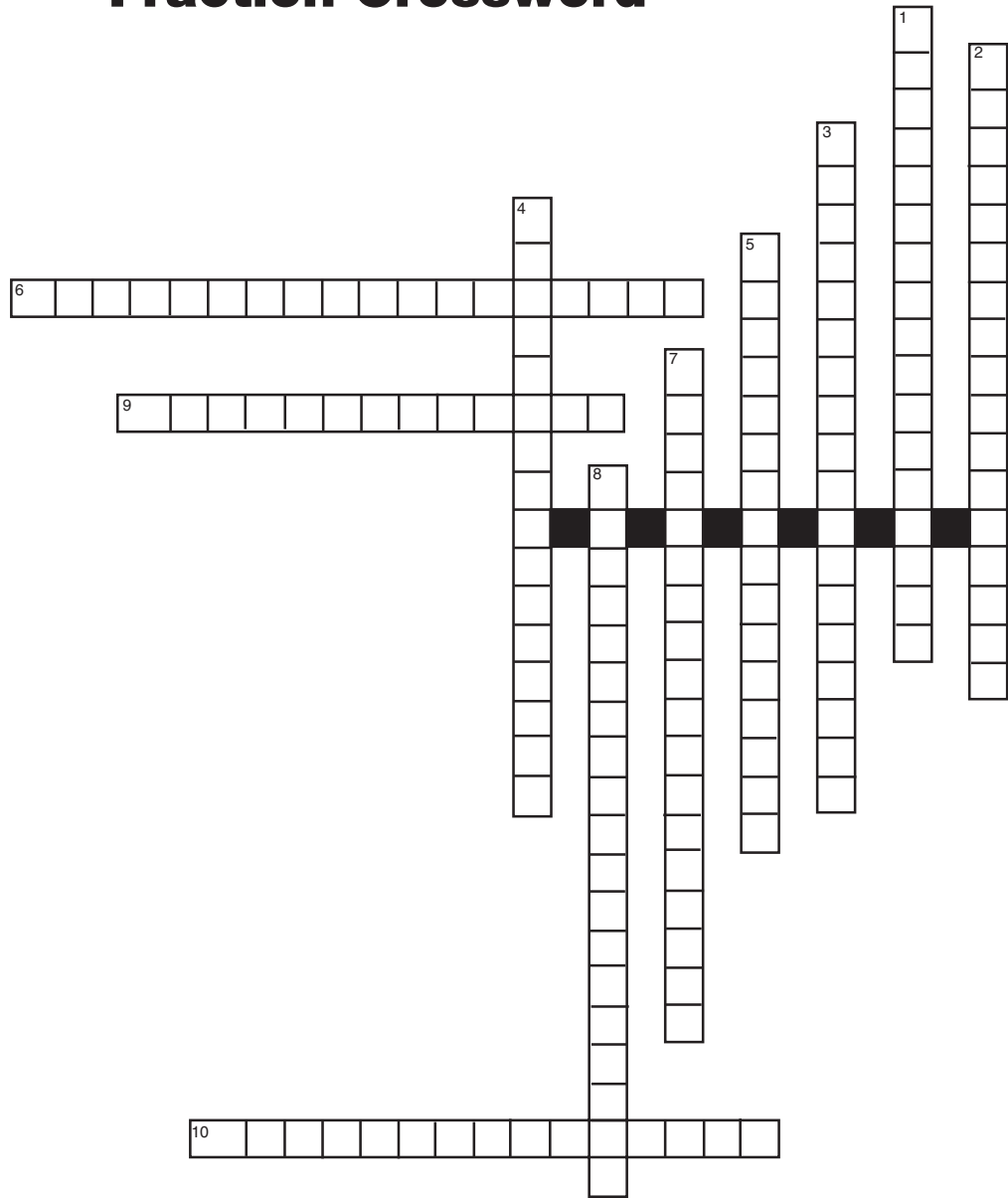
LEVEL:	6.0 – 8.9
STANDARD:	32.0 Demonstrate proficiency in number sense, concepts, and operations involving fractions
BENCHMARK:	32.01 Associate fractions to their respective spoken names, written names and numerals.
MATERIALS:	Fraction Crossword
PROCEDURE:	Discuss verbal names for numerals and fractions covering the fact that a mixed number will be separated by its fraction part with the word “and”. Give examples on the board and then go over. Then give them the handout to complete individually.

Student: _____

Date: _____

Teacher: _____

Fraction Crossword



Across

- 6. $6 \frac{3}{8}$
- 9. $1 \frac{1}{2}$
- 10. $2 \frac{2}{3}$

Down

- 1. $10 \frac{7}{8}$
- 2. $3 \frac{1}{4}$
- 3. $4 \frac{3}{5}$
- 4. $8 \frac{1}{5}$
- 5. $9 \frac{1}{4}$
- 7. $7 \frac{1}{12}$
- 8. $5 \frac{3}{4}$

Fraction Crossword

Across

- 6. $6 \frac{3}{8}$
- 9. $1 \frac{1}{2}$
- 10. $2 \frac{2}{3}$

Down

- 1. $10 \frac{7}{8}$
- 2. $3 \frac{1}{4}$
- 3. $4 \frac{3}{5}$
- 4. $8 \frac{1}{5}$
- 5. $9 \frac{1}{4}$
- 7. $7 \frac{1}{12}$
- 8. $5 \frac{3}{4}$

⁶SIX AND THREE EIGHTHS

⁹ONE AND ONE HALF

¹⁰TWO AND TWO THIRDS

¹TEN AND SEVEN EIGHTS

²THREE AND ONE FOURTH

³FOUR AND NINE FIFTHS

⁴EIGHT AND ONE FIFTH

⁵NINE AND FOURTHS

⁷SEVEN AND TWELFTHS

⁸FIVE AND THREE FIFTHS

Benchmark: 32.03, 32.04, 35.04

- LEVEL:** 6.0 – 8.9
- STANDARD:** 32.0 Demonstrate proficiency in number sense, concepts, and operations involving fractions
35.0 Demonstrate proficiency in the mastery of number sense, concepts, and operations involving percents
- BENCHMARK(S):** 32.03 Understand the relative size of fractions.
32.04 Identify concrete and symbolic representations of fractions in real-world situations.
35.04 Understand that percents can be represented in a variety of equivalent forms.
- ACTIVITY:** To model the relationship among equivalent fractions using egg cartons and candy.
- MATERIALS:** An egg carton for each group of students
Gumdrops, peanut chocolate candies, plastic eggs or whatever you wish to use in each egg section of the carton as a manipulative
Student activity sheets
One sheet of newsprint per group
Colored pencils/ markers/ or crayons
- PROCEDURE:**
- Role of the Teacher:***
Collect, fill and distribute egg cartons
Lead opening discussion on equivalent fractions (What are equivalent fractions? What does it mean to say that $\frac{2}{4} = \frac{1}{2}$? How can we determine what fraction would be equivalent to $\frac{7}{8}$?
Explain activity—go over activity sheet
Monitor group work
Evaluation – Listen to cooperative group’s findings and view each group’s activity sheets.
- Role of the Students:***
Take part in discussion
Listen
Ask questions
Work cooperatively in groups
Be eggs-tra careful!
- Variation:***
Two pieces of candy could be placed in each egg cup and 24ths could be explored, etc.
Groups could receive 1 and $\frac{1}{2}$ egg cartons and work with 18ths.
Change to equivalent percents

Student: _____

Date: _____

Teacher: _____

“Eggs-actly Equal”

Student Activity Sheet Materials: Each group will receive:

- eggs-actly one egg carton
- one piece of newsprint
- colored pencils/ markers/crayons

Directions:

- Place names of group members on your newsprint
- Draw the inside of your egg carton for each fraction you solve. Use your egg carton to justify your answer.



For example: $1/6 = 2/12$

$1/2 = \quad /12$

$3/6 = \quad /2$

$2/6 = \quad /12$

$5/6 = \quad /12$

$1/3 = \quad /12$

$2/3 = \quad /12$

$1/4 = \quad /12$

$2/4 = \quad /12$

$3/4 = \quad /12$

$4/6 = \quad /12$

$6/6 = \quad /12$

$3/6 = \quad /12$

- On your newsprint, under the egg-carton, write an explanation of how and why you chose the numerator you did.
- Make sure everyone in your group agrees with and understands your findings.
- Justify your findings to the teacher. Explain how you found the equivalent fractions. Be sure to let each person in your group give an explanation.
- Once your work is finished and justified to the teacher, if your teacher has used candies, you may divide them equally among you as a treat.

Benchmark: 32.03, 32.04, 32.07, 32.10, 32.11 32.12, 38.01, 41.01

LEVEL: 6.0 – 8.9

STANDARD: 32.0 Demonstrate proficiency in number sense, concepts, and operations involving fractions
38.0 Use estimation skills to problem solve and compute
41.0 Interpret data from graphs, charts, and maps

BENCHMARK: 32.03 Understand the relative size of fractions.
32.04 Identify concrete and symbolic representations of fractions in real-world situations.
32.07 Multiply common fractions, mixed numbers, and whole numbers.
32.10 Perform multiple operations using common fractions, mixed numbers, and whole numbers.
32.11 Select the appropriate operation to solve specific problems involving fractions.
32.12 Solve real-world problems involving fractions.
38.01 Use estimation strategies to predict results and to check the reasonableness of data.
41.01 Interpret and compare data from pictographs, circle graphs, bar graphs, and line graphs.

MATERIALS: Stock market reports from newspapers

ACTIVITIES:

1. Students research and discuss the stocks and bonds traded on the stock market, the vocabulary used and the history of trading in the U.S.
2. Students use the media to follow several specific stocks over a two week period and the market as a whole. Students chart the movement of the stocks and the market and identify trends or factors that may be working.
3. Given \$10,000 to spend in the market, students in groups compete over a six week period, buying and selling stocks and bonds. All transactions must be recorded and the stock portfolio value at the end of the period will be used to determine the winner.

Benchmark: 32.05, 38.01, 38.03, 41.02

LEVEL: 6.0 – 8.9

STANDARD: 32.0 Demonstrate proficiency in number sense, concepts, and operations involving fractions
38.0 Use estimation skills to problem solve and compute
41.0 Interpret data from graphs, charts, and maps

BENCHMARK: 32.05 Add whole numbers, fractions, and mixed numbers with and without common denominators.
38.01 Use estimation strategies to predict results and to check the reasonableness of data.
38.03 Use estimates to solve real-world problems of money, time, and temperature.
41.02 Use data from charts and tables to solve real-world problems, e.g., determine tax on purchases using a sales tax table or calculate tax from a withholding tax schedule or income tax schedule.

MATERIALS: Mechanism for keeping time

ACTIVITIES:

1. Students brainstorm the things that people do with their time. List the things that they do in a typical day and estimate the time each takes.
2. Students estimate the time spent for certain activities in the week, such as sleeping, driving or riding in a car, preparing and eating meals, reading, etc. Students then log the time spent on these activities over a period of a week. In groups, students compare the results obtained.

- LEVEL:** 6.0 - 8.9
- STANDARD:** 32.0 Demonstrate proficiency in number sense, concepts, and operations involving fractions
- BENCHMARK:** 32.06 Subtract whole numbers, fractions, and mixed numbers with or without regrouping
- MATERIALS:** Fraction Practice Worksheet
- DIRECTIONS:** Review subtracting fractions with students. Remind them that they must get a common denominator and change the fractions to equivalent fractions with that denominator before subtracting. Also remind them that when borrowing they must borrow one whole and change it into a fraction using that same denominator. Use the example and relate it to money for those unsure of what they are doing.

Example:

$$\begin{array}{r} 8 \frac{3}{4} \\ - 2 \frac{1}{6} \\ \hline \end{array} = \begin{array}{r} 8 \frac{9}{12} \\ - 2 \frac{2}{12} \\ \hline 6 \frac{7}{12} \end{array}$$

$$\begin{array}{r} 5 \\ - 2 \frac{3}{4} \\ \hline \end{array} = \begin{array}{r} 4 \frac{4}{4} \\ - 2 \frac{3}{4} \\ \hline 2 \frac{1}{4} \end{array}$$

Student: _____

Date: _____

Teacher: _____

Fraction Practice

Find the difference of the following items.

1. $3/5 - 1/2 =$ _____

2. $3\ 5/6 - 1\ 3/4 =$ _____

3. $12 - 4\ 3/5 =$ _____

4. $7\ 5/8 - 3 =$ _____

5. $9\ 1/3 - 5\ 7/8 =$ _____

6. $90 - 43\ 1/2 =$ _____

7. $23\ 5/18 - 1\ 2/9 =$ _____

8. $154\ 1/12 - 67\ 1/36 =$ _____

9. $89 - 23/35 =$ _____

10. $376\ 2/3 - 148\ 4/5 =$ _____

Fraction Practice KEY

Find the difference of the following items.

1. $3/5 - 1/2 = \underline{1/10}$
2. $3 \frac{5}{6} - 1 \frac{3}{4} = \underline{2 \frac{1}{12}}$
3. $12 - 4 \frac{3}{5} = \underline{7 \frac{2}{5}}$
4. $7 \frac{5}{8} - 3 = \underline{4 \frac{5}{8}}$
5. $9 \frac{1}{3} - 5 \frac{7}{8} = \underline{3 \frac{11}{24}}$
6. $90 - 43 \frac{1}{2} = \underline{46 \frac{1}{2}}$
7. $23 \frac{5}{18} - 1 \frac{2}{9} = \underline{22 \frac{1}{8}}$
8. $154 \frac{1}{12} - 67 \frac{1}{36} = \underline{87 \frac{1}{18}}$
9. $89 - 23/35 = \underline{88 \frac{12}{35}}$
10. $376 \frac{2}{3} - 148 \frac{4}{5} = \underline{227 \frac{13}{15}}$

- LEVEL:** 6.0 – 8.9
- STANDARD:** 32.0 Demonstrate proficiency in number sense, concepts, and operations involving fractions
- BENCHMARK:** 32.08 Divide fractions.
32.09 Divide whole numbers, fractions, and mixed numbers.
- MATERIALS:** Fraction Division Handout
- DIRECTIONS:** Teach these three steps for all fraction division.

Step 1: Turn all whole numbers into fractions and make all mixed numbers improper fractions.

Step 2: NEVER divide by a fraction. You must make the problem into a multiplication problem by changing the division sign into a multiplication sign and inverting or flipping the second number. This is called multiplying by the reciprocal.

Step 3: Now solve like a multiplication problem:

Example: $12 \div 4 \frac{1}{3}$

Step 1: $12/1 \div 13/3$

Step 2: $12/1 \times 3/13 = 36/13 = 2 \frac{10}{13}$

Example: $4 \frac{2}{3} \div 3$

Step 1: $14/3 \div 3/1$

Step 2: $14/3 \times 1/3 = 14/9 = 1 \frac{5}{9}$

Now have the students work on the handout.

- ANSWER KEY:**
1. $1 \frac{5}{12}$
 2. $5 \frac{1}{4}$
 3. $9/16$
 4. 12
 5. $2/3$
 6. $1 \frac{89}{186}$
 7. $2 \frac{32}{59}$
 8. 10

Student: _____

Date: _____

Teacher: _____

Fraction Division

Divide the following items.

1. $5/6 \div 10/17 =$ _____

2. $2 \frac{1}{3} \div 4/9 =$ _____

3. $3/8 \div 2/3 =$ _____

4. How many fourths are there in 3? _____

5. $1 \frac{3}{4} \div 2 \frac{5}{8} =$ _____

6. $4 \frac{7}{12} \div 3 \frac{1}{10} =$ _____

7. $6 \div 2 \frac{9}{25} =$ _____

8. A piece of wood $8 \frac{3}{4}$ feet long is cut into pieces $7/8$ foot long. How many pieces will you get?

LEVEL:	6.0-8.9
STANDARD	33.0 Demonstrate proficiency in number sense, concepts, and operations involving decimals
BENCHMARK	33.02 Order a sequence of decimal numbers from smallest to largest.
MATERIALS:	Decimal Number Cards
DIRECTIONS:	Hand each student a card as he/she comes in the door. When everyone is in, have him or her line up from smallest to largest according to their decimal card. Usually someone in the class will take charge and explain what is going on. Let them try it themselves and when they are finished, check their results.

Cut out and glue on large index cards.

.003

1.5

3.902

.032

1.25

3.5

.09

1.05

1.98

2.0

2.10

2.76

2.001

1.005

3.15

3.42

.089

.023

.00032

.021

4.0

2.031

.070

.0710

3.1

2.56

3.01

1.67

1.0

1.05

1.74

.04

4.02

LEVEL;	6.0-8.9
STANDARD	33.0 Demonstrate proficiency in number sense, concepts, and operations involving decimals
BENCHMARK	33.03 Multiply a decimal by a whole number and another decimal
MATERIALS:	Multiplying Decimals Handout
DIRECTIONS:	To multiply decimals, multiply just like you would multiply whole numbers ignoring the decimal points. Then count how many places there are in the problem to the right of the decimal. Then move the decimal that many places to the left from the far right.

Ex: 3.1	Now you have 713 and 2 digits on the right side of the
$\begin{array}{r} \text{_}x \ 2.3 \\ \quad 93 \\ \quad 62 \\ \hline 7.13 \end{array}$	decimal points
	3. <u>1</u> 2. <u>3</u> so you must move the decimal 2 to the left.
	713 = 7.13

Give a few more examples. Have the students work them out on the board and explain them to students.

Student: _____

Date: _____

Teacher: _____

Multiply a decimal by a whole number or another decimal.

Complete the multiplication problem in column 1. Match the answer to the answer in column 2.

COLUMN 1	COLUMN 2
2.1 x 2	7.425
4 x 1.5	26.16
3.4 x 2.1	.15
.5 x .3	1.44
6.9 x 1.05	282.906
4.7 x .31	4.2
3 x 8.72	26.039
1.2 x 1.2	157.5
45 x 3.5	17.55
23.4 x 12.09	6
15.07 x 31.7	477.719
2.04 x 1.001	4.5738
3.9 x 4.5	1.457
13 x 2.003	7.14
3.098 x 2.09	2.04204
254.1 x .018	6.47482

Multiply a decimal by a whole number or another decimal.

Complete the multiplication problem in column 1. Match the answer to the answer in column 2.

COLUMN 1	COLUMN 2
2.1 x 2	7.245
4 x 1.5	26.16
3.4 x 2.1	.15
.5 x .3	1.44
6.9 x 1.05	282.906
4.7 x .31	4.2
3 x 8.72	26.039
1.2 x 1.2	157.5
45 x 3.5	17.55
23.4 x 12.09	6
15.07 x 31.7	477.719
2.04 x 1.001	4.5738
3.9 x 4.5	1.457
13 x 2.003	7.14
3.098 x 2.09	2.04204
254.1 x .018	6.47482

Benchmark: 33.03, 33.04, 33.05

LEVEL: 6.0-8.9

STANDARD: 33.0 Demonstrate proficiency in number sense, concepts, and operations involving decimals

BENCHMARK: 33.03 Multiply a decimal by a whole number and another decimal.
33.04 Divide a decimal by a whole number and a decimal.
33.05 Divide a whole number by a decimal.

MATERIALS: Decimal Division Handout

DIRECTIONS: First teach the following decimal division rules.

1. If the divisor(outside #) is a decimal, move the decimal point to the right to make the divisor a whole number.
2. Move the decimal point in the dividend(inside #) the same number of places as the divisor's decimal point was moved. Add zeros as needed. Remind students that if a number is not written with a decimal point that there is always one to the far right.
3. Insert a decimal point in the quotient (answer) directly above the new decimal point in the dividend.
4. Divide as with whole numbers

Ex: $.3 \overline{)39}$

3. $\overline{)390}$. move the decimal one digit to the right and add a 0

130.

3. $\overline{)390}$. divide as normal

to check: $.3 \times 130 = 39$

Have the students pick one partner. They are going to do a partner activity where #1 will do the first problem and then pass it to # 2 and then #2 will check it with multiplication and then do the next problem and pass it to #1 for checking. Now #1 will check problem 2 and do problem 3 and then pass it to #2 for checking. The passing continues until the entire handout is done.

ANSWER KEY:

1. .493	6. 63.8
2. 16	7. 890
3. 60	8. 50,000
4. 3	9. \$0.12
5. 0.5	

Student: _____

Date: _____

Teacher: _____

Decimal Division

#1 _____

#2 _____

Divide the following decimals and whole numbers.

1. $1.48 \div 3 =$ _____ check:

2. $4.8 \div .3 =$ _____ check:

3. $42 \div .7 =$ _____ check:

4. $4.8 \div 1.6 =$ _____ check:

5. $.75 \div 1.5 =$ _____ check:

6. $1646.04 \div 25.8 =$ _____ check:

7. $121396 \div 136.4 =$ _____ check:

8. $5 \div .0001 =$ _____ check:

9. In 1993, the third class, single piece cost to mail a 14- ounce letter or package was \$1.67.

About how much is this per ounce? _____ check:

- LEVEL:** 6.0-8.9
- STANDARD:** 33.0 Demonstrate proficiency in number sense, concepts, and operations involving decimals
- BENCHMARK:** 33.07 Select the appropriate operation to solve specific problems involving decimals
33.08 Solve real-world problems involving decimals
- MATERIALS:** Decimal Sets handout
- DIRECTIONS:** Have students read the four addition problems. Discuss what the four problems have in common and make a list or rule of how to determine if a problem is addition. Do the same thing for subtraction, multiplication and division. Once you have written your lists or rules have the students solve the problems.

ANSWER KEY: Addition: lists of amount, doubling things, raising rates, altogether

1. $4.2 + 2.4 = 6.6\%$
2. $2.54 + 2.54 = 5.08$ cm
3. $3.1 + 2.5 + 4.5 = 10.1$ miles
4. $45.21 + 23.19 + 105.67 + 16.54 = \190.61

Subtraction: how much more, how much left, saving from a sale, spending money

5. $1.56 - 1.45 = \$0.11$
6. $1.002 - .786 = .216$ million
7. $45.50 - 23.90 - 5.75 = \$15.85$
8. $699.99 - 559.99 = \$140.00$

Multiplication: average/monthly, three times, adding money, of

9. $30 \times .3 = 9$ inches
10. $.89 \times 3 = \$2.67$
11. $4 \times 10.00 + 5 \times 5.00 + 7 \times 1.00 + 3 \times .25 + 6 \times .05 + 3 \times .01 = \73.28
12. $.5 \times 3.7 = 1.85$

Division: better buys, each, per, average

13. $1.00 / 3 = .33$, or $.39$, the 3 cans are a better buy
14. $4.2 / 2 = 2.1$
15. $234.8 / 10.9 = 21.54$ miles per gallon
16. 2.88 miles

Student: _____

Date: _____

Teacher: _____

Decimal Sets

Read the sets of problems and come up with a rule that you can use to determine which operation to use when you are not told how to solve real-world problems.

After you have developed your rules solve the problems.

Adding decimals:

1. In 1994, the unemployment rate for single women 16 years of age was 2.4 percent. If the unemployment rate for single men was 4.2 percent higher, what was that rate?
2. One inch equals 2.54 centimeters. What is the length in centimeters of 2 inches?
3. Maria ran 3.1 miles on Monday, 2.5 miles on Wednesday, and 4.5 miles on Friday. How much did she run all week?
4. Connie spent \$45.21 at Wal-mart, \$23.19 at Eckerd's, \$105.67 at Publix, and \$16.54 at the gas station. How much did she spend altogether?

Subtracting decimals:

5. One gas station sells regular gas for \$1.45 per gallon and one down the street sells the same gas for \$1.56. How much more does the second station sell their gas for?
6. The number of cars, trucks, and motorcycles registered in one county totaled 1.002 million. If there were .786 million cars registered, how many trucks and motorcycles are registered?
7. Jovonne went shopping with \$45.50. He spent \$23.90 at the store and the \$5.75 for lunch. How much money did he have left after shopping?
8. A TV set that is regularly priced \$699.99 is on sale for \$559.99. How much do you save by buying it on sale?

Multiplying decimals

9. The average daily rainfall in Vermont for the month of April was .3 inches. If there are 30 days in the month, how much rainfall was there in the month of April?

10. In 1978, a gallon of milk cost \$0.89. Today a gallon of milk is three times what it was in 1978. How much is milk today?
11. What is the value of 4 ten-dollar bills, 5 five-dollar bills, 7 one-dollar bills, 3 quarters, 2 dimes, 6 nickels and 3 pennies?
12. What is .5 of 3.7?

Dividing decimals

13. Lashauna can either buy 3 cans of lima beans for \$1.00 or pay \$0.39 for one. Which is the better buy?
14. David has a piece of wood that is 4.2 feet long. He needs to cut it into 2 equal parts. How long would each part be?
15. April drove 234.8 miles on 10.9 gallons of gas. How many miles per gallon did she average?
16. Mr. Wheeler walks 1 to 4 miles per day. If he walked 14.4 miles in five days, how many miles did he average each day?

Benchmark: 34.01, 34.02, 34.03, 34.04

LEVEL:	6.0-8.9
STANDARD:	34.0 Demonstrate proficiency in the mastery of number sense, concepts, and operations involving ratios and proportions
BENCHMARK	34.01 Associate ratios to their respective spoken names, written names, and numeral. 34.02 Understand the concept of ratio and proportion. 34.03 Identify concrete and symbolic representatives of ratios in the real world. 34.04 Understand that ratios can be represented in other equivalent forms
MATERIALS:	Ratio Handout
DIRECTIONS:	Go over the three main ways that ratios can be written. 2:5; 2 to 5; 2/5

Ratios can be reduced just like fractions, thus creating equivalent ratios.

Example: 2 to 4 becomes 1 to 2
12 : 8 becomes 3 : 2
5 to 10 becomes 1 to 2

Ratios can also be written in different ways and still be equivalent

Example: 2 to 5 is the same as 2 : 5 and 2/5

Remember to keep the number in the same order or you will be changing the meaning.

Now have the students complete the handout

When the students are finished discuss their findings and list as many different ways to write each ratio on the board.

ANSWER KEY:	1. 3/1	3:1	3 to 1
	2. 9/18	1:2	1/2
	3. 8 to 25	8/25	8:25
	4. 7:8	7/8	7 to 8
	5. 7.5: 16.5	7.5 to 16.5	7.5/16.5
	6. 250/1400	250 to 1400	250:1400 or 5:28
	7. 305/10	30.5/1	305 to 10

Student: _____ Date: _____

Teacher: _____

Ratios

Write three equivalent ratios for each word problem.

1. To make apple juice, combine 3 cans of water with 1 can of concentrate apple juice. What is the ratio of water to concentrate?

1. _____ 2. _____ 3. _____

2. The Cougars won 9 out of 18 basketball games. What is the ratio of games won to the total number of games?

1. _____ 2. _____ 3. _____

3. There are 25 M&M's in the bag. Eight of the M&M's are red. Seven are blue. What is the ratio of red M&M's to the total # of M&M's?

1. _____ 2. _____ 3. _____

4. Using the information in question 3, what is the ratio of blue M&M's to red M&M's? _____

5. Jack works 7.5 hours per day. What is the ratio of his hours working to his hours not working?

1. _____ 2. _____ 3. _____

6. Reshard makes \$1650 per month. He saves \$250 and spends the rest on bills. What is the ratio of money saved to money spent?

1. _____ 2. _____ 3. _____

7. Kevin goes 305 miles on 10 gallons of gas. What is the ratio of miles to gas used?

1. _____ 2. _____ 3. _____

Benchmark: 35.01, 35.02, 35.05

- LEVEL:** 6.0 - 8.9
- STANDARD:** 35.0 Demonstrate proficiency in the mastery of number sense, concepts, and operations involving percents
- BENCHMARK:** 35.01 Associate percents to their respective spoken names, written names, and numerals
35.02 Understand the relative size of percents
35.05 Convert between fractions, decimals, and percents
- MATERIALS:** M&M candy, baggies, M&M worksheet (sample follows), paper towel, scratch paper, pencils
- PROCEDURE:** Preparation: Prepare a baggie for each student. In each baggie, put an “easy” number of M&M candies; i.e. 20, 25, 50, etc.
Teacher Talk: Today, we will begin to work with percent. Percent is another way to measure how much of a total we have. Whenever you see a number represented as a percent, you have a part, not the whole amount. *You may want to briefly review fractions and decimals at this point.*
- When you get your bag of M&Ms, count the total number first.
- I pass out the bags, the paper towels and the worksheets. Some students prefer to spread the candy out on the paper towels. Some like to keep them in the bags.*
- Record the total number of M&Ms in the space provided. Then count each color and record that number in the proper space.
- Check to make sure that all students have counted correctly.*
- Use the total number of M&Ms as the denominator of your fraction. Use the number of the color for the numerator. Remember to reduce if needed. Repeat for all colors.
- Demonstrate: Total = 20 Orange = 7 Fraction = $\frac{7}{20}$*
- Divide the denominator into the numerator to get a decimal equivalent. Repeat for all fractions.
- Demonstrate: $\frac{7}{20} = 0.35$*
- Move the decimal point two places to the right to make the equivalent percent. Repeat for all decimals.
- Demonstrate: $0.35 = 35\%$*

Benchmark: 35.01, 35.02, 35.05

Student: _____

Date: _____

Teacher: _____

M&M Percentages

Add up the percents. If you have done this correctly, you should get 100%.

Total # of M&Ms _____

	TOTAL #	FRACTION	DECIMAL	PERCENT
RED				
YELLOW				
ORANGE				
BLUE				
GREEN				
BROWN				
SUM (TOTAL)				

Benchmark: 35.03, 35.04

- LEVEL:** 6.0-8.9
- STANDARD:** 35.0 Demonstrate proficiency in the mastery of number sense, concepts, and operations involving percents
- BENCHMARK:** 35.03 Identify concrete and symbolic representations of percents in real-world situations
35.04 Understand that percents can be represented in a variety of equivalent forms
- MATERIALS:** Newspaper, poster board, scissors, glue
- DIRECTIONS:** First brainstorm on where students have seen percents used in the real world. Make a list on the board of all the possibilities.

Now put this table on the board or overhead and fill it in with the students.

Percent	Fraction	Decimal
50%	$50/100 = 1/2$	.50 = .5
	$75/100 = 3/4$	
		.20 = .2
33 1/3 %		
	$1 1/2$	
		2.0
90 %		
	$1/20$	
		.045
ANSWER KEY:		
Percent	Fraction	Decimal
50%	$50/100 = 1/2$	.50 = .5
75 %	$75/100 = 3/4$	.75
20 %	$20/100 = 1/5$	.20 = .2
33 1/3 %	$1/3$	.333
150 %	$1 1/2$	1.5
200 %	$200/100 = 2/1 = 2$	2.0
90 %	$90/100 = 9/10$	.90 = .9
5 %	$1/20$	.05
4.5 %	$9/200$	.045

Now have the students go through the newspaper and find as many concrete examples of how percents are used in real world situations. If possible, cut out the cases and make a collage on poster board to hang in the room to remind them of how important percents are in the world.

- LEVEL:** 6.0 - 8.9
- STANDARD:** 35.0 Demonstrate proficiency in the mastery of number sense, concepts, and operations involving percents
- BENCHMARK:** 35.05 Convert between fractions, decimal, and percents
- MATERIALS:** Converting Fractions to Decimals to Percents worksheet, scratch paper and pencil
- PROCEDURE:** Hand out worksheet and have students work individually or in groups. If it is appropriate for your class, you can have groups compete to have both the quickest time and most correct answers.

Student: _____

Date: _____

Teacher: _____

Converting Fractions to Decimals to Percents

To change from a fraction to a decimal, divide the denominator into the numerator. To change from a decimal to a percent, move the decimal two places to the right. To change from a percent to a decimal, move the decimal two places to the left (remember that if there is no decimal there is always one to the right of the number). To change from a decimal to a fraction, read the number as a decimal then right it as a fraction, then reduce. (.5 is five tenths written as a fraction $\frac{5}{10}$ which can be reduced to $\frac{1}{2}$)

Fraction	Decimal	Percent
$\frac{1}{2}$	.5	50%
	.25	
$\frac{3}{8}$		
$\frac{1}{8}$		
	.625	
$\frac{3}{4}$		
$\frac{7}{8}$		
$\frac{4}{10}$		
	.20	
		30%
$\frac{1}{10}$		

Converting Fractions to Decimals to Percents

To change from a fraction to a decimal, divide the denominator into the numerator. To change from a decimal to a percent, move the decimal two places to the right. To change from a percent to a decimal, move the decimal two places to the left (remember that if there is no decimal there is always one to the right of the number). To change from a decimal to a fraction, read the number as a decimal then right it as a fraction, then reduce. (.5 is five tenths written as a fraction $\frac{5}{10}$ which can be reduced to $\frac{1}{2}$)

Fraction	Decimal	Percent
$\frac{1}{2}$	.5	50%
$\frac{1}{4}$	.25	25%
$\frac{3}{8}$	0.375	37.50%
$\frac{1}{8}$	0.125	12.5%
$\frac{5}{8}$	.625	62.5%
$\frac{3}{4}$	0.75	75%
$\frac{7}{8}$	0.875	87.5%
$\frac{4}{10}$	0.4	40%
$\frac{1}{5}$	.20	20%
$\frac{3}{10}$	0.30	30%
$\frac{1}{10}$	0.10	10%

Benchmark: 35.06, 35.07, 35.08

LEVEL: 6.0-8.9

STANDARD: 35.0 Demonstrate proficiency in the mastery of number sense, concepts, and operations involving percents

BENCHMARK(s): 35.06 Find a percent of a number
35.07 Find what percent one number is of another
35.08 Find the total when a percent is given

MATERIALS: Percent Circle handout

ACTIVITIES: **Using the Percent Circle**

To use the percent circle:

- Cover the symbol of the number you are trying to find.
- Do the math indicated by the uncovered symbols.

Example 1: Finding *part* of a whole

If 30% of your \$1900 monthly check is used to pay rent, how much is your rent payment?

Step 1. Cover **P** (the part)-the number you are trying to find.

Step 2. Read the uncovered symbols: $\% \times W$
 $P = \% \times W$

- To find the *part*, multiply the percent by the whole.

Example 2: Finding what *percent* a part is of a whole.

If \$400 of your \$1900 monthly check is used to buy food, what percent of your check is spent on food?

Step 1. Cover **%** (the percent)-the number you are trying to find.

Step 2. Read the uncovered symbols:
 $\% = P \div W$

- To find the *percent*, divide the part by the whole.
- Multiply the decimal by 100.

Example 3: Finding a *whole* when a part is given.

Suppose you buy a used car and make a 10% down payment of \$250. What is the price of the car?

Step 1. Cover **W** (the whole)-the number you are trying to find.

Step 2. Read the uncovered symbols:
 $W = P \div \%$

- To find the *whole*, divide the part by the percent.

Student: _____

Date: _____

Teacher: _____

Using the Percent Circle

To use the percent circle:

- Cover the symbol of the number you are trying to find.
- Do the math indicated by the uncovered symbols.

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 $P = \% \times W$

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If \$400 of your \$1900 monthly check is used to buy food, what percent of your check is spent on food?

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Step 1. Cover **W** (the whole)-the number you are trying to find.

Step 2. Read the uncovered symbols:
 $W = P \div \%$

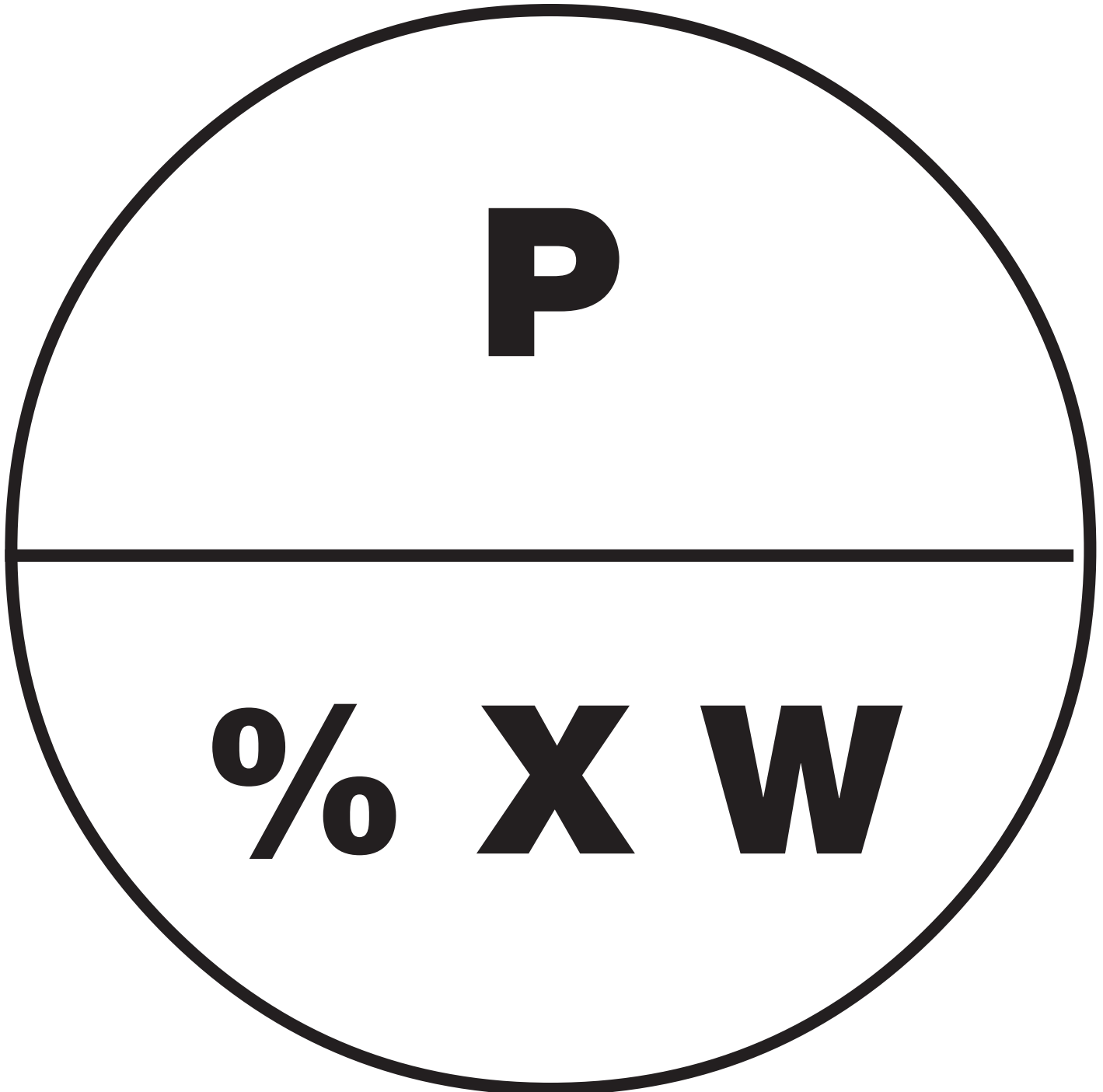
- To find the *whole*, divide the part by the percent.

Student: _____

Date: _____

Teacher: _____

Percent Circle



Benchmark: 34.06, 34.07, 35.09, 35.10

LEVEL:	6.0-8.9
STANDARD	35.0 Demonstrate proficiency in the mastery of number sense, concepts, and operations involving percents
BENCHMARK(S)	34.06 Solve real world problems involving ratios and proportions. 34.07 Demonstrate the process of cross multiplying to solve proportions. 35.09 Solve real-world problems involving percents. 35.10 Determine sales tax on a purchase when given the tax rate.

MATERIALS: Percent application handout

DIRECTIONS: **TEACH** the Percent Equation! This equation works with all percent problems and if the students use it on a regular basis for all the problems it is less confusing. This equation uses ratio and proportion to solve percent problems

There are 2 versions but both means the same thing.

$$\frac{\text{Part}}{\text{Whole}} = \frac{\text{percent}}{100} \quad \text{is} = \frac{\%}{100}$$

Is/of = %/100 uses key words that are found in the problem.

What **IS** 20 % **OF** 100? So $x/100 = 20/100$ and then you cross multiply and get $100(x) = 20(100)$

Now divide both sides by whatever is in front of the x

$$\frac{100x}{100} = \frac{2000}{100}$$

Now you have your solution $x = 20$ so 20 is 20% of 100.

Part/whole = %/100 is when they give you a part of a number, the whole amount and you must find the % or when they give the whole number and the % and you have to find the part. It is worked the same way but is used mainly for more wordy problems. I mainly use it for sales and discount problems.

Try these with your students:

What is 45 % of 200? $\frac{x}{200} = \frac{45}{100}$ so $100x = 9000$,

now divide both sides by whatever is in front of the x

$$\frac{100x}{100} = \frac{9000}{100}$$

and you get $x = 90$

200 is what percent of 100? $\frac{200}{100} = \frac{x}{100}$

$$\frac{100x}{100} = \frac{20000}{100} \quad x = 200\%$$

25 is 50% of what number? $\frac{25}{x} = \frac{50}{100}$

$$\frac{50x}{50} = \frac{2500}{50} \quad \text{so } x = 50$$

Have some students come up with some problems and trade with each other.

Student: _____

Date: _____

Teacher: _____

Percent Applications

Solve the following problems using the percent equation.

$$\frac{\text{Is}}{\text{of}} = \frac{\%}{100} \quad \text{or} \quad \frac{\text{part}}{\text{whole}} = \frac{\%}{100}$$

1. Find
- 9 % of 270
- .

$$\frac{X}{270} = \frac{9}{100}$$

2. Find
- 11.3 % of 460
- . _____ =
- $\frac{\quad}{100}$

- 3.
- 45 is what % of 72?
- _____ =
- $\frac{\quad}{100}$

- 4.
- 17 is what % of 51?
- _____ =
- $\frac{\quad}{100}$

- 5.
- 20 % of what number is 80?
- _____ =
- $\frac{\quad}{100}$

- 6.
- 28 % of what number is 45?
- _____ =
- $\frac{\quad}{100}$

7. There are 140 members in an Elks Club. If only 98 show up for the fall meeting, what percent of the members attended the meeting? _____ =
- $\frac{\quad}{100}$

8. Johnny weighed 190 pounds. After three months of dieting and exercising, he lost 20 pounds. What percent of his weight did he lose? _____ =
- $\frac{\quad}{100}$

9. Jason paid \$325 interest on a school loan of \$13,000. What percent was the interest on this loan? $\frac{\quad}{\quad} = \frac{\quad}{100}$
10. Kamil got 51 problems correct on the language test. If this is 85 % of the test, how many problems were on the test? $\frac{\quad}{\quad} = \frac{\quad}{100}$
11. The sales tax rate in Leon County is 7%. How much tax does a person pay if they buy a dress that costs \$45? $\frac{\quad}{\quad} = \frac{\quad}{100}$
12. Reid saves 3% of his weekly take-home pay. He saves \$10.50 per week. How much is his take-home pay? $\frac{\quad}{\quad} = \frac{\quad}{100}$
13. The total bill for the William's dinner is \$39.60. They left a tip of \$5.94. The tip is what percent of the total bill? $\frac{\quad}{\quad} = \frac{\quad}{100}$
14. Selah works in a music store. He gets a 20% discount on all of his purchases. How much can he save on a CD player that sells for \$99.99? $\frac{\quad}{\quad} = \frac{\quad}{100}$
15. A school raised \$45,000 for new playground equipment. The amount is 75% of what they need. What is the total cost for the equipment? $\frac{\quad}{\quad} = \frac{\quad}{100}$

- ANSWER KEY:**
1. 24.3 %
 2. $x/460 = 11.3/100$, $x = 51.98$
 3. $45/72 = x/100$, $x = 62.5\%$
 4. $17/51 = x/100$, $x = 33.33\%$
 5. $80/x = 20/100$, $x = 400$
 6. $45/x = 28/100$, $x = 160.71$
 7. $98/140 = x/100$, $x = 70$
 8. $20/190 = x/100$, $x = 10.52\%$
 9. $325/13000 = x/100$, $x = 2.5\%$
 10. $51/x = 85/100$, $x = 60$
 11. $x/45 = 7/100$, $x = \$3.15$
 12. $10.50/x = 3/100$, $x = \$350$
 13. $5.94/39.60 = x/100$, $x = 15\%$
 14. $x/99.99 = 20/100$, $x = \$19.99$
 15. $45000/x = 75/100$, $x = \$60,000$

Benchmark: 35.02, 35.03, 35.06, 35.09, 36.05, 36.08

LEVEL:	6.0 – 8.9
STANDARD:	35.0 Demonstrate proficiency in the mastery of number sense, concepts, and operations involving percents. 36.0 Demonstrate proficiency in number sense, concepts, and operations involving integers.
BENCHMARK(S):	35.02 Understand the relative size of percents. 35.03 Identify concrete and symbolic representations of percents in real-world situations. 35.06 Find a percent of a number. 35.09 Solve real-world problems involving percents. 36.05 Add, subtract, multiply, and divide integers. 36.08 Solve real-world problems involving integers.
ACTIVITY:	To represent monetary units as equivalent forms to convert fractions, decimals, and percent in calculating discounts. Students select and discuss the most appropriate method of calculating six word problems by using total response cards. Then in groups students solve one or more questions of their choosing and give a presentation of why they chose that method as the most appropriate means of calculating.
MATERIALS:	Calculators and/or appropriate technology Activity Sheet(s)
PROCEDURE:	<i>Role of the Teacher:</i> Leader of total group discussion to initiate student thinking and involvement or as facilitator of cooperative groups and/or individual activity View the activity sheets and provide feedback on presentations <i>Role of the Students:</i> Choose appropriate tool, explain reasoning and make a presentation Variation: To simplify, consider changing percents to 10%, etc. To make more difficult, consider changing percents to 12.5%, or 1/8 off, etc. Create a new activity sheet to acquire real-life data from newspapers, stores, internet, etc. May use fraction rings to model decimals and percents. Data analysis using spreadsheet option. Modify problem to state difference in product prices and discounts, for example store may end the sale or product price may change.

Benchmark: 35.02, 35.03, 35.06, 35.09, 36.05, 36.08

Student: _____

Date: _____

Teacher: _____

Old School Music Equipment on Sale

SPEAKERS
\$163
1/3 off set of 2

Stackables
All 4
15% off

Turntable \$86
Radio/ Tuner \$78
Cassette \$66
CD Player \$110

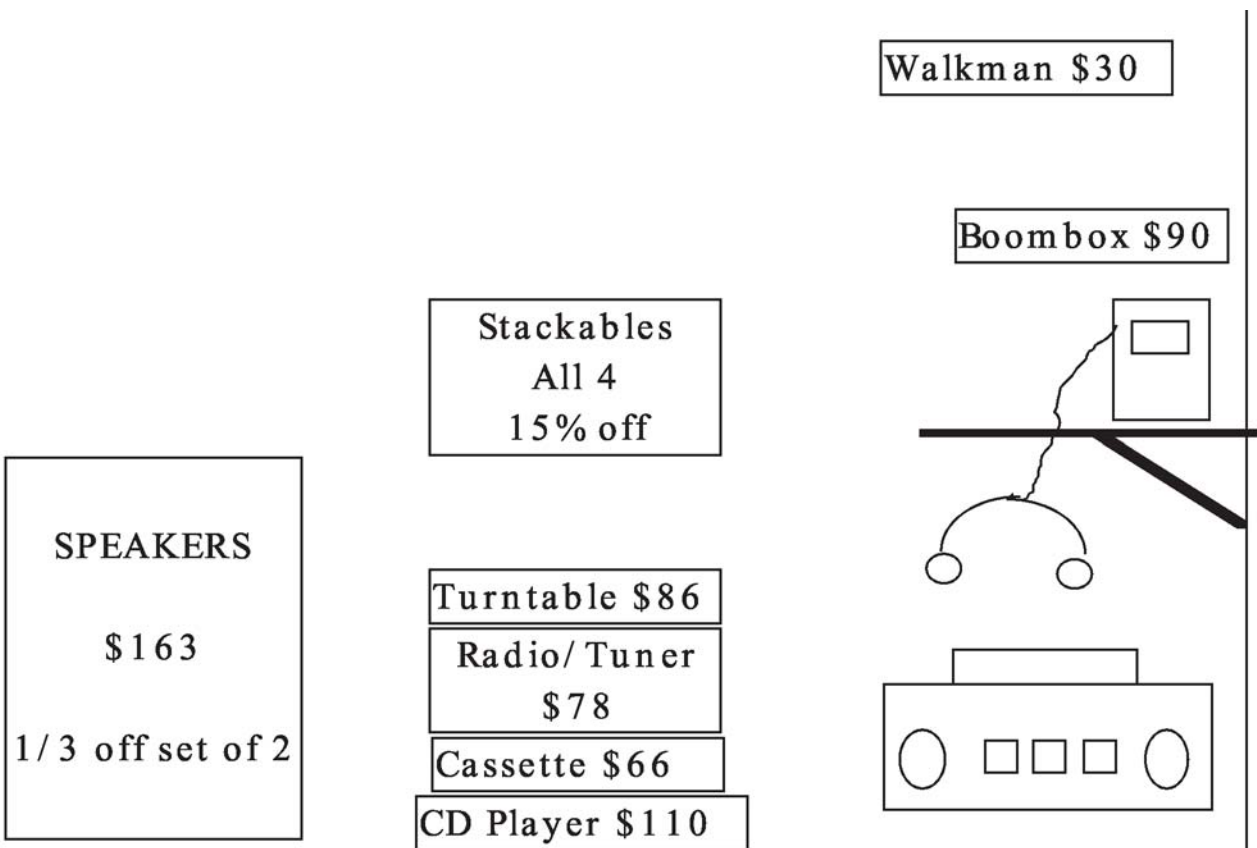
Walkman \$30
Boombox \$90

Ned and Lucy are shopping for stereo equipment. They would like to buy a CD player, cassette player, radio/tuner, and two speakers. They have \$700 but 25% of this must be used for rent. Ned also wants to buy a Walkman. Can they purchase any or all of these items?

Extension:

The rent changes, now you must spend 32% of your money on rent. Can you buy two Walkmans, a boombox, a tuner, and a CD player?

Old School Music Equipment on Sale



Ned and Lucy are shopping for stereo equipment. They would like to buy a CD player, cassette player, radio/tuner, and two speakers. They have \$700 but 25% of this must be used for rent. Ned also wants to buy a Walkman. Can they purchase any or all of these items?

YES $700 - 25\% = 525$ $\$110 + 66 + 78 + 217.33 = 471.33$ Rent = 125
 $\$163 \times 2 = 326 \div 3 = 108.67$ purchase 471.33 TOTAL = 596.33

Extension:

The rent changes, now you must spend 32% of your money on rent. Can you buy two Walkmans, a boombox, a tuner, and a CD player?

$700 - 32\% = 476$ YES, rent = 224 + 338 = \$562 (total purchase)

$30 \times 2 = 60 + 90 + 78 + 110 = 338$

Benchmark: 35.02, 35.03, 35.04, 41.01

LEVEL:	6.0 – 8.9
STANDARD:	35.0 Demonstrate proficiency in the mastery of number sense, concepts, and operations involving percents 41.0 Interpret data from graphs, charts, and maps
BENCHMARK(S):	35.02 Understand the relative size of percents. 35.03 Identify concrete and symbolic representations of percents in real-world situations. 35.04 Understand that percents can be represented in a variety of equivalent forms. 41.01 Interpret and compare data from pictographs, circle graphs, bar graphs, and line graphs.
ACTIVITY:	Keep on-going information about your favorite sports team, e.g. basketball, for either high school or college (College teams are easier to find in print.) Start at the beginning of the season and about tournament time your data bank should be large. Students will compare height, weight, field goal percentage, free throw percentage, assists, and many kinds of average.
MATERIALS:	Print material that includes the needed information Prepare a place in the classroom to collect the material over several months May use cooperative groups
PROCEDURE:	<i>Role of the Teacher:</i> Choose any or all of the activities from the activity page. Evaluation: Teacher may choose any activity and identify patterns. Many of the activities may be used to identify and express functions. <i>Role of the Students:</i> Follow directions <i>Variation:</i> May be used with any seasonal sports (i.e. fall football) May choose two teams to follow and create a larger data base and evaluate comparisons.

Benchmark: 35.02, 35.03, 35.04, 41.01

Student: _____

Date: _____

Teacher: _____

Suggested Activities for Basketball Statistics

1. Make a chart showing the team schedule. Include date, opponent, place, and time of all games.
2. Make a bar graph which shows the height of each player.
3. Using the number of field goals and the number of attempts, figure the percentage of shots made by each player. Then make a line graph to compare these percentages.
4. Using information in a single given game, construct a table which shows field goals made, free throws made, assists, fouls, total points, and turnovers for each player. Note patterns.
5. Choose two of your favorite players and compare them in at least eight ways, using a double bar graph.
6. Keep a continuing graph for any and/or all players to note change in rate.

Benchmark: 35.01, 35.06, 35.08, 35.09, 35.10, 42.02

LEVEL:	6.0 – 8.9
STANDARD:	35.0 Demonstrate proficiency in the mastery of number sense, concepts, and operations involving percents 42.0 Demonstrate proficiency in consumer math skills
BENCHMARK(S):	35.01 Associate percents to their respective spoken names, written names, and numerals. 35.06 Find a percent of a number. 35.08 Find the total when a percent is given. 35.09 Solve real-world problems involving percents. 35.10 Determine sales tax on a purchase when given the tax rate. 42.02 Use the sales tax rate to calculate sales tax and total cost of a purchase.
ACTIVITY:	Apply and explain procedures for estimation with monetary decimals. Estimate and compute the actual cost of a meal at a favorite restaurant from a menu including tax and 18% tip.
MATERIALS:	Menu from restaurant(s) Scenario on an activity sheet per group or individual Calculators/appropriate technology Data/ Spreadsheet Cooperative and/or individual grouping
PROCEDURE:	Scenario should be completed according to the teacher’s and the students’ preferences <i>Role of the Teacher:</i> Facilitator of Cooperative groups and/or individual activity Evaluation of Activity: Observation during the group activity for processes such as brainstorming and planning, data collection and organization, revision, and publication of the results (estimation and computations with reasoning) Field trip to the restaurant using data collected and information from scenario <i>Role of the Students</i> Read the story Plan, estimate, and compute the cost of an actual meal using the menu Choose appropriate technology for computations Explain reasoning for procedures in groups Prepare presentation for the class including the food items chosen Complete data/spreadsheet

Variation:

What if the total cost of the meal was more than the money available? What would you do?

What if you chose to do an activity after the meal? How would this effect your decisions?

Tax and tip may be excluded and/or changed

- LEVEL:** 6.0 - 8.9
- STANDARD:** 36.0 Demonstrate proficiency in number sense, concepts, and operations involving integers
- BENCHMARK:** 36.05 Add, subtract, multiply, and divide integers
- MATERIALS:** Positive and Negative Numbers Handout
- PROCEDURE:** This handout is a good reference for students beginning to work with positive and negative numbers. It works well with a number line, also. If you have many students working on this standard, it would be good to make a big class copy of these rules and display it.
- Go over examples of problems using each of the four operations. Discuss with students how money relates to positive and negative numbers. When adding numbers have them think of positive numbers as money they have and negative numbers as money they owe.

Student: _____

Date: _____

Teacher: _____

POSITIVE AND NEGATIVE NUMBERS

ADDITION

- If both numbers are + add and the number is + .
- If both numbers are – add and the answer is - .
- If one is + and one is – get the difference between the two numbers (subtract) and the answer is the sign of the larger number.
- If you have more than two numbers: add all the positives together, add all the negatives together, then add the + answer to the – answer following the rule above.

SUBTRACTION

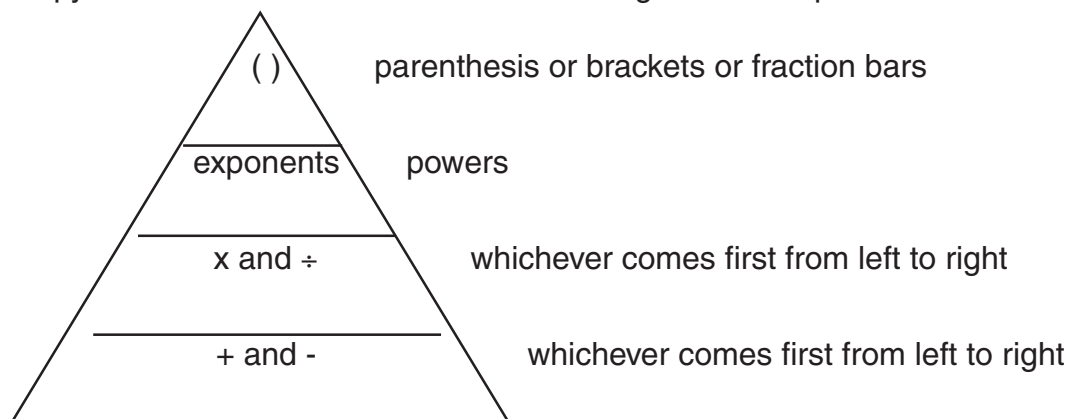
- Keep the first number the same, change subtraction to addition, change the sign of the second number, then follow the rules for addition of positive and negative numbers.
- If you have more than two numbers: change all the subtraction signs to addition, change all the signs of the numbers after the subtraction signs, then follow rules for addition.

MULTIPLICATION AND DIVISION

- If both numbers are + the answer will be positive.
- If both numbers are – the answer will be positive.
- If one number is + and one is – the answer will be negative.
- If you have more than two numbers in multiplication: multiply all the numbers, if there was an odd number of – signs your answer will be -, if there was an even number of – signs your answer will be positive.

LEVEL:	6.0 - 8.9
STANDARD:	36.0 Demonstrate proficiency in number sense, concepts, and operations involving integers
BENCHMARK:	36.06 Solve simple problems by applying the algebraic order of operations.
MATERIALS:	Order of operations handout and a calculator
PROCEDURE:	<p>First give this example on the board now show them that if there were no rules many answers could be found</p> $2 + 3 \times 4 - 2 \times 3$ $5 \times 4 - 2 \times 3$ $5 \times 2 \times 3$ <p>30</p> $2 + 3 \times 4 - 2 \times 3$ $2 + 12 - 6$ <p>8</p> $2 + 3 \times 4 - 2 \times 3$ $5 \times 4 - 2 \times 3$ $20 - 2 \times 3$ 18×3 <p>54</p> $2 + 3 \times 4 - 2 \times 3$ $5 \times 4 - 2 \times 3$ $20 - 6$ <p>14</p>

Now which one is it? Around the world an order has been established so everyone will get the same answer. It is called "The Order of Operations Rule." This pyramid shows the order to follow. Starting from the top



I never teach "Please Excuse My Aunt Sally" because it says multiplication before division and addition before subtraction and this is not the case. Multiplication is done at the same time as division; you just go from left to right and do whichever comes first. The same with addition and subtraction. So I always teach the pyramid method.

Using this method with the above problem we would solve it like this;

$$2 + 3 \times 4 - 2 \times 3$$

$$2 + 12 - 6$$

$$8$$

Now explain to students that most calculators will do the order of operations automatically. Show them with the overhead calculator if you have one, if not have a student do the calculations and share with the class. Tell them when they are done with the worksheet they will be allowed to check their work with a calculator.

Now pass out the handout and have the students do the problems individually and then check them with a calculator to see how they did.

ANSWER KEY:

- | | |
|-------|---------|
| 1. 65 | 8. 26.5 |
| 2. 0 | 9. 51 |
| 3. 7 | 10. 14 |
| 4. 2 | 11. 172 |
| 5. 18 | 12. 4.3 |
| 6. 30 | 13. 6 |
| 7. 41 | 14. 24 |

Student: _____

Date: _____

Teacher: _____

Order of Operations

Find the value of the following problems using the order of operations rule.

1. $25 + 4 \times 10 = \underline{\hspace{2cm}}$

9. $[7(2) - 4] + [9 + 8(4)] = \underline{\hspace{2cm}}$

2. $9 \div 3 - 15 \div 5 = \underline{\hspace{2cm}}$

10. $29 - 3(9 - 4) = \underline{\hspace{2cm}}$

3. $4 - (9 - 12) = \underline{\hspace{2cm}}$

11. $(5 - 1)^3 + (11 - 2)^2 + (7 - 4)^3 = \underline{\hspace{2cm}}$

4. $36 \div 6 \div 3 = \underline{\hspace{2cm}}$

12. $7(0.2 + 0.5) - 0.6 = \underline{\hspace{2cm}}$

5. $36 \div (6 \div 3) = \underline{\hspace{2cm}}$

13. $\frac{2 \times 8^2 - 4 \times 8}{2 \times 8} = \underline{\hspace{2cm}}$

6. $3 \times 4 + 3 \times 6 = \underline{\hspace{2cm}}$

14. $[3(6) - 4^2]^3 \times 15 \div 5 = \underline{\hspace{2cm}}$

7. $5 \times 7 - 6 \div 2 + 3 \times 3 = \underline{\hspace{2cm}}$

8. $8(6 - 3) + 5 \div 2 = \underline{\hspace{2cm}}$

LEVEL: 6.0-8.9

STANDARD: 36.0 Demonstrate proficiency in number sense, concepts, and operations involving integers

BENCHMARK: 36.02 Identify concrete and symbolic representations of integers to real world situations, e.g., temperature.

MATERIALS: Integer operation handout

PROCEDURE: Discuss the following things with the class:

1. What is an integer? (a positive or negative whole number)
2. Explain how a minus sign can be used in two ways. (subtracting and negative direction)
3. Give two examples where negative integers are used in workplace situations. (A freezer repairman needs to use negative temperatures, and a football referee uses negative numbers to back up the ball)

Now pass out the handout and have the students work in groups to choose an integer to represent each situation.

- ANSWER KEY:**
1. -16
 2. +25
 3. -14,600
 4. -2430
 5. +33
 6. -9765
 7. +115
 8. +300
 9. -45.90
 10. +15
 11. +500
 12. -34
 13. -500
 14. +50
 15. +10

Student: _____

Date: _____

Teacher: _____

Integer Operations

Write an integer to represent each situation.

1. An elevator goes down 16 floors. _____
2. A construction detour causes a 25 minute longer drive to work after school. _____
3. The Mayfield Cookie Company lost \$14,600 the first year of business. _____
4. To land at a local airport, a plane must lose 2430 feet of altitude. _____
5. The stock market increased 33 points in the first hour of trading. _____
6. The deepest point in the Pacific Ocean is 9765 meters below sea level. _____
7. A helium balloon rose 115 feet. _____
8. Mark deposited \$300 into his savings account. _____
9. Jennifer wrote a check for \$45.90. _____
10. Jovonne gained 15 pounds during weight training. _____
11. The Townsends enlarged their deck by 500 square feet. _____
12. After a chemical reaction, the temperature of the metal dropped 34 degrees. _____
13. A mountain climber descends 500 feet per hour. _____
14. A diver ascends the ocean at 50 feet per hour. _____
15. The temperature rose 10 degrees as the sun came up. _____

Now write a few of your own to share with the class.

16. _____
17. _____
18. _____

LEVEL:	6.0 – 8.9
STANDARD:	36.0 Demonstrate proficiency in number sense, concepts, and operations involving integers
BENCHMARK:	36.07 Select the appropriate operation to solve specific problems involving integers
ACTIVITY:	To select and apply an appropriate method for computing from among mental arithmetic, paper and pencil, and appropriate technology and evaluate the reasonableness of results. Students select and discuss the most appropriate method of calculating six word problems by using total response cards. Then in groups students solve one or more questions of their choosing and give a presentation of why they chose that method as the most appropriate means of calculating.
MATERIALS:	Integer Word Problems worksheet Duplicate Question sheet—1 per group 3 index cards per student labeled as “mental”, “paper and pencil”, and “calculator” Calculators and/or computer Record the class responses to each question on the board or newsprint.
PROCEDURE:	<p><i>Role of the Teacher:</i> Read multiple choice questions to students. Facilitator of groups while they apply the appropriate computing method. Guide discussions of student responses Evaluation: Teacher observes and analyzes index card responses and group presentations as to reasonableness of their thought.</p> <p><i>Role of the Students:</i> Respond to questions by displaying one of the three index cards. Discuss variety of responses to each question. Groups apply one or two questions of their choosing and present their thoughts as to why their choice was the most appropriate method of calculating.</p> <p><i>Variation:</i> Add other multiple choice questions. Simplify or enhance the difficulty of the questions.</p> <p>Brainstorm with students different clues for deciding what operation to use when solving word problems.</p>

Student: _____

Date: _____

Teacher: _____

Integer Word Problems

1. Basketball Ticket Sales
- | | |
|------------------------------------|--------|
| Adults/ High School Students | \$2.00 |
| Elementary/ Middle School Students | \$1.00 |

There were 169 adult tickets sold. The total amount of sales was \$426. How many elementary students bought tickets?

OPERATION: _____

2. There are 25 students in each of twenty classrooms. How many students in the entire school?

OPERATION: _____

3. There are a total of 3,789 teachers in our school system and 117 schools. What is the average number of teachers per school?

OPERATION: _____

4. Divide 400 snacks among twenty students.

OPERATION: _____

5. The entire school system is going to a concert. There are 2,762 students, 111 teachers, and 79 parents attending. Sixty seven persons can ride on a bus. How many buses are needed?

OPERATION: _____

6. Sixty seven sixth graders are present today. In the seventh grade 79 are present. The eighth grade had 72 students. There were eight middle school students absent. What is the total enrollment of the middle school?

OPERATION: _____

Integer Word Problems

1. Basketball Ticket Sales

Adults/ High School Students	\$2.00
Elementary/ Middle School Students	\$1.00

There were 169 adult tickets sold. The total amount of sales was \$426. How many elementary students bought tickets?

OPERATION: Multiplication: $169 \times 2 = 338$ Subtraction - $426 - 338 = 88$

2. There are 25 students in each of twenty classrooms. How many students in the entire school?

OPERATION: Multiplication: $25 \times 20 = 500$

3. There are a total of 3,789 teachers in our school system and 117 schools. What is the average number of teachers per school?

OPERATION: Division: $3789 \div 117 = 32.3 = 32$

4. Divide 400 snacks among twenty students.

OPERATION: Division: $400 \div 20 = 20$

5. The entire school system is going to a concert. There are 2,762 students, 111 teachers, and 79 parents attending. Sixty seven persons can ride on a bus. How many buses are needed?

OPERATION: Addition: $2762 + 111 + 79 = 2952$ Division - $2952 \div 67 = 44.05 = 45$

6. Sixty seven sixth graders are present today. In the seventh grade 79 are present. The eighth grade had 72 students. There were eight middle school students absent. What is the total enrollment of the middle school?

OPERATION: Addition: $67 + 79 + 72 + 8 = 226$

LEVEL:	6.0-8.9
STANDARD:	36.0 Demonstrate proficiency in number sense, concepts, and operations involving integers
BENCHMARK:	36.08 Solve real-world problems involving integers.
MATERIALS:	Paper and pencil
PROCEDURE:	Review the work from 36.07 and list the key words that mean positive or negative.

Example: down, longer, detour, lost, lose, increased, below, gained, enlarged, dropped, descends, ascends, credit, debit, decreased, and more generate by students.

Chose two words and write a problem with your students help. Example:
The temperature increased 5 degrees when the sun rose, and dropped 15 degrees when the sun set. If the temperature started out at 54 degrees what was it after sunset? ($54 + 5 - 15 = 44$ degrees)

The stock market dropped 33 points during the first hour, but rose 12 points for the remainder of the day. If the points ended up at 345, where did they start for that day? ($___ - 33 + 12 = 345$) = 366

Now have the students work in small groups and have each group write 5 problems. After they have written the problems and solved them, have them trade with another group. Do this until every group has done every other group's problems.

- LEVEL:** 6:0-8.9
- STANDARD:** 36.0 Demonstrate proficiency in number sense, concepts, and operations involving integers
- BENCHMARK:** 36.09 Find squares of numbers 1-20.
36.10 Find square roots of perfect squares.
- MATERIALS:** Square Table handout and calculators

PROCEDURE: Have a discussion about squaring a number and have the student call out the ones they have memorized as you write them on the board. $1 = 1$, $2 = 4$, 9 , 16 , 25 , 36 , 49 , 64 , 81 , 100 , 121 , 144 , that is usually as high as they can get. These are called the perfect squares.

Now as subtraction is the opposite of addition and division is the opposite of multiplication, square root is the opposite of squaring. For the above numbers, it is just reading backwards: square root of 4 is 2, of 16 is 4, of 144 is 12. These are perfect squares because the answer you get is always a whole number. Sometimes you won't get a whole number. You will get a decimal. The square root of 3 is 1.732050808. Round these to 4 decimal places so you have 1.7321. Using the overhead calculator show how you found this number. Explain how when calculators were too expensive there was always a table in the back of the book that listed the squares and square roots. Since they may not have a calculator at home they are going to make their own table. Pass out the table handout and calculators.

Do the first few with them and then let them finish the table. They can keep the table in their notebook, folder, or take it home.

Have students complete the worksheet.

Student: _____

Date: _____

Teacher: _____

Find the squares of the following numbers:

7

4

3

9

8

5

12

17

19

1

Find the square roots of the following numbers:

36

121

400

196

100

256

169

324

225

4

Find the squares of the following numbers:

$7 - 49$

$4 - 16$

$3 - 9$

$9 - 81$

$8 - 64$

$5 - 25$

$12 - 144$

$17 - 289$

$19 - 361$

$1 - 1$

Find the square roots of the following numbers:

$36 - 6$

$121 - 11$

$400 - 20$

$196 - 14$

$100 - 10$

$256 - 16$

$169 - 13$

$324 - 18$

$225 - 15$

$4 - 2$

LEVEL:	6.0 – 8.9
STANDARD:	36.0 Demonstrate proficiency in number sense, concepts, and operations involving integers
BENCHMARK:	36.12 Solve one-step equations involving any of the mathematical operations, e.g., $X + 9 = 27$; $x/4 = 3.5x - (-4) = 2$.
ACTIVITY:	To solve addition equations using models To model solving linear equations using manipulatives to determine the number of silver nuggets Denver Dan has hidden on student activity sheet.
MATERIALS:	Small paper bags or envelopes (1 per group) Counters (cm squares, beans, buttons, popcorn, peanuts, M&Ms, etc.) 8" by 10" (approximately) sheet of paper (colors show up better) Journal or notebook paper for recording results
PROCEDURE:	Divide the class into groups consisting of four or five students. Distribute approximately 35 counters and a small envelope or bag for each group of students and one student page per group.

Role of the Teacher:

Leader of the total group discussion to initiate student thinking and involvement — ("What is an equation? What do all equations have in common? What is the root word of equation? How can we model an equation using counters and an envelope as the variable?")

Facilitator of cooperative groups

Evaluation: View modeling, Informal observation of group discussions and read journals

Role of the Students:

Model and evaluate algebraic equations

Use mathematical symbols to describe the model

Explain in journal the steps to solving an equation

Variation:

Rational numbers may be used in place of whole numbers.

Two step equations may be used.

Subtraction, multiplication and division equations may be used.

Expressions could be used instead of equations.

Smaller numbers could be substituted.

Student: _____

Date: _____

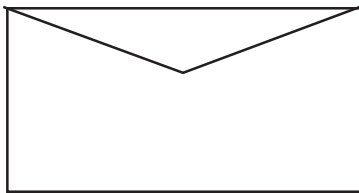
Teacher: _____

“X Marks the Spot or Varying Variables

Denver Dan has hidden “x” number of silver nuggets. Your clue to the treasure reads:

***If you add 5 nuggets to my treasure,
the total of silver nuggets will be 13.***

How many silver nuggets has Dan hidden? Use your markers, mat (poster board or table top), and envelope to demonstrate your answer. Using algebraic symbols, write the steps you model at the bottom of the mat.



= mystery amount

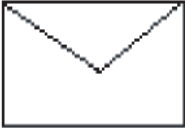
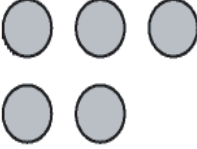
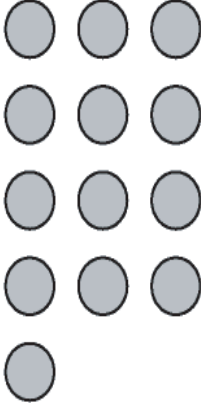
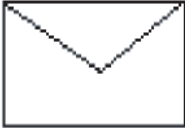
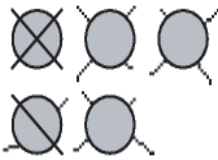
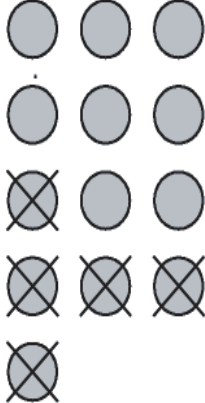


= 1 nugget

How many nuggets had Dan hidden? (If your teacher gave you candy, peanuts, or popcorn, you may eat your treasure when you are finished with this activity).

Does your mat look like this?

And like this?

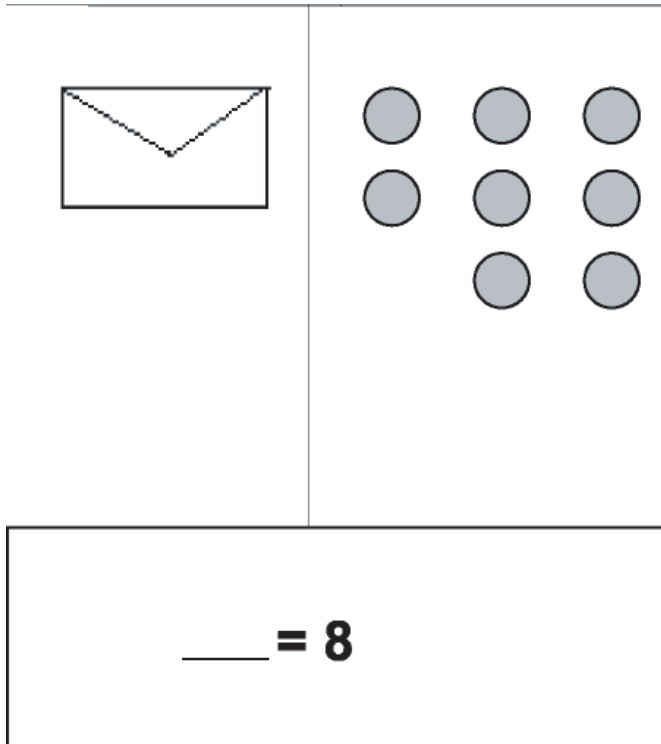
 		 	
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_____ + 5 = 13

_____ + 5 - 5 = 13 - 5

“X” Marks the Spot

Then like this?



Now try this problem. This time as you draw the steps, write the numbers and variable to represent your work.

$$x + 6 = 14$$

YOUR TURN! Let each member of the group take a turn suggesting an equation. The rest of the group will model this equation. Make sure each group member has a chance to model an equation. Check your group and make sure they represented it correctly. How can you check the answer?

In your journal, write the equation $x + 2 = 6$ and draw the solution using models. Label each step. Tell why you think the term “variable” is a good name for the x (or whatever letter you have chosen for the variable).

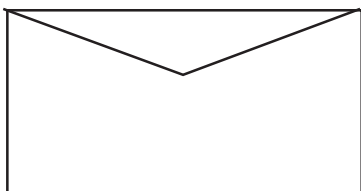
Discuss in the group why 2 was subtracted from each side of the equation to find the value of the variable. Summarize the discussion in your journal.

“X Marks the Spot or Varying Variables

Denver Dan has hidden “x” number of silver nuggets. Your clue to the treasure reads:

***If you add 5 nuggets to my treasure,
the total of silver nuggets will be 13.***

How many silver nuggets has Dan hidden? Use your markers, mat (poster board or table top), and envelope to demonstrate your answer. Using algebraic symbols, write the steps you model at the bottom of the mat.



= mystery amount

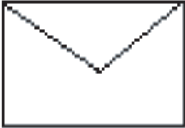
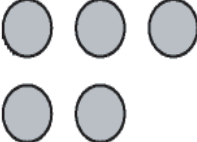
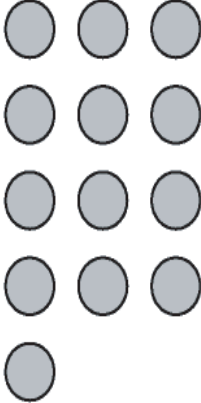
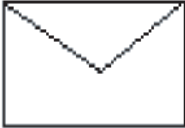
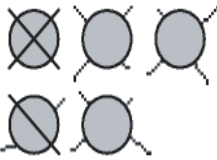
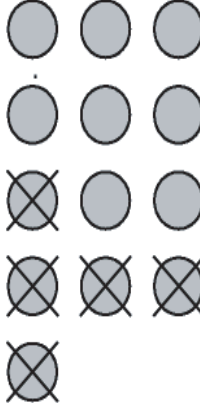


= 1 nugget

How many nuggets had Dan hidden? (If your teacher gave you candy, peanuts, or popcorn, you may eat your treasure when you are finished with this activity).

Does your mat look like this?

And like this?

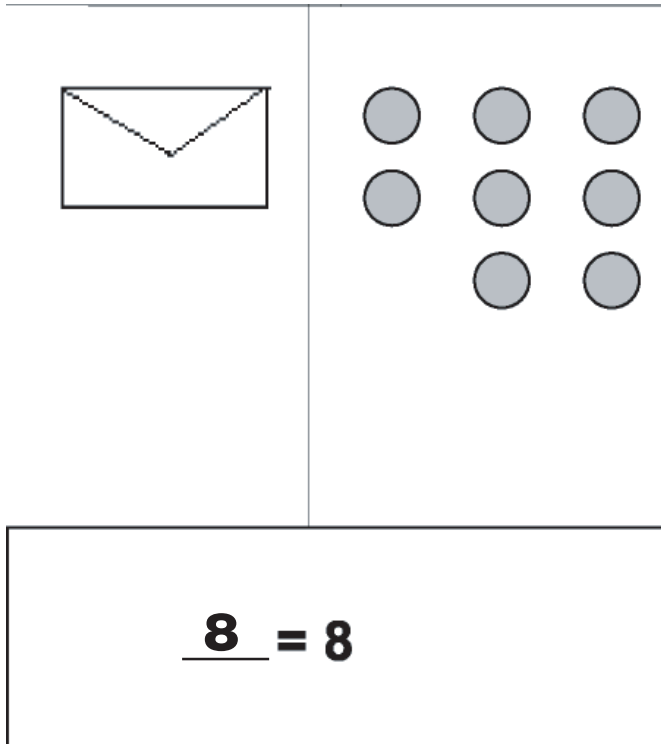
 		 	
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$$\underline{8} + 5 = 13$$

$$\underline{8} + 5 - 5 = 13 - 5$$

“X” Marks the Spot

Then like this?



Now try this problem. This time as you draw the steps, write the numbers and variable to represent your work.

$$x + 6 = 14$$

YOUR TURN! Let each member of the group take a turn suggesting an equation. The rest of the group will model this equation. Make sure each group member has a chance to model an equation. Check your group and make sure they represented it correctly. How can you check the answer?

In your journal, write the equation $x + 2 = 6$ and draw the solution using models. Label each step. Tell why you think the term “variable” is a good name for the x (or whatever letter you have chosen for the variable).

Discuss in the group why 2 was subtracted from each side of the equation to find the value of the variable. Summarize the discussion in your journal.

- LEVEL:** 6.0 – 8.9
- STANDARD:** 36.0 Demonstrate proficiency in number sense, concepts, and operations involving integers
- BENCHMARK(S):** 36.06 Solve simple problems by applying the algebraic order of operations.
36.11 Write algebraic expressions, e.g., $2x$; $2m - 10$.
- ACTIVITY:** To identify variables, write expressions, and evaluate equations.
This activity gives a clear understanding of what a variable is, how to write expressions and equations.
- MATERIALS:** 100 counters with an activity page
Calculators and/or appropriate technology
- Procedure:**
- Role of the Teacher:***
Facilitator of cooperative groups
Evaluation: Discussion of results by group
Explanations by individual
Computer prints of finished products
- Role of the Students:***
Read and follow directions on the activity sheet
Group discussion
Create a Spreadsheet
- Variation:***
Change numerical values.

Student: _____

Date: _____

Teacher: _____

Sale Table

Variable Expression Equation

An antique dealer sold lamps for \$100, tables for \$20, and cricket boxes for \$1. The dealer sold 100 items in all and earned exactly \$2000.

Using counters and the activity page, model the following activities:

L = the number of lamps sold

T = the number of tables sold

C = the number of cricket boxes sold

- Write an equation using L, T, and C.
- Write a variable expression for:
 - the amount of money earned on the sale of Lamps ----- (100 L)
 - the amount of money earned on the sale of Tables ----- (20 T)
 - the amount of money earned on the sale of cricket boxes ----- (C)
- Use the above expressions to write an equation expressing the total amount of money the dealer earned.
- How do you know the number of lamps is less than 20?
- Complete the table.

No. Lamps Sold	14	15	16	17	18	19
No. Tables Sold	3	5				
No. Boxes Sold			78	75		79
Amount Earned						

- Find the values in the table which produce earnings closest to \$2,000. Adjust them using “guess and test” until you find the correct answer.

Lamps _____ Tables _____ Boxes _____

Sale Table

Variable Expression Equation

An antique dealer sold lamps for \$100, tables for \$20, and cricket boxes for \$1. The dealer sold 100 items in all and earned exactly \$2000.

Using counters and the activity page, model the following activities:

L = the number of lamps sold
T = the number of tables sold
C = the number of cricket boxes sold

- Write an equation using L, T, and C.
- Write a variable expression for:
 - the amount of money earned on the sale of Lamps ----- (100 L)
 - the amount of money earned on the sale of Tables ----- (20 T)
 - the amount of money earned on the sale of cricket boxes ----- (C)
- Use the above expressions to write an equation expressing the total amount of money the dealer earned.
- How do you know the number of lamps is less than 20? **Because $20 \times 100 = 2000$ which is the total amount he made selling 100 items.**
- Complete the table.

No. Lamps Sold	14 1400.00	15 1500.00	16 1600.00	17 1700.00	18 1800.00	19 1900.00
No. Tables Sold	3 60.00	5 100.00	6 120.00	8 160.00	1 20.00	2 40.00
No. Boxes Sold	83	80	78	75	81	79
Amount Earned	1543.00	1680.00	1798.00	1935.00	1901.00	2019.00

- Find the values in the table which produce earnings closest to \$2,000. Adjust them using “guess and test” until you find the correct answer.

Lamps 17 Tables 8 Boxes 75

- LEVEL:** 6.0-8.9
- STANDARD:** 36.0 Demonstrate proficiency in number sense, concepts, and operations involving integers
- BENCHMARK:** 36.11 Write algebraic expressions, e.g., $2x$; $2m-10$
- MATERIALS:** Algebraic Expression Handout
- PROCEDURE:** Review expressions. $3 + 2$: two more than three, $5 - 2$: the difference between five and two, 2×3 : twice three, twenty divided by 5 gives a quotient of 4. List the words that communicate math on the board with the student's help

+	-	\times	\div	=
Added to	Subtraction	Multiplication	Division	Equal to
Plus	Minus	Times	Divided by	Is
More than	Less	Twice	Quotient	Equals
Total	Difference	Double	Goes into	Same as
Sum	Take away	Product		
Addition		Of		
		per		

Now discuss what makes expressions algebraic:
Variables used for unknown numbers. Usually stated as the letter or as “a number”

Examples: $x - 3$: three less than a number
X minus three
The difference between a number and three

$3y + 5$: three times a number plus five
the sum of three times y and five

$2(x - 3)$: two times the difference between x and three
twice the difference between a number and three

Now have students work on the handout with a partner. Have the first person do the first problem and then pass it to the second to check it. Then the second person does the second problem and passes it back to the first person to check and so on until the entire handout is done.

Algebraic Expressions

Answers will vary

1. A number plus seven
2. Y divided by seven
3. Six times w less three
4. Take thirty-six away from a number
5. The quotient of a and four
6. Four times a number added to 2
7. Five times y minus 3
8. Two times the difference between x and four
9. The quotient of the sum of a number and one and four
10. Seven times a number less than 13
11. $3n$
12. $2n - 5$
13. $4(4 - x)$
14. $5/n$
15. $3(6 + n)$

Student: _____ Date: _____

Teacher: _____

Algebraic Expressions

Write the following algebraic expressions in words.

1. $n + 7$: _____2. $y/7$: _____3. $6w - 3$: _____4. $r - 36$: _____5. $a/4$: _____6. $4x + 2$: _____7. $5y - 3$: _____8. $2(x - 4)$: _____9. $(x + 1)/4$: _____10. $13 - 7x$: _____

Now try to write these algebraic expressions in math symbols.

11. three times a number: _____

12. double a number less five: _____

13. four times the difference between four and x : _____

14. the quotient of five and a number: _____

15. triple the sum of six and a number: _____

LEVEL:	6.0-8.9
STANDARD:	6.0 Demonstrate proficiency in number sense, concepts, and operations involving integers
BENCHMARK:	36.12 Solve one-step equations involving any of the mathematical operations, e.g., $x + 9 = 27$; $x/4 = 3$; $x - (-4) = 2$
MATERIALS:	None
PROCEDURE:	<p>The most important thing about solving equations is keeping them balanced. Think of a scale or even draw one on your board. They start balanced and they must stay that way the entire process. If you add something to one side you must add the same thing to the other side. The same goes for all of the other operations. Whatever you do to one side you must do to the other.</p>

Always keep your goal in mind; I often have my students write it next to every equation. The variable = a number. So if you have $x - 3 = 9$ then your goal is $x = \#$. You will work toward that so it helps to see the light at the end of the tunnel.

To solve an equation, follow the following steps:

1. Do all subtraction and addition first, if a # is added then subtract, if subtracted then add. You are trying to eliminate anything that is on the same side as the variable.
2. Do all division and multiplication second, if a number is multiplied then divide, if a number is divided then multiply. You are trying to eliminate anything that is next to the variable.
3. your goal is $1x = \#$

Examples:

$x + 3 = 4$:	Your goal is $x = \#$, so you need to get rid of the 3
$\underline{-3} \quad -3$	The opposite of +3 is -3 so subtract 3 from each side.
$x = 1$	Now you have reached your goal and you are done!

$$\begin{array}{r}
 Y - 5 = 10 \\
 + 5 \quad +5 \\
 \hline
 Y = 15
 \end{array}
 \qquad
 \begin{array}{r}
 3y = 9 \\
 3 \quad 3 \\
 \hline
 y = 3
 \end{array}
 \qquad
 \begin{array}{r}
 z/2 = 1 \\
 2(z/2) = (1)2 \\
 \hline
 z = 2
 \end{array}
 \qquad
 \begin{array}{r}
 9y - 2 = 16 \\
 + 2 \quad + 2 \\
 \hline
 9y = 18 \\
 9 \quad 9 \\
 \hline
 y = 2
 \end{array}
 \qquad
 \begin{array}{r}
 x - (-5) = 6 \\
 x + 5 = 6 \\
 - 5 \quad -5 \\
 \hline
 x = 1
 \end{array}$$

Now let your students try these:

a. $-10q = -5$ b. $b/12 = -7$ c. $22 = y + 5$ d. $-k = -8$
 e. $-1.9 = s - 5.1$ f. $y + 5 = 9$ g. $18 - w = 20$ h. $16 = 4t - 20$
 i. $-5x + 9 = 4$ j. $2x + 15 = 29$

ANSWER KEY:

a. $q = 1/2$
 b. $b = -84$
 c. $17 = y$
 d. $k = 8$
 e. $3.2 = s$
 f. $y = 4$
 g. $w = -2$
 h. $9 = t$
 i. $x = 1$
 j. $x = 7$

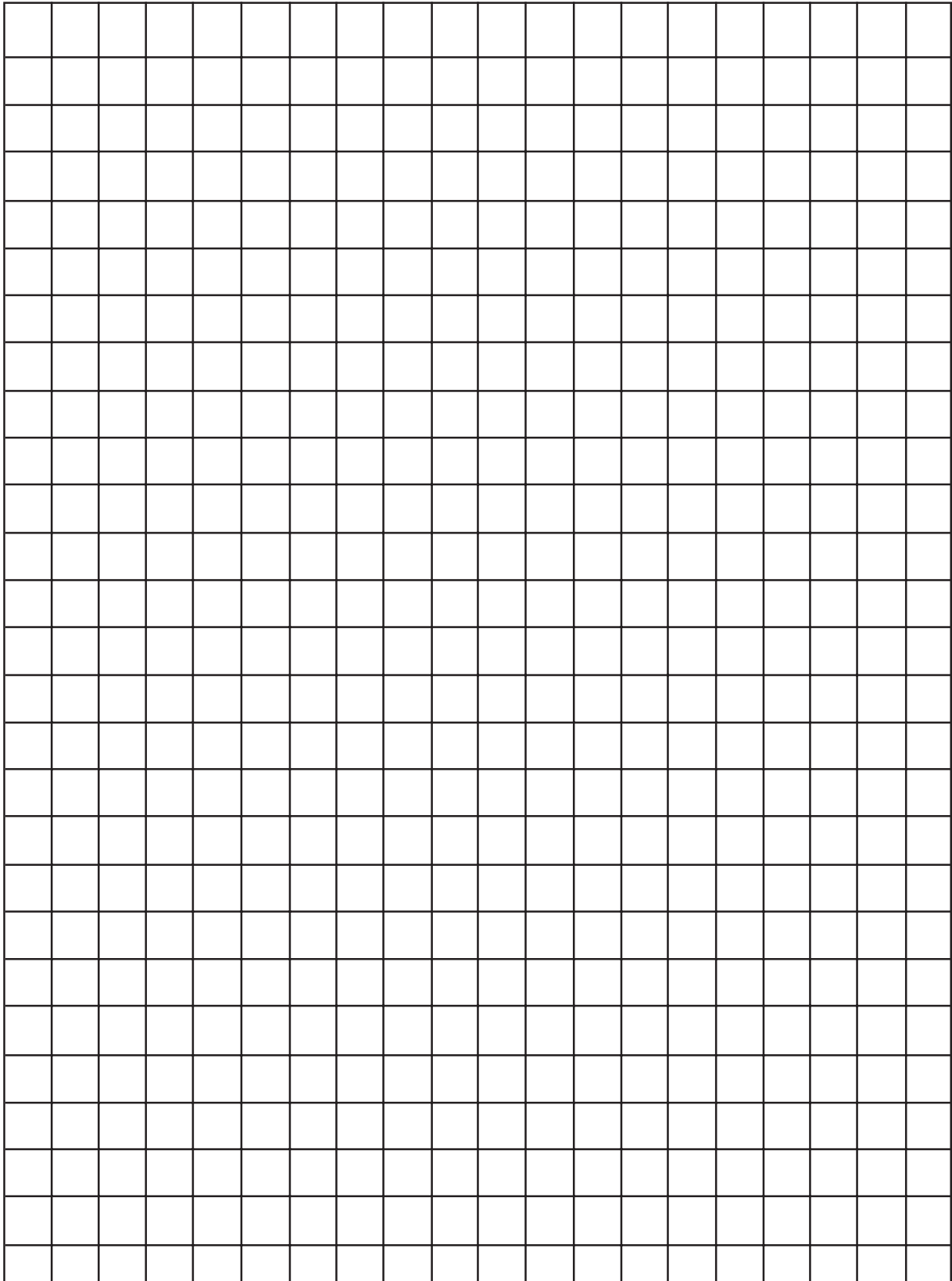
- LEVEL:** 6.0 - 8.9
- STANDARD:** 37.0 Demonstrate proficiency in number sense, concepts, and operations involving geometry
- BENCHMARK:** 37.01 Recognize and understand the basic properties of the following geometric shapes in two and three dimensions: circle, square, rectangle, triangle, parallelogram, pentagon, cube, rectangular solid, pyramid, cone, and cylinder.
37.06 Recognize and apply geometric formulas for perimeter, area, and circumference.
- MATERIALS:** Graph paper cut into 5 grid.X 5 grid squares; scissors; tape; newsprint for each group
- PROCEDURE:** This activity is designed to help you understand the relationship between the shape of a figure and the effect that shape has on perimeter and area. By keeping the area constant and changing the shape of the figure you will be able to determine which shapes produce the greatest perimeters.
- Group students in groups of four. Each student in the group gets a 5 X 5 square. Each student then cuts the square apart using only straight cuts. Next, each student tapes these pieces together in a shape other than a square. Students should work to make the shapes as different as possible in each group, making some long and skinny and others more compact. Then, using one large sheet of newsprint per group, students take one shape at a time and trace each side in a continuous line to create a bar graph of the perimeter of each shape. Tape the shape traced under the appropriate line. As a group, students discuss and agree on three to five observations you can make about the relationship between perimeter and shape. Finally, students write these observations on their newsprint.

Benchmark: 37.01, 37.06

Student: _____

Date: _____

Teacher: _____



LEVEL: 6.0 - 8.9

STANDARD: 37.0 Demonstrate proficiency in number sense, concepts, and operations involving geometry

BENCHMARK: 37.01 Recognize and understand the basic properties of the following geometric shapes in two and three dimensions: circle, square, rectangle, triangle, parallelogram, pentagon, cube, rectangular solid, pyramid, cone, and cylinder
37.06 Recognize and apply geometric formulas for perimeter, area, and circumference

MATERIALS: 24 colored tiles per student or group; chart and graph sheets

PROCEDURE: This activity has two components that allow for the discovery of patterns which suggest the formulas for area and perimeter. Students may work individually or in groups, but groups are recommended.

First, students are to find all the rectangular arrays that can be made using 24 tiles. For this exercise, no tile may be stacked on top of another. Students then chart the area and perimeter of each rectangular array made. (The area will always be twenty four, but the perimeter will change.) After recording the data on the chart, students must graph their findings. Finally, students should write 3 observations about the data on either their chart or graph sheet.

Second, students are to hold the perimeter of the rectangular arrays to 24 units. This may be illustrated by talking in terms of tables and the number of people who could be seated at each table. Again, no tile may be stacked on another. Students should record the area and perimeter of their arrays on the chart. (Here the perimeter will always be 24, but the area will change.) After recording the data on the chart, students must graph their findings. Finally, students should write 3 observations about their data either on their chart or on their graph sheet.

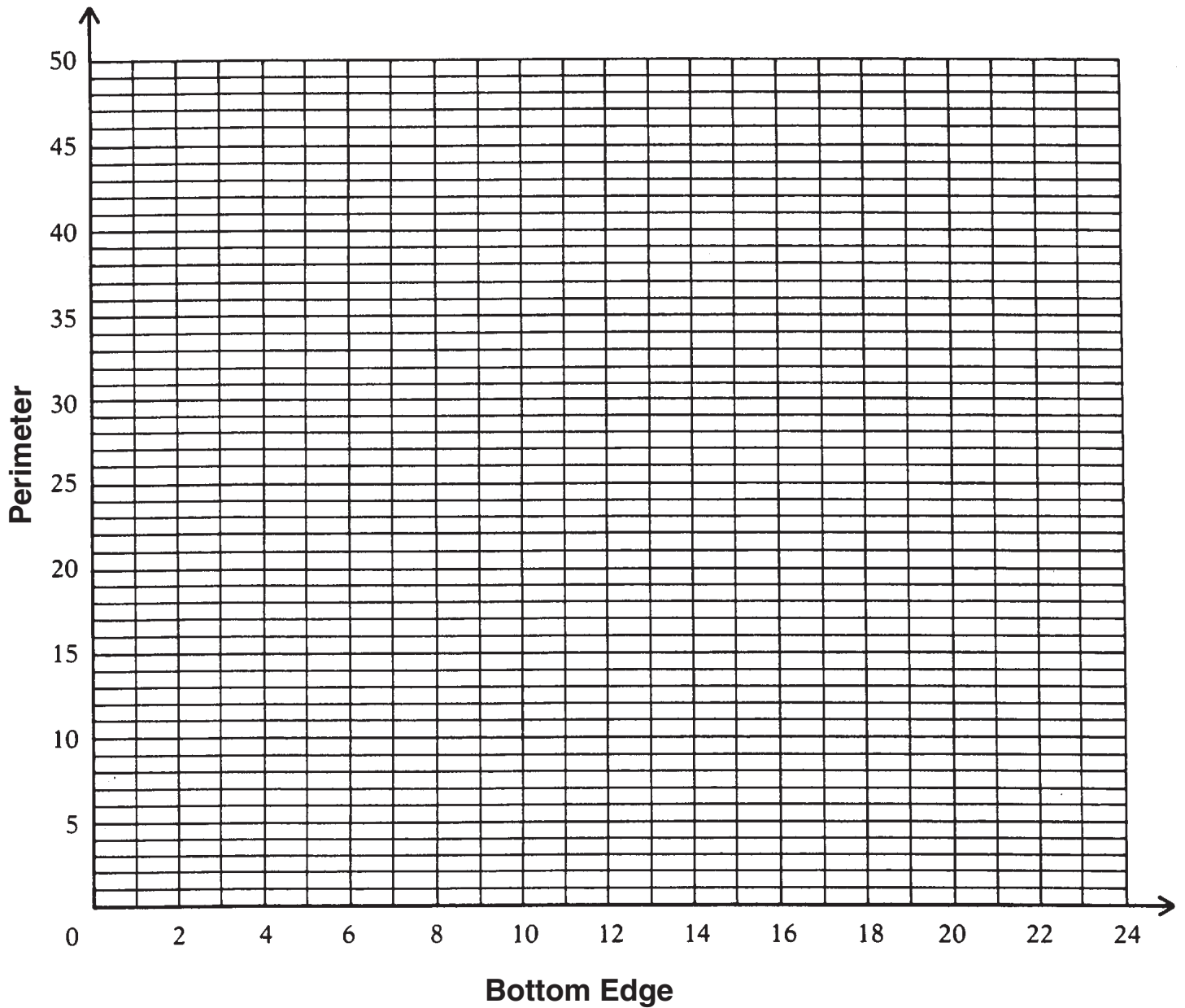
Handouts for possible chart and graphs sheets follow.

Student: _____

Date: _____

Teacher: _____

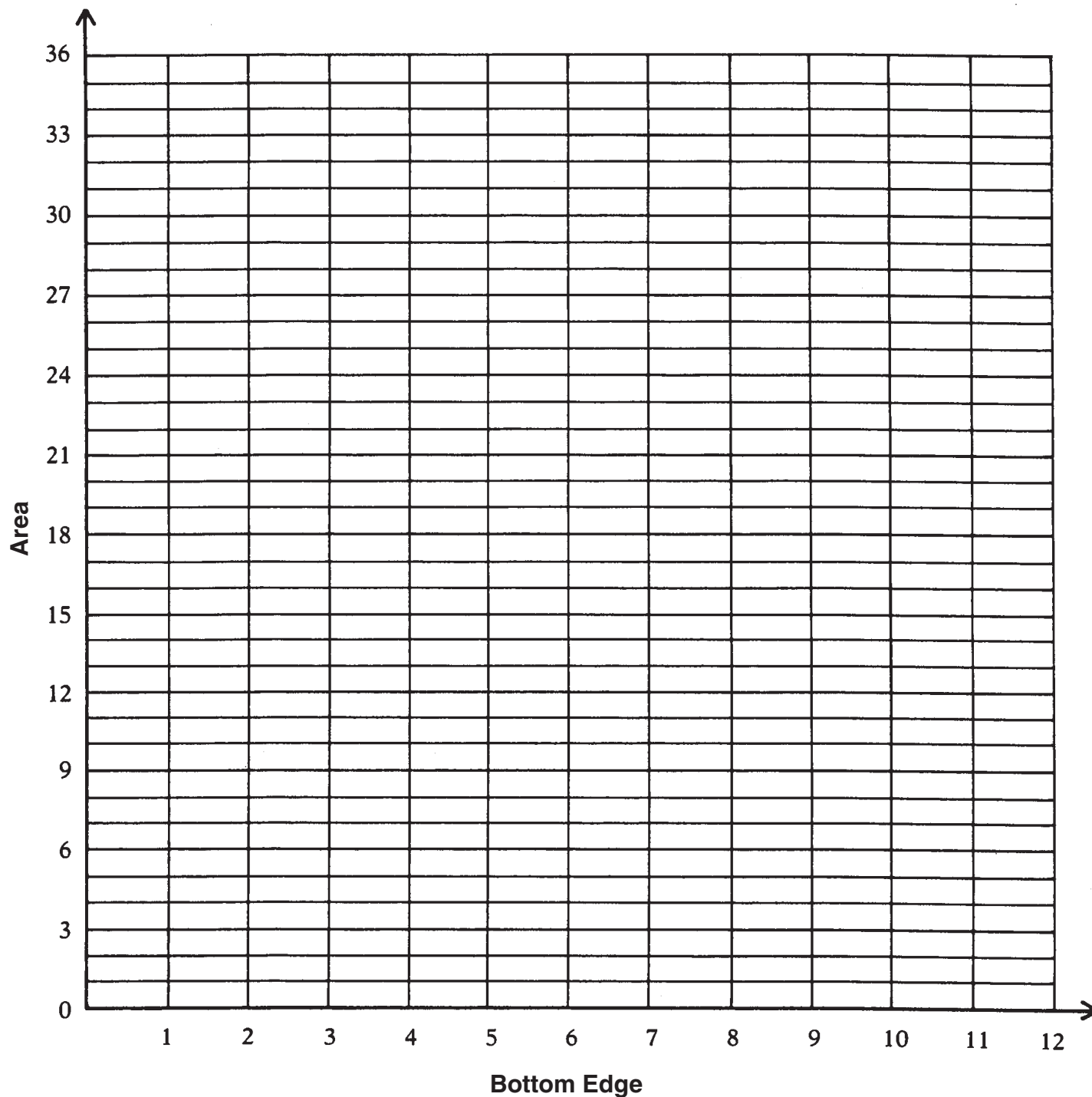
Fixed Area Graph



Student: _____ Date: _____

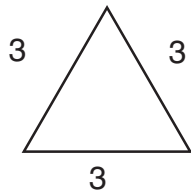
Teacher: _____

Fixed Perimeter Graph

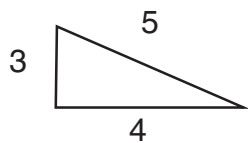


- LEVEL:** 6.0-8.9
- STANDARD:** 37.0 Demonstrate proficiency in number sense, concepts, and operations involving geometry
- BENCHMARK:** 37.02 Recognize types of angles (acute, obtuse, straight, and right).
- MATERIALS:** Cardboard circle with two movable handles attached with a brad (paper fastener).
- PROCEDURE:** Discuss the types of angles with students
Acute angle - less than 90°
Obtuse angle - greater than 90°
Straight angle - 180°
Right angle - 90°
Complementary angles - 2 angles that add up to 90°
Supplementary angles - 2 angles that add up to 180°
- Have student form different angles by moving the handles. Identify the angles.
Form complementary and supplementary angles.

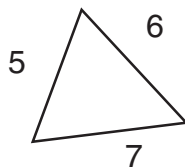
- LEVEL:** 6.0-8.9
- STANDARD:** 37.0 Demonstrate proficiency in number sense, concepts, and operations involving geometry
- BENCHMARK:** 37.03 Recognize types of triangles (equilateral, right, scalene, and isosceles).
- MATERIALS:** Triangle handout, ruler
- PROCEDURE:** First review the types of triangles:



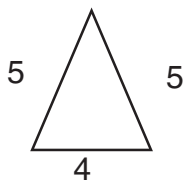
Equilateral Triangle: All sides and all angles are the same measure (congruent)



Right Triangle: One angle measures 90 degrees



Scalene Triangle: All sides are different measures.



Isosceles Triangle: Two sides and two angles are the same measure.

Now have the students work on the handout. When done, compare answers and discuss.

Triangle handout

1. scalene triangle
2. isosceles triangle
3. equilateral triangle
4. scalene triangle
5. right triangle
6. isosceles triangle
7. equilateral triangle
8. scalene triangle

Student: _____

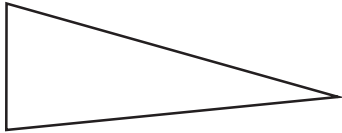
Date: _____

Teacher: _____

Triangles

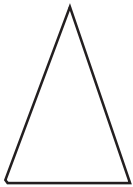
Using a ruler to measure the sides, determine what type of triangle each triangle is. Either right, equilateral, isosceles, or scalene.

1.



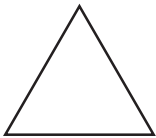
1. _____

2.



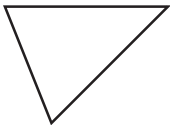
2. _____

3.



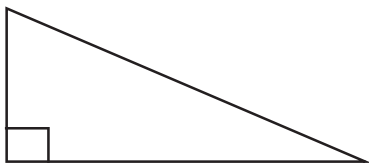
3. _____

4.



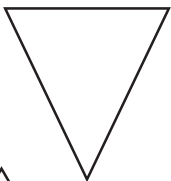
4. _____

5.



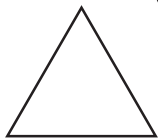
5. _____

6.



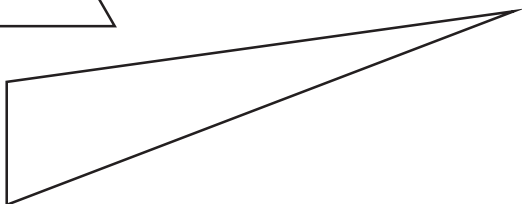
6. _____

7.



7. _____

8.



8. _____

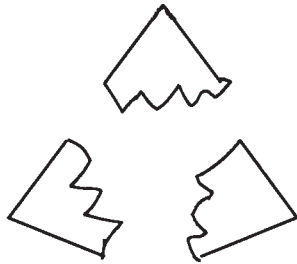
LEVEL: 6:0-8.9

STANDARD: 37.0 Demonstrate proficiency in number sense, concepts, and operations involving geometry

BENCHMARK: 37.04 Know the number of degrees in a triangle and a quadrilateral.

MATERIALS: Pass out a cut-out of 2 triangles and 2 quadrilaterals for each student (see handout).

PROCEDURE: Explain that a straight line is 180 degrees and a complete circle is 360 degrees. Draw these on the board so they can have a visual. Starting with the triangle, have each student tear his/her triangle into 3 pieces with an angle on each tear.

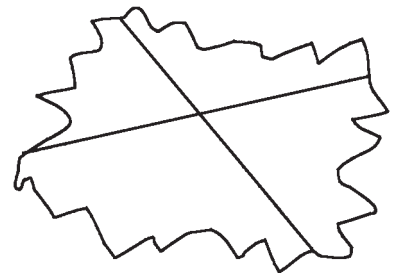


Now have them place the three angles together to see how many degrees they add up to:



They will see that all 3 angles add up to 180 degrees. Now do the same with the second triangle and it will work out the same.

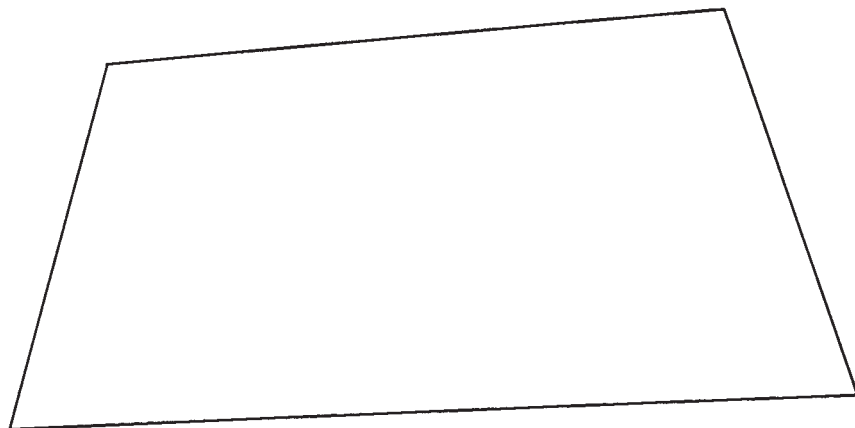
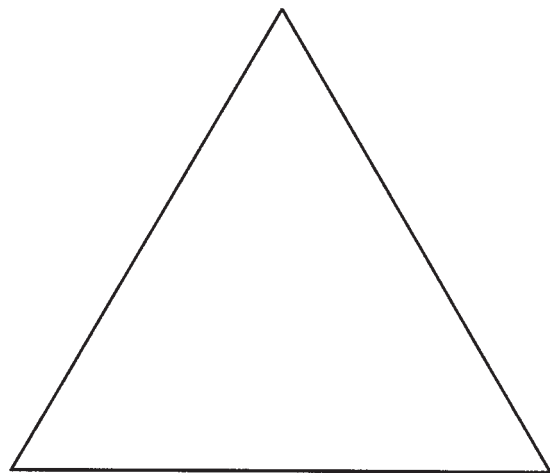
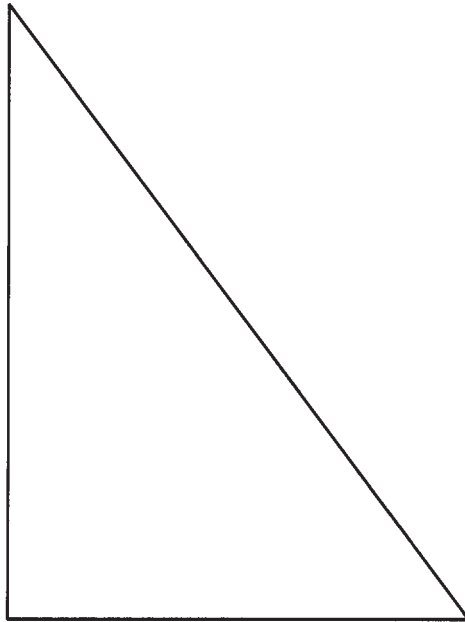
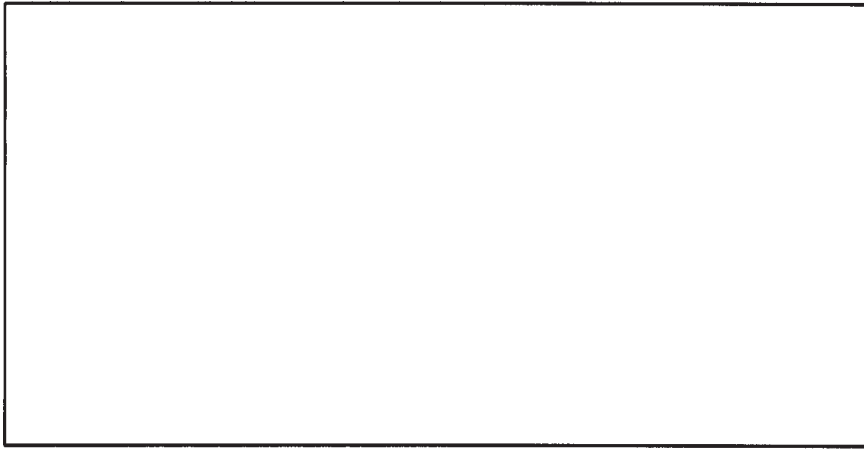
Now do the same thing with the quadrilaterals (4 sided shape) the sum will always be 360 degrees



Student: _____

Date: _____

Teacher: _____



LEVEL: 6.0-8.9

STANDARD: 37.0 Demonstrate proficiency in number sense, concepts, and operations involving geometry

BENCHMARK: 37.05 Use appropriate geometric vocabulary (parallel, perpendicular, similar, and congruent) to write a description of a figure or a picture composed of geometric figures

MATERIALS: Pencil and paper

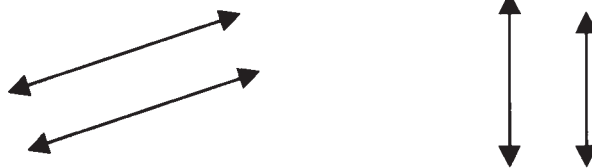
PROCEDURE: List these words on the board.

Parallel
Perpendicular
Similar
Congruent

Now have the students look them up in the dictionary or in a math book. Have them write a MATH definition for each of them and draw a picture of each of them.

Definitions should be close to:

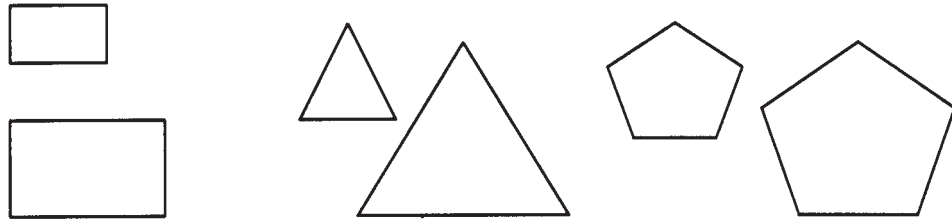
Parallel: two lines that never intersect, they are always equidistant from each other.



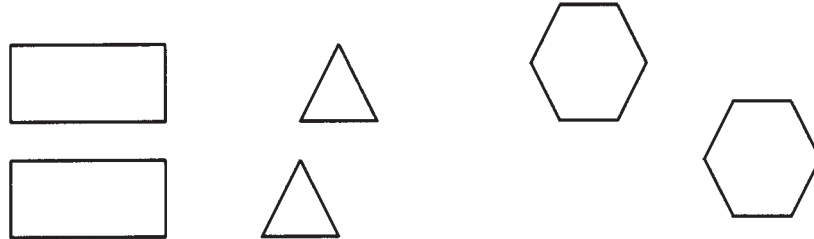
Perpendicular: Two lines that intersect at 90-degree angles.



Similar: two figures that are the same exact shape, can be different sizes.

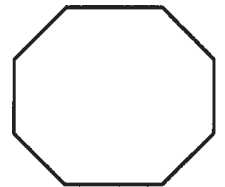


Congruent: Equal in measure. Can be a shape that is similar and the same size or just two line segments that are the same length.

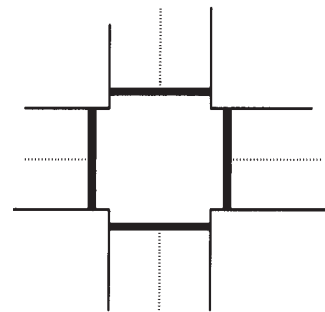


Now read this paragraph to the class and have them draw the figure as you read the description.

I am an eight-sided shape. I am flat if you lay me on a table. All of my sides are congruent to each other. Sides that are opposite are parallel. I have no touching perpendicular lines. I am similar to a stop sign. What am I? (An octagon)



Now draw a figure on the board and have the students describe it using the words parallel, perpendicular, congruent, and similar.



Example:

I consist of two perpendicular lines. Each line is edged with parallel lines. I am similar to an addition sign but not congruent to this one, +. I have a light that has three colors on it in the middle of myself and I am constantly run over. What am I?

I am an intersection of roads!

Have the students share theirs before you share this one. Now have each student draw a simple shape. Have them trade with someone and write a short description using the four words. Share these with the class. Now for the last part. Have the students secretly draw a figure and write a description for it. Have them read these out loud and see if any one can guess what they are.

LEVEL:	6.0-8.9
STANDARD:	37.0 Demonstrate proficiency in number sense, concepts, and operations involving geometry
BENCHMARK:	37.07 Recognize and apply geometric formulas for volume of three-dimensional shapes including cubes, rectangular solids, and cylinders
MATERIALS:	Rectangle, cube, cylinder and pyramid handouts; scissors; ruler.
PROCEDURE	Give the students the formulas for volume of a rectangle, a cube, a cylinder and a pyramid. Have them cut out and construct the four 3-dimensional objects. After they have completed this have them measure the dimensions of each object with a ruler and calculate the volume of each one.

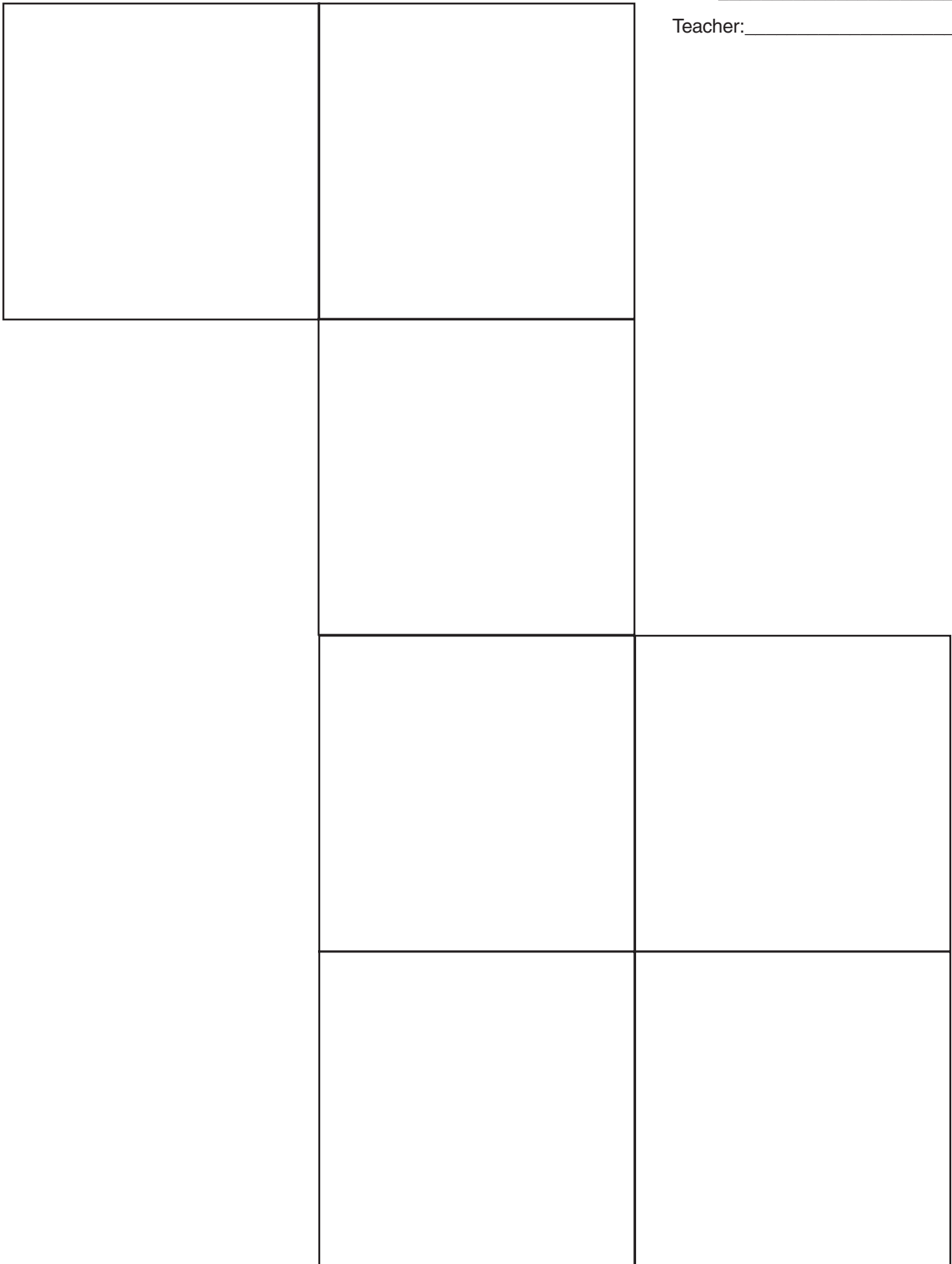
ANSWER KEY:	Cube: $V = L \times W \times H$ $2.75 \times 2.75 \times 2.75 = 20.8$ cubic inches
	Rectangle: $V = L \times W \times H$ $1.5 \times 1.5 \times 3 = 6.75$ cubic inches
	Cylinder: $V = \pi r^2 h$ $3.14 \times (.9375)^2 \times 1.75$ $3.14 \times .9375 \times .9375 \times 1.75 = 4.83$ cubic inches
	Pyramid: $V = \frac{1}{3} bh$ $\frac{1}{3} \times 2.5 \times 2.5 \times 2 = 4.125$ cubic inches

3-Dimensional Cube

Student: _____

Date: _____

Teacher: _____

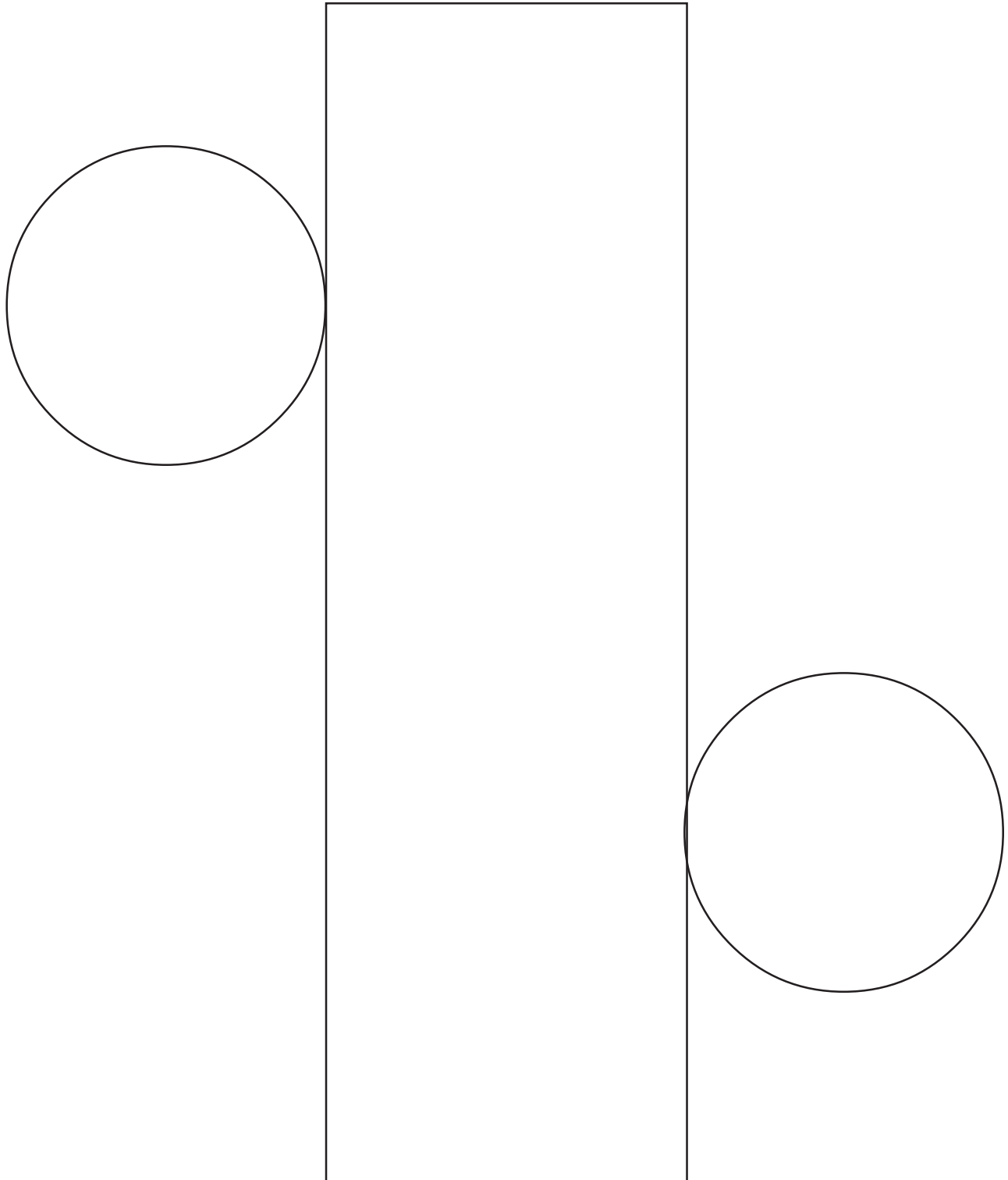


Student: _____

Date: _____

Teacher: _____

3-Dimensional Cylinder

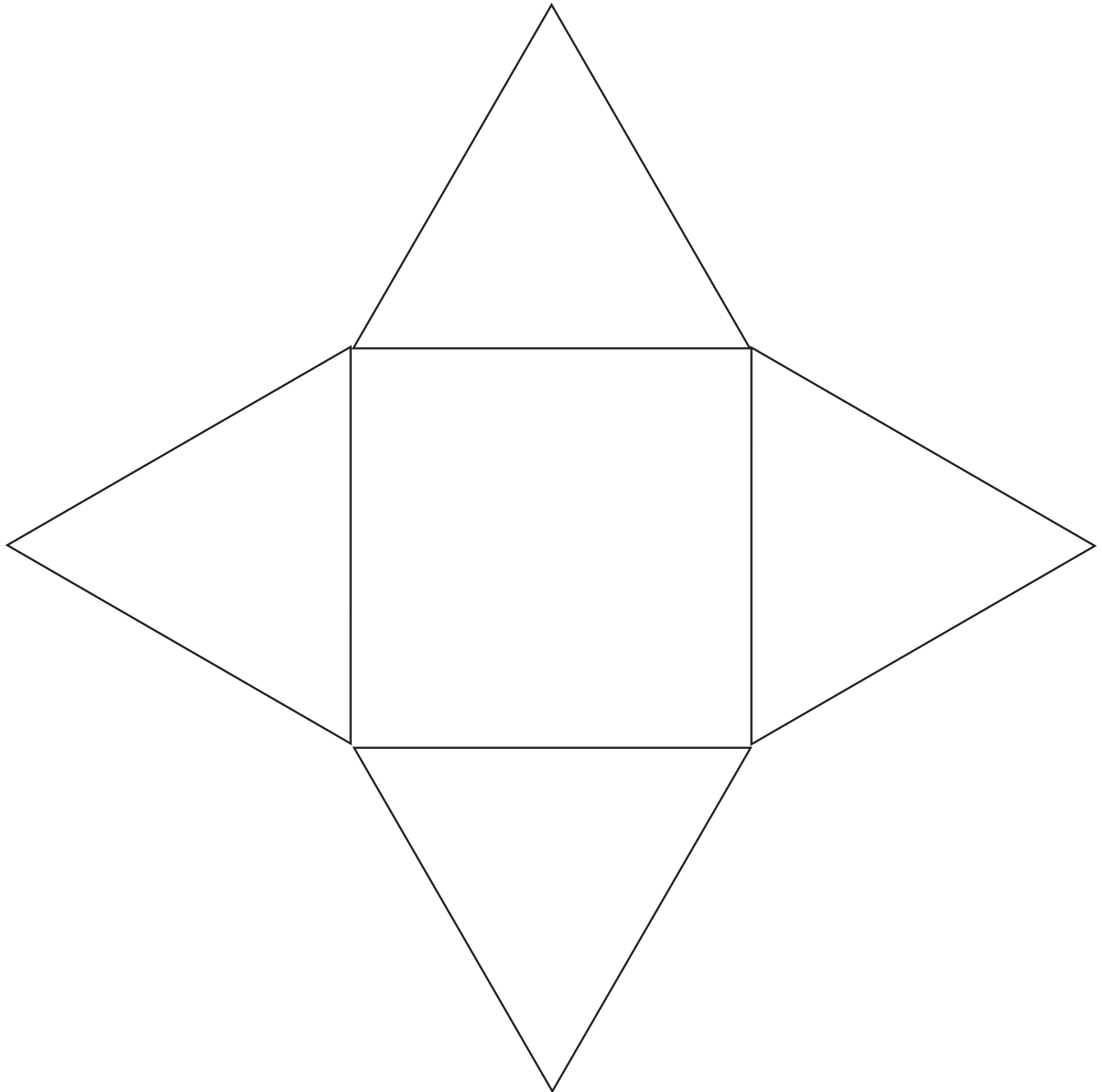


Student: _____

Date: _____

Teacher: _____

3-Dimensional Pyramid

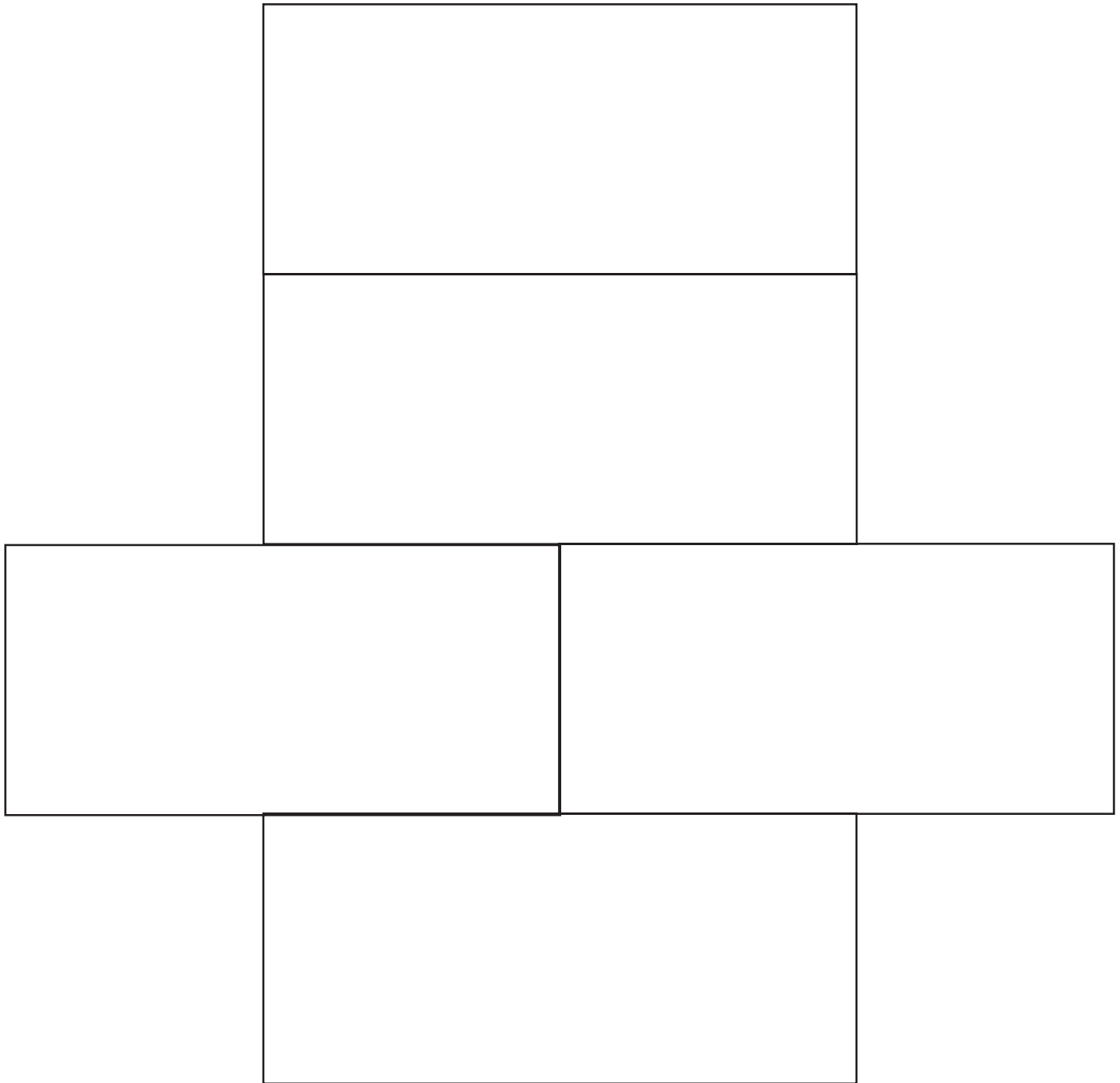


Student: _____

Date: _____

Teacher: _____

3-Dimensional Rectangle



Benchmark: 37.03, 37.05, 38.02, 38.06

LEVEL:	6.0 – 8.9
STANDARD:	37.0 Demonstrate proficiency in number sense, concepts, and operations involving geometry 38.0 Use estimation skills to problem solve and compute
BENCHMARK:	37.03 Recognize types of triangles (equilateral, right, scalene, and isosceles.) 37.05 Use appropriate geometric vocabulary (parallel, perpendicular, similar, and congruent) to write a description of a figure or a picture composed of geometric figures. 38.02 Use estimates to solve real-world problems of length, perimeter, area, mass volume, and capacity. 38.06 Solve real-world and mathematical problems with the help of estimating measurements, e.g., length, time, weight, and mass, temperature, money, perimeter, area, and volume in either the customary* system or in the metric system.

•Customary refers to the system of measurement used in the United States.

ACTIVITY: Using the shadow of a flagpole or tree and a meter stick, students will demonstrate an understanding of indirect measurement using knowledge of similar triangles to measure heights of inaccessible objects.

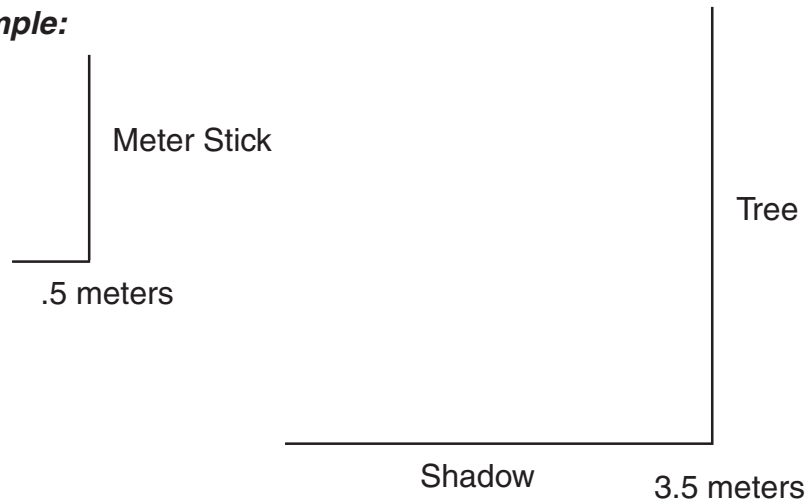
MATERIALS: 1 meter stick (ruler)
Flag pole or large tree which casts its shadow on a level area
1 measuring tape or another meter stick (ruler)
Sunny day probably around 10 a.m. or 2 p.m.

PROCEDURE: ***Role of the Students:***
Measure length of shadow of a meter stick
Measure length of shadow of a flag pole or tree
Use knowledge of similar triangles to determine height of flag pole
Share findings

Similar triangles allow students to use ratio and proportion to solve the problem.

Continued

Example:



$$\frac{1 \text{ meter (height of meter stick)}}{.5 \text{ meter (length of meter stick shadow)}} = \frac{X \text{ (height of tree)}}{.3.5 \text{ meters (length of tree shadow)}}$$

Multiply diagonally across and divide by the third number
 $1 \text{ meter} \times 3.5 \text{ meters} = 3.5 \text{ meters}$

$3.5 \text{ meters} \text{ divided by } .5 \text{ meters} = 7 \text{ meters}$

$$.5 \overline{) 3.5} \begin{array}{r} 7. \\ \underline{3.5} \\ 0 \end{array}$$

Variation:

Determine height of other inaccessible objects by using the teacher's or a student's height in place of the meter sticks.
Calculate range, mean, median, and/or mode of the different group's measurements and/or solutions.
Use reflections in a mirror as another means to determine measurements of inaccessible objects.
Class discussion of how this is applicable to daily lives
Write a story where this activity had to be done (Indiana Jones type, etc.)

- LEVEL:** 6.0-8.9
- STANDARD:** 38.0 Use estimation skills to problem solve and compute
- BENCHMARK:** 38.02 Use estimates to solve real-world problems of length, perimeter, area, mass, volume, and capacity.
38.05 Use a variety of strategies estimating lengths, widths, time intervals, and money, and compare them to actual measurements.
- MATERIALS:** At least five objects in the shapes of a rectangle, a circle, a cube, a box, a cylinder, a pyramid, and a cone.
- PROCEDURE:** You are going to have a contest. Students love contests, especially if you give a little prize. You need at least five objects in the shape of a rectangle, a circle, a cube, a box, a cylinder, a pyramid, and a cone. Use things you can find around the house. A rectangle can be just a cut piece of paper. A paper plate makes a great circle. An empty toilet paper roll is a great cylinder. Any box will do. If you can not find a pyramid, use the one made in lesson 37.07 A cone can be a cone-shaped paper cup or even an ice cream cone. Place these items on a table for viewing. Tell the students “no touching.” Then give them the formulas for perimeter, area, and volume of each shape. The students, working in small groups will use the formulas to estimate the appropriate measurement for each given object.
- There is no measuring or touching allowed. After the groups are done estimating, measure each shape and calculate each measurement. The group with the closest estimate wins the prize for that object.
- Below are the measurements you can request for each object:
Rectangle: perimeter, $2(l+w)$, area $l \times w$
Circle: circumference, πd , area πr^2
Box or cube: volume $l \times w \times h$
Cylinder: volume $\pi r^2 h$
Cone: volume $\frac{1}{3} \pi r^2 h$
Pyramid: volume $\frac{1}{3} bh$

LEVEL: 6.0-8.9

STANDARD: 38.0 Use estimation skills to problem solve and compute

BENCHMARK: 38.04 Use rounding techniques to estimate the solution to a real-world addition or subtraction measurement problem; then determine the actual result.

MATERIALS: Rounding handout

PROCEDURES: First give a demonstration to the students on rounding. When using measurements it is best to round to the nearest whole number or *units* place. Follow the old rule, if the number on the right of where you are rounding to is five or more then raise the number up one, if not the leave the number alone.

Example: $34.6 = 35$
 $182.4 = 182$
 $5.89 = 6$
 $29.765 = 30$

Now present them with the handout. They may work in small groups of 2 – 4. Have them round the measurements to estimate the sizes needed to solve the problems.

ANSWER KEY:

1. 4 gallons, 4 1/4 gallons
2. 46,080 gallons, 43826.538 gallons
3. \$60, \$74.65
4. 19 miles, 18.9 miles
5. 48 desks, 51 desks
6. \$52, \$52.54

Student: _____

Date: _____

Teacher: _____

Rounding

For each of the real world problems below, first round the measurements and estimate an answer. Then figure the actual answer and compare the two.

1. Antwan started a paint job for his parents. He started out with five and three-fourths gallon of paint. After the job was all done he had one and a half gallons of paint left. How much paint did he use on the job?

Estimate: _____ Answer: _____

2. A cylinder tank at the gas station is 30.2 feet long and has a diameter of 15.7 feet. What is the volume of the tank? If a cubic foot is about 7.5 gallons, approximately how many gallons of gas does the tank hold?

Estimate: _____ Answer: _____

3. A hallway measures 2.9 feet by 19.5 feet. You must give an estimate to the owner of the building for the cost of square tiles to cover the floor. If each tile measures one square foot and costs \$1.32, how much would the floor cost?

Estimate: _____ Answer: _____

4. A woman ran 4.1 miles on Monday, 3.6 on Tuesday, 5.1 one Wednesday, 1.2 on Thursday, and 4.9 on Friday. How many miles did she run for the week?

Estimate: _____ Answer: _____

5. A teacher is moving into a new room. The room is 30 feet by 25 feet. She has 30 desks that measure 30 _ inches by 25 _ inches. If she needs to leave at least one foot between each desk and area of 6 feet by 30 feet for her desk, can she fit all 30 desks in the room? How many desks can she fit in?

Estimate: _____ Answer: _____

6. A package of meat costs \$3.95 per pound. Clara picks out 4 packages for the company picnic. The packages weigh 1.2 pounds, 4.3 pounds, 5.1 pounds and 2.7 pounds. What is the cost of the meat?

Estimate: _____ Answer: _____

LEVEL: 6.0-8.9

STANDARD: 39.0 Demonstrate proficiency in measuring quantities and solving problems related to measurement

BENCHMARK: 39.01 Identify the customary* measures most appropriate for a given situation.

MATERIALS: An empty cereal box, a package of string or tape, a can of soda, a can of vegetables, a label from a meat package, (or other things you can find around the house or office to measure) and the Which Measure? Handout

PROCEDURE: Measure the items you brought in or discuss the types of measurements the manufacturer used. Determine which measurements are length, which are weight, and which are capacity. Discuss when and why these measurements are used.

Give them the handout and have them determine the unit of measure that is most appropriate for each item. When everyone is finished, go over their answers and have them justify a few each.

ANSWER KEY:

1. quarts	12. gallons
2. gallons	13. miles
3. yards	14. gallons
4. feet	15. inches
5. gallons	16. inches
6. feet	17. ounces
7. inches	18. tons
8. fluid ounces	19. cups
9. pounds	20. gallons
10. ounces	21. cups
11. inches	22. teaspoons

*Customary refers to the system of measurement used in the United States.

Student: _____

Date: _____

Teacher: _____

Which Measure?

Length

1 foot = 12 inches
1 yard = 36 inches
1 yard = 3 feet
1 mile = 5280 feet
1 mile = 1760 yards

Weight

1 pound = 16 ounces
1 ton = 2000 pounds

1 cup = 8 fluid ounces
1 pint = 16 fluid ounces
1 quart = 2 pints
1 gallon = 4 quarts

Capacity

1 pint = 2 cups
1 fluid ounce = 2 tbsp.
1 tbsp. = 3 tsp.

Using the chart above and the products you discussed earlier, name the most appropriate unit of measure for each of the items below.

1. the oil in your car _____
2. the milk in your refrigerator _____
3. the track _____
4. the height of the water tower _____
5. the water in the water tower _____
6. the size of your bedroom floor _____
7. the thickness of your mattress _____
8. the amount of toothpaste you have left _____
9. the weight you should lose _____
10. the weight of a letter _____
11. a picture frame _____
12. how much paint you need to paint your house _____
13. how far is it from Texas to New York _____
14. how much gas did you use _____

15. the height of a paper clip _____
16. the width of the handout _____
17. the weight of one orange _____
18. the weight of a garbage truck _____
19. the amount of water you need to add to the rice _____
20. the amount of water needed to cook 5 lobsters _____
21. one serving of soup _____
22. one dose of cold medicine _____

- LEVEL:** 6.0 – 8.9
- STANDARD:** 39.0 Demonstrate proficiency in measuring quantities and solving problems related to measurement
- BENCHMARK(S):** 39.04 Solve capacity problems with cups, pints, quarts, or gallons.
39.05 Solve mass/weight problems with ounces, pounds, or tons.
- ACTIVITY:** Collect data by counting items in individual-sized commercial packages (such as raisins, candy corn, or M & M's), weighing the contents and making conjectures about how many items could be predicted to be in unopened packages.
- MATERIALS:** Several prepackaged snack products per group. The class may do the same product (i.e. raisins) but different brands for different groups or different groups could collect data on different products (i.e. raisins, candy corn, colored chocolate candies, chocolate-covered peanuts, chocolate covered raisins, etc.)
Scales for weighing product (optional)
Paper for table/graph and predictions
- PROCEDURE:**
- Role of the Teacher:***
Initiate discussion by holding up a bag/box of the product “in question” and ask students how many they estimate are in the bag/box. Ask students to estimate the weight and price. Ask if they think the same number of raisins are in each box (M & M's in each bag, etc.) and why or why not.
Explain that today students are going to collect real data by counting and weighing a product, making a graph/table of their results and then reporting these results back to the class.
After the data has been collected the group can report their findings back to the class for completion of class tables. Ask groups if they had clusters of data (if so where), gaps in their data, unusual results, or any surprising results. What do they predict would be the results of opening 5 more packages? 50 more? If different brands are used, a comparison of amounts versus price should be included.
Teacher may choose to have students weigh the product (out of the box, wrapper) to determine cost per raisins, etc.
Evaluation: Class discussion, written description of data, table/graph of data
- Role of the Students:***
Estimate the amount of product in the bag/box
Weigh it
Open the bag/box and count the contents
Make a table. Record the brand name, the number of items in the box/bag and the weight in grams.
This table may also be graphed showing the weights along the y-axis and the

number of items per bag/box along the x-axis. Different symbols or colors may be used to graph two brands on the same graph.

Use this information to write a description of the data. How close were group estimates to the actual number of items per package? How close was the group's weighing to the weight printed on the box/bag? Are there any clusters of data? Gaps? Surprises?

What predictions can be made based on this data? What would the group expect to find (data-wise!) if 5 more packages were opened? 50 more? 500 more?

Variation:

Different groups can compare different snack-paks in terms of content and price.

Different groups can do different brands of the same product for comparison

- LEVEL:** 6.0-8.9
- STANDARD:** 39.0 Demonstrate proficiency in measuring quantities and solving problems related to measurement
- BENCHMARK:** 39.05 Solve mass/weight problems with ounces, pounds, or tons
- MATERIALS:** Different types of scales, or pictures of them; Weight handout
- PROCEDURE:** Show the students the different types of scales. Try to have one that measures very small things like a postal scale or a cooking scale. Have one that measures medium sizes, like a bathroom scale or a scale from a produce department. Have one that measures very large things, like the scales that are used to measure the weight of trucks, or very large animals. If you can not find these items, try to find a picture of them in magazines or pamphlets.

Discuss the different things that can be measured on each scale and even demonstrate a few. Weigh a pencil on a bathroom scale and then on a postage scale. What is the difference? Which is best?

Now have the students use their estimation skills to determine which type of scale would be best for the following items:

A birthday card	a serving of meat	an infant	a car
A bag of oranges	a person	a baseball	a stove
A horse	a dog	an elephant	a small box

Now give them the handout to complete. They may work with a partner.

- ANSWER KEY:**
1. 2200 pounds
 2. .78125 pounds
 3. 4 pounds
 4. 24 ounces
 5. 32 patties
 6. 2.16 tons
 7. 7500 pounds
 8. 1.4 tons

Student: _____

Date: _____

Teacher: _____

Weight

Using the information below, use equivalent measurements for ounces, pounds, and tons to solve each problem

$$1 \text{ pound} = 16 \text{ ounces}$$

$$1 \text{ ton} = 2000 \text{ pounds}$$

1. Jeff drives a mail truck. He delivered 1.1 tons of mail last week. How many pounds did he deliver?
2. A can of green beans weighs 12.5 ounces. How many pounds is that?
3. The bag of oranges weighed 64 ounces. How many pounds is that?
4. Shantell bought $1 \frac{1}{2}$ pounds of apples. How many ounces is that?
5. Mr. Thompson is having a cookout for his class. He bought 12 pounds of hamburger meat. How many 6-ounce patties can he make out of that?
6. The elephant weighed 4320 pounds. How many tons would that be?
7. A truck weighed $3 \frac{1}{2}$ tons. How many pounds would that be?
8. Sand is sold by the ton. The school needs 2,800 pounds for the new playground. How many tons do they need?

LEVEL:	6.0-8.9
STANDARD:	39.0 Demonstrate proficiency in measuring quantities and solving problems related to measurement
BENCHMARK:	39.06 Identify metric units of measure for length, weight/mass, or capacity (meter, gram, or liter) most appropriate for a given situation.
MATERIALS:	Metric Choices handout
PROCEDURE	Discuss what metric units are called for weight, length, and capacity.

Weight: grams
Length: meters
Capacity: liters

Discuss the prefixes and what they mean;
Kilo: 1000 times
Hecto: 100 times
Deka: 10 times
Deci : 10th of
Centi: 100th of
Milli: 1000th of

Now have the students do the handout. After they are done, discuss their results and have them justify different answers.

ANSWER KEY:

- | | |
|------------|--------|
| 1. grams | 11. mm |
| 2. g | 12. mg |
| 3. kg | 13. l |
| 4. kg | 14. cm |
| 5. kg | 15. l |
| 6. kg | 16. kl |
| 7. mg | 17. m |
| 8. m or km | 18. cm |
| 9. km | 19. cm |
| 10. m | 20. km |

Student: _____

Date: _____

Teacher: _____

Metric Choices

Complete each measurement by writing milligrams (mg), gram (g), kilograms (kg), Meter (m), kilometer (km), centimeter (cm), milliliter (ml), liter (l), or kiloliter (kl).

- | | | |
|---|---------|-------|
| 1. A hamburger | 50 | _____ |
| 2. A postage stamp | 0.5 | _____ |
| 3. A pickup truck | 2950 | _____ |
| 4. A brick | 1 | _____ |
| 5. A mini-van | 932 | _____ |
| 6. A crate of bananas | 36 | _____ |
| 7. A shipping package (padded envelope) | 1750 | _____ |
| 8. A running track | 40 | _____ |
| 9. A race track | 6.8 | _____ |
| 10. A football field | 96.68 | _____ |
| 11. The height of an ant | 1.5 | _____ |
| 12. The weight of a feather | 3 | _____ |
| 13. A can of soda | .475 | _____ |
| 14. The height of a child | 113 | _____ |
| 15. Gas in a car tank | 24 | _____ |
| 16. Water in a tower | 15 | _____ |
| 17. Length of a swimming pool | 100 | _____ |
| 18. The length of a paper clip | 2 | _____ |
| 19. The width of a book | 4 | _____ |
| 20. The distance from Florida to California | 6231.54 | _____ |

Benchmark: 39.07, 39.08, 39.09

LEVEL: 6.0-8.9

STANDARD: 39.0 Demonstrate proficiency in measuring quantities and solving problems related to measurement

BENCHMARK: 39.07 Associate prefixes used in the metric system with the decimal equivalents (kilo, deci, centi, and milli)
39.08 Convert, within the metric system, measures from one prefix to another
39.09 Solve problems involving units of measure, and convert answers to a larger or smaller unit within either the metric or customary systems*

MATERIALS: Metric Conversion Handout

PROCEDURE: Have students look up the definitions of the following words.

Kilo
Hecto
Deka
Deci
Centi
Milli

Basically, kilo means one thousand (1,000), hecto means one hundred (100), deka means ten (10), deci means one tenth (1/10), centi means one hundredth (1/100), and milli means one thousandth (1/1000).

After you have discussed these meaning and the number equivalents; show them how to convert using the metric table:

Kilo	Hecto	Deka	units	Deci	Centi	Milli
1000	100	10	Liter,gram,meter	1/10	1/100	1/1000

Every place you have to move to the new metric unit you will move the decimal point one digit, in the same direction.

Example:

a. You have 3 liters and you want to know how many milliliters it would be. Milli is 3 places to the right. So 3.0 Liters becomes 3000.0 milliliters.

Kilo	Hecto	Deka	units	Deci	Centi	Milli
1000	100	10	Liter,gram,meter	1/10	1/100	1/1000

* 

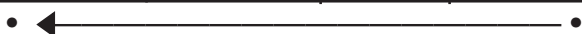
b. You want to convert 5 kilometers to meters. Start on kilometers and meters is 3 places to the right, so you would have 5.0 kilometers → 5000.0 meters.

Kilo	Hecto	Deka	units	Deci	Centi	Milli
1000	100	10	Liter,gram,meter	1/10	1/100	1/1000



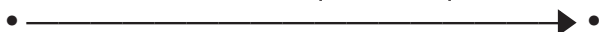
c. Add 3 kilograms to 3452 grams
 For kilograms: Change grams to kilograms 3452 grams becomes 3.452 kilograms

Kilo	Hecto	Deka	units	Deci	Centi	Milli
1000	100	10	Liter,gram,meter	1/10	1/100	1/1000



For grams: Change kilograms to grams 3 kilograms becomes 3000 grams

Kilo	Hecto	Deka	units	Deci	Centi	Milli
1000	100	10	Liter,gram,meter	1/10	1/100	1/1000



Now add the two numbers:
 $3 + 3.452 = 6.452$ kilograms or $3000 + 3452 = 6452$ grams

Now the students should be prepared to do the handout.

- ANSWER KEY:**
1. .5 grams
 2. 8600 liters
 3. 4 km
 4. 4 grams
 5. 6341 m
 6. 21 mm
 7. 35
 8. 327 mm
 9. 4200 m
 10. 345.21 m
 11. 200m

*Customary refers to the system of measurement used in the United States.

Student: _____

Date: _____

Teacher: _____

Metric Conversion

Use the following table to complete the following items.

Kilo (k)	Hecto (h)	Deka (dk)	units	Deci (dc)	Centi ©	Milli (m)
1000	100	10	Liter,gram,meter	1/10	1/100	1/1000

1. Change 500 mg to grams. _____
2. Change 8.6 kl to liters. _____
3. Which is more, 4 km or 4530cm? _____
4. Which is less, .564 kg or 4 grams? _____
5. Add 4 km to 2341 m _____
6. How much more is 6.5 cm than 44 mm? _____
7. Flynn Pharmaceuticals makes cough syrup.
If pharmacies buy large bottles of 3.5 liters,
how many 100 ml bottles can be sold from it? _____
8. Matt measured a board and found it to be
32.7 centimeters wide. How many millimeters is that? _____
9. Jeff drove 4.2 km delivering valentines.
How many meters did he drive? _____
10. Jeremy jogged 34,521 centimeters.
How many meters did he jog? _____
11. The length of a rectangular field is 0.040 kilometers
and the width is 20 meters. What is the length
of a fence that goes around the field in meters? _____

- LEVEL:** 6.0-8.9
- STANDARD:** 39.0 Demonstrate proficiency in measuring quantities and solving problems related to measurement
- BENCHMARK:** 39.09 Solve problems involving units of measure, and convert answers to a larger or smaller unit within either the metric or customary systems*
- MATERIALS:** Standard measurement handout
- PROCEDURE:** First give each student a copy of the standard measuring system.

The Standard Measuring System

<i>Length</i>	<i>Volume</i>	<i>Time</i>
1 foot (ft) = 12 inches (in)	1 cup (c) = 8 fluid ounces (fl oz)	1 minute 1(min) = 60 seconds (sec)
1 yard (yd) = 3 ft	1 pint (pt) = 2 c	1 hour (hr) 60 min
	1 quart (qt) = 2 pt	1 day = 24 hr
	1 gallon (gal) = 4 qt	1 week = 7 days
<i>Weight</i>		1 year = 12 months
1 pound (lb) = 16 ounces (oz)		1 year = 365 days
1 ton = 2000 lb		

Now pose the question: How many seconds are there in a week? Give them a few minutes to ponder and then solve. The solution is 604,800 seconds.

There are many methods that they will use to solve this, but they are all basically the same. Giving them a concrete method is very helpful especially for problems that are more difficult. Show them this method.

You are going from seconds to weeks, so list the ratios that will take you there. You want to make sure that the bottom unit of one is the top unit of the next

$$\frac{60 \text{ seconds}}{1 \text{ minute}} \quad \times \quad \frac{60 \text{ minutes}}{1 \text{ hour}} \quad \times \quad \frac{24 \text{ hours}}{1 \text{ day}} \quad \times \quad \frac{7 \text{ days}}{1 \text{ week}}$$

now cross cancel and number and units that you can (in italics):

$$\frac{60 \text{ seconds}}{1 \text{ minute}} \quad \times \quad \frac{60 \text{ minutes}}{1 \text{ hour}} \quad \times \quad \frac{24 \text{ hours}}{1 \text{ day}} \quad \times \quad \frac{7 \text{ days}}{1 \text{ week}}$$

so now you have:

$$\frac{60}{1} \times \frac{60}{1} \times \frac{24}{1} \times \frac{7}{1 \text{ week}} = \underline{\hspace{2cm}} \frac{\text{seconds}}{\text{week}}$$

continued

$$\text{now multiply: } \frac{60 \times 60 \times 24 \times 7}{1 \times 1 \times 1 \times 1} = \frac{604,800 \text{ seconds}}{1 \text{ week}}$$

another example:

How many fluid ounces are in 5 gallons?

$$\frac{8 \text{ fl oz}}{1 \text{ c}} \times \frac{2 \text{ c}}{1 \text{ pint}} \times \frac{2 \text{ pt}}{1 \text{ qt}} \times \frac{4 \text{ qt}}{1 \text{ gal}} \times \frac{5 \text{ gal}}{1}$$

so there are 640 fluid ounces in 5 gallons.

Now give these next two examples for the student to try on their own.

How many ounces are there in 10 tons?

$$\frac{10 \text{ ton}}{1} \times \frac{2000 \text{ lb}}{1 \text{ ton}} \times \frac{16 \text{ oz}}{1 \text{ lb}} = \frac{10 \times 2000 \times 16 \text{ Oz}}{1 \times 1 \times 1} = 320,000 \text{ oz}$$

How many yards are there in 23,472 inches?

$$\frac{23472 \text{ in}}{1} \times \frac{1 \text{ ft}}{12 \text{ in}} \times \frac{1 \text{ yd}}{3 \text{ ft}} = \frac{23472 \times 1 \times 1 \text{ yd}}{1 \times 12 \times 3} = 36 = 652 \text{ yards}$$

Now your students are ready for the handout, have them work in pairs.

ANSWER KEY:

1. $10500 \text{ lb} / 1 \times 1 \text{ ton} / 2000 \text{ lb} = 10500 / 2000 \text{ tons} = 5.25 \text{ tons}$
2. $102 \text{ ft. oz} / 1 \times 1 \text{ c} / 8 \text{ fl oz} \times 1 \text{ pt} / 2 \text{ c} = 102 / 16 \text{ pt} = 6.375 \text{ pints}$
3. a. $25 \text{ lb} / 1 \times 16 \text{ oz} / 1 \text{ lb} = 25 \times 16 = 400 \text{ oz}$
b. $400 \div 6 = 66.67 \text{ patties}$ which means 66 hamburgers
4. a. $8 \text{ hr} / 1 \times 60 \text{ min} / 1 \text{ hr} = 480 \text{ min}$
b. $480 \div 25 = 19.2 \text{ chairs}$
5. a. $4 \text{ gal} / 1 \times 4 \text{ qt} / 1 \text{ gal} \times 2 \text{ pt} / 1 \text{ qt} = 32 \text{ pints}$
b. $32 - 10 = 22 \text{ pints to sell}$
c. $22 \times \$1.50 = \33.00
6. $28 \text{ oz} / 1 \times 1 \text{ c} / 8 \text{ oz} = 3.5 \text{ cups per box} / 1.5 = 2.33 \text{ servings}$
 $50 \times 1.5 \text{ c} = 75 \text{ cups needed} \quad 75 / 3.5 = 21.43 \text{ boxes}$
So you will need 22 boxes of macaroni and cheese $\times .99 = \$21.78 \text{ cost}$

*Customary refers to the system of measurement used in the United States.

Student: _____

Date: _____

Teacher: _____

Customary Measurement

Use your Standard Measurement System table to answer the following questions.

1. How many tons are there in 10,500 pounds?
2. How many pints are there in 102 fluid ounces?
3. Mr. Hanna bought 25 pounds of meat for the class cookout. How many 6-ounce burgers can he make out of the meat?
 - a. Find out how many ounces are in 25 pounds of meat.
 - b. Divide it by 6.
4. Will can make one chair in 25 minutes. How many chairs can he make in an 8-hour workday?
 - a. Find out how many minutes are in 8 hours.
 - b. Divide by 25.
5. Nancy is canning green beans. She cans 4 gallons of beans. She wants to keep 10 pints for herself and sell the rest at the local farmer's market. If she sells each pint for \$1.50, how much money will she make?
 - a. Find out how many pints are in 4 gallons.
 - b. Subtract 10.
 - c. Multiply by \$1.50
6. A package of macaroni and cheese that costs 99 cents makes 28 ounces of macaroni and cheese. If $1\frac{1}{2}$ cups equals one serving, how much would it cost to make enough to feed 50 people?
 - a. figure out this one for yourself!

The Customary Measuring System

Length

1 foot (ft) = 12 inches (in)
1 yard (yd) = 3 ft

Weight

1 pound (lb) = 16 ounces (oz)
1 ton = 2000 lb

Volume

1 cup (c) = 8 fluid ounces (fl oz)
1 pint (pt) = 2 c
1 quart (qt) = 2 pt
1 gallon (gal) = 4 qt

Time

1 minute (min) = 60 seconds (sec)
1 hour (hr) 60 min
1 day = 24 hr
1 week = 7 days
1 year = 12 months
1 year = 365 days

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Time

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1 day = 24 hr
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1 year = 365 days

- LEVEL:** 6.0-8.9
- STANDARD:** 39.0 Demonstrate proficiency in measuring quantities and solving problems related to measurement
- BENCHMARK:** 39.10 Select and use appropriate instruments, technology, and techniques to measure quantities in order to achieve specified degrees of accuracy in a problem situation.

MATERIALS: Yard sticks, rulers with inches and centimeters

PROCEDURE: This lesson is designed to teach an understanding of techniques to measure quantities in order to achieve specified degrees of accuracy in a problem situation. In other words, large things are measured in bigger units and smaller things are measured in smaller units. You wouldn't want to use miles to measure the length of your driveway or inches either. You would want to use something that would give you a more accurate measurement like feet or even yards. The problem situation comes into play, too. If you buy concrete by the square foot, you wouldn't want to use square yards. You need to know how to determine the most accurate unit for the situation.

On the board, draw an inch, a foot, and a yard so the students can tell the difference. Now hold up a pencil to each measure. Which measure would provide the most accurate measure? The inch is best because the foot and yard are too big.

You want to cover classroom floor with carpet. The carpet you want is sold for \$5.99 a square yard. How much will it cost you to carpet your classroom?

- a. Think of your goal "square yards"
- b. You can measure in inches, feet, or yards. If you choose inches and feet you will need to do some converting. If you use yards are you going to get an accurate measurement because the room is large and you will not have to convert to get the answer.

Now have the students work in pairs and actually measure the classroom using the rulers or yard sticks if you have them. Have them solve the problem and then explain in writing how they got their answer.

Now give them some other situations and problems to solve. Things they can actually measure and solve. Here are a few examples but you may need to make up your own depending on your site.

1. You are going to paint the walls of your classroom. Paint costs \$12.99 per gallon or \$59 for 5 gallons. Each gallon covers 400 square feet. How much will it cost you to paint the room?
2. You want to build a bookcase just like the one you have. (This would be a good problem to change for your site) You will be using plywood that is $\frac{3}{4}$ inch thick. The plywood sells for \$34.50 per 4-ft x 8-ft sheet. How much will this bookcase cost to make?
3. You want to paint the above bookshelf. The paint you want sells for \$3.99 a pint. How much will it cost to paint the bookshelf?

- LEVEL:** 6.0-8.9
- STANDARD:** 40.0 Understand and apply theories related to numbers
- BENCHMARK:** 40.03 Understand the structure of number systems other than the decimal number system (Roman number system)

MATERIALS: Roman Numeral Bingo

PROCEDURE: Introduce the basic roman numerals:

1- I	30- XXX
2- II	40 - XL
3- III	50- L
4- IV	60- LX
5- V	70- LXX
6- VI	80- LXXX
7- VII	90- XC
8- VIII	100- C
9- IX	200- CC
10- X	300- CCC
11- XI	400- CD
12- XII	500- D
13- XIII	600- DC
14- XIV	700- DCC
15- XV	800- DCCC
16- XVI	900- CM
17- XVII	1000- M
18- XVIII	
19- XIX	
20- XX	

Ask them where they have seen Roman numerals used before?
Some answers might be: The Super Bowl, the year at movies, in outlines,
...Start with the year because that is the most visible form used.

$$2001 = 2000 + 1 = \text{MM} + \text{I} = \text{MMI}$$

$$2000 = \text{MM}$$

$$1999 = 1000 + 900 + 90 + 9 = \text{M} + \text{CM} + \text{XC} + \text{IX} = \text{MCMXCIX}$$

Have them figure their birth year.

$$1960 = 1000 + 900 + 60 = \text{M} + \text{CM} + \text{LX} = \text{MCMLX}$$

Now roll a die or spin a spinner to generate some numbers with 4 digits. Have the students try these numbers. Go over their results.

What 4-digit number would be the longest Roman numeral?

MMMDCCLXXXVIII

That is 3888

What would be the shortest 4-digit number in Roman numerals?

M or 1000

Now it is time to play Roman numeral bingo. Give each student a Roman bingo card. Write the following numbers on the board and have them pick out 25 of them and put them on their cards using Roman numerals. Now using the Roman Bingo calling cards you are ready to play.

12	14	8	62	94	255	642	9	83	1500	491
4653	191	25	75	142	1030	904	597	68	23	95
3256	109	624	26	538	1708	462	325	833	1353	83
59	19	123	2546							

40.03 ROMAN CALLING CARDS

XII- 12	XIV- 14	VIII- 8	LXII- 62
XCIV- 94	CCLV- 255	DCXLII- 642	IX- 9
LXXXIII- 83	MD- 1500	CDXCI- 491	XLVI- 46
LIII- 53	CXCI- 191	XXV- 25	LXXV- 75
CXLII- 142	MXXX- 1030	CMIV- 904	DXCVII- 597

LXVIII- 68	XXIII- 23	XCV- 95	MMMCLVI- 3256
MMCIX- 109	DCXXIV- 624	XXVI- 26	DXXXVIII- 538
MDCCVIII- 1708	CDLXII- 462	CCCXXV- 325	DCCXXXIII- 833
MCC- 1200	MCCCVIII- 1353	DCCCLXXXVII- 877	LXXXIII- 83
LIX- 59	XIX- 19	CXXIII- 123	MMVXLVI- 2546

R

O

M

A

N

LEVEL: 6.0-8.9

STANDARD: 41.0 Interpret data from graphs, charts, and maps

BENCHMARK: 41.01 Interpret and compare data from pictographs, circle graphs, bar graphs, and line graphs

MATERIALS: Pictograph 1 and 2

PROCEDURE: Have the following graphs printed on an overhead or make a copy for each student. Have the students answer the questions on graph 1 and then discuss how they got their answers. Have them come up with more questions that could be answered with the data on the graph. Next have them come up with 5 questions for the NASCAR graph and trade with another student for answers.

ANSWER KEY:

1. Vero County
2. Santa Anna County
3. 20
4. 3
5. 51

Student: _____

Date: _____

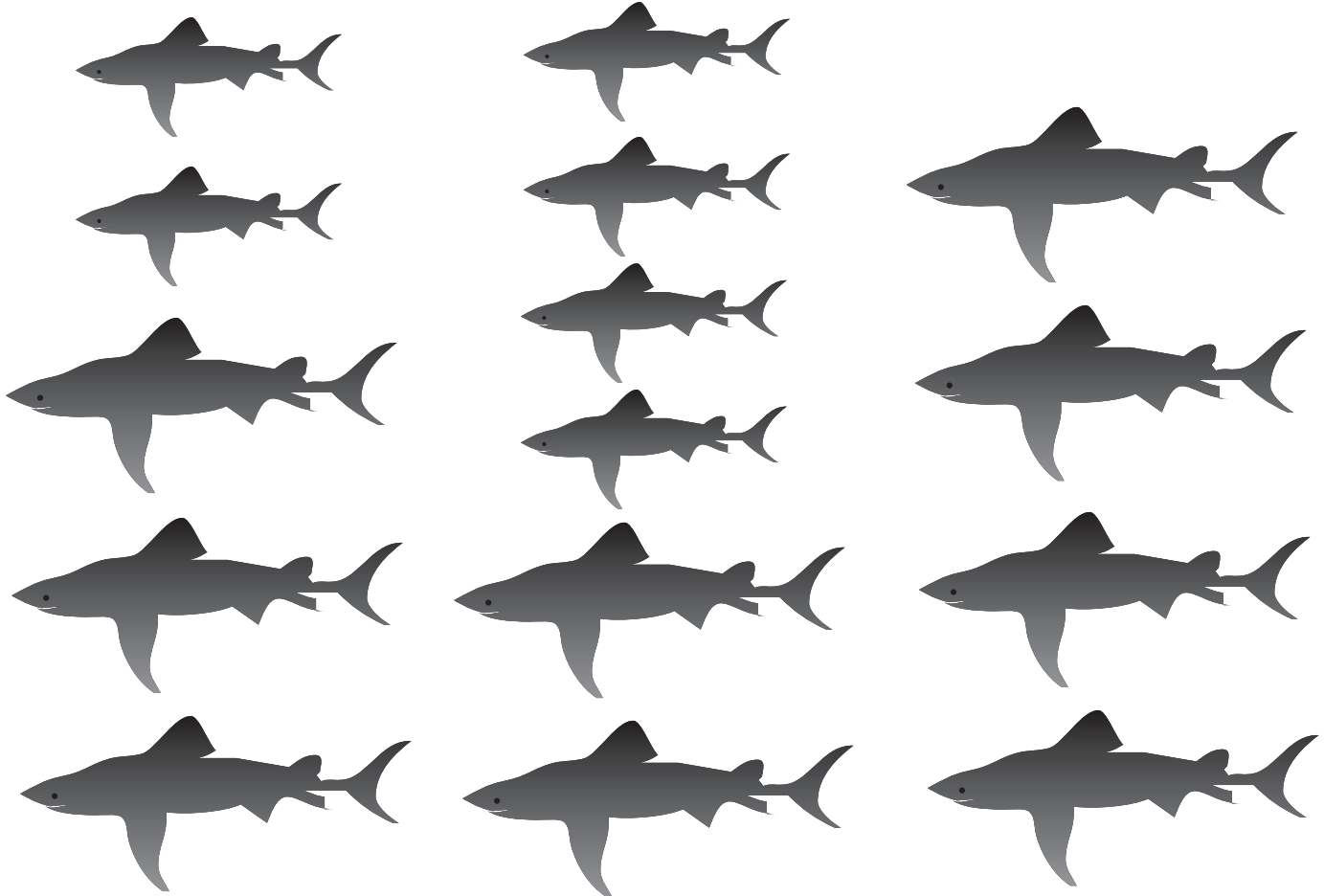
Teacher: _____

Shark Attacks in 3 California Counties for 1999

Camara County

Santa Anna County

Vero County



1. Which county had the most shark attacks? _____
2. Which county had the least shark attacks? _____
3. How many shark attacks did Vero County have? _____
4. How many more shark attacks did Camara County have than Santa Anna County? _____
5. How many shark attacks were there for all 3 counties combined? _____

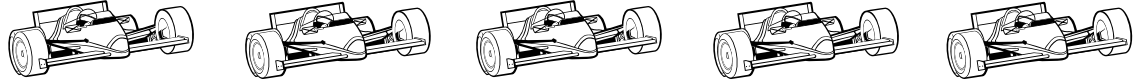
Student: _____

Date: _____

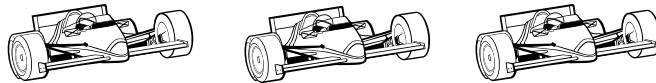
Teacher: _____

The 1979 Nascar Top Drivers for the Months of January - April

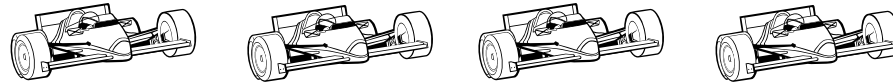
Jeff Mickey



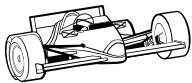
Jasper Sarity



Ricky Roberts



Dale Parson, Jr.



= 1 race won

1. _____
2. _____
3. _____
4. _____
5. _____

LEVEL: 6.0-8.9

STANDARD: 41.0 Interpret data from graphs, charts, and maps

BENCHMARK: 41.01 Interpret and compare data from pictographs, circle graphs, bar graphs, and line graphs.

MATERIALS: Line graphs 1 and 2

PROCEDURE: Have the line graphs printed on an overhead or make a copy for each student. Have the students answer the questions on graph 1 and then discuss how they got their answers. Have them come up with more questions that could be answered with the data on the graph. Now have them come up with 5 questions from the graph about Ms. Smith's Class and trade with another student for answers.

ANSWER KEY:

1. September
2. February
3. January
4. About 97 degrees
5. November High temperature = 84 / Low temperature = 25

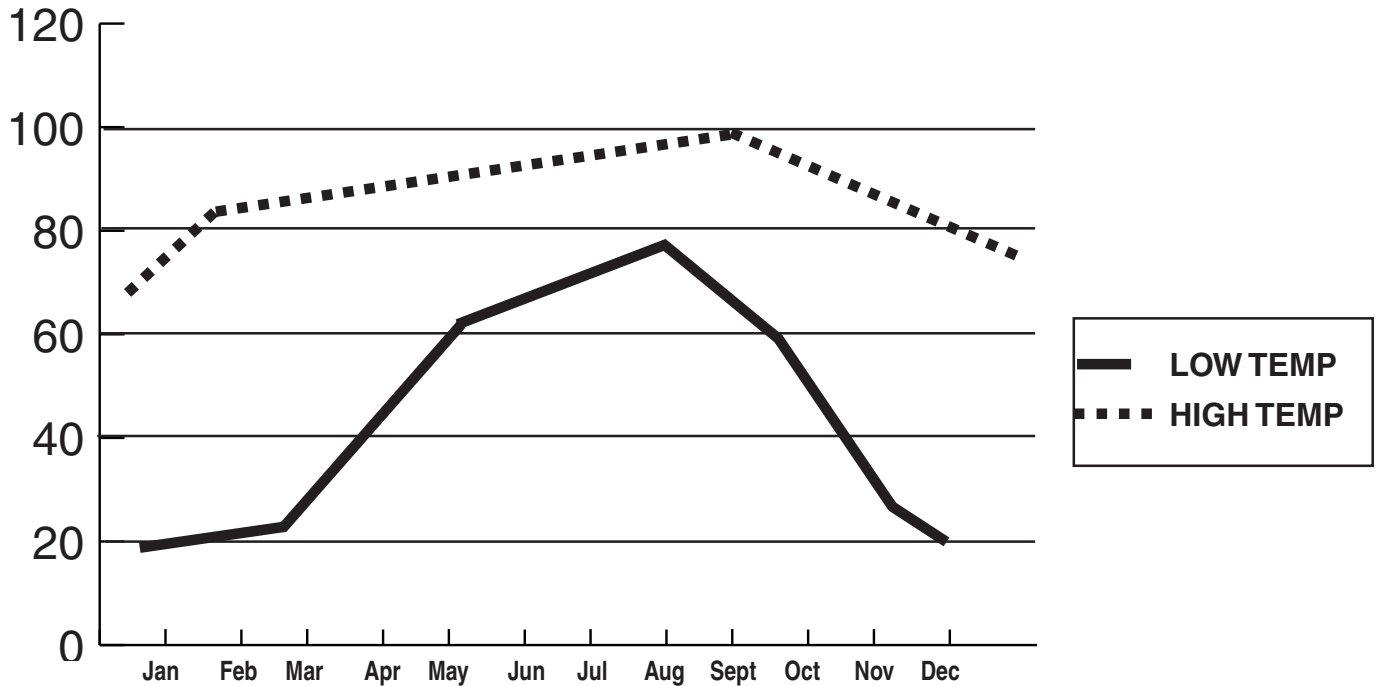
59

Student: _____

Date: _____

Teacher: _____

High and Low Temperatures for Leon County in 1998



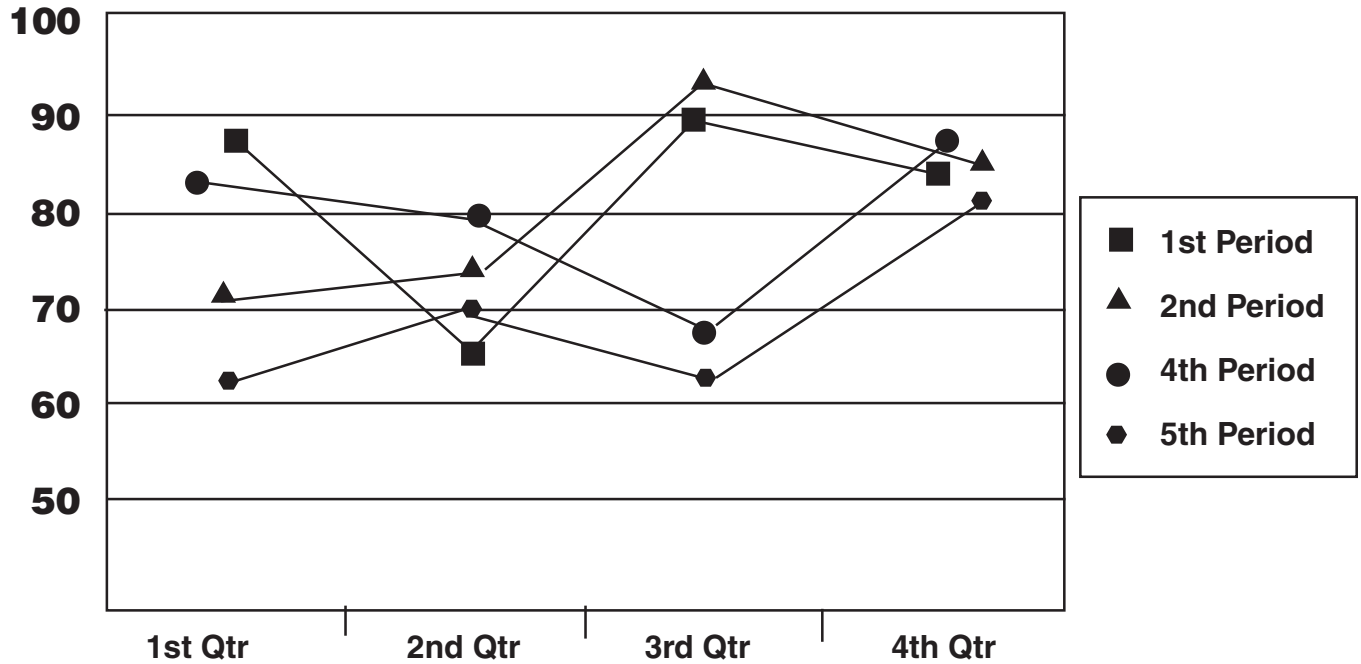
1. Which month had the highest high temp?
2. Which month had the largest difference between the high and low temp?
3. Which was colder, January, March or December?
4. What was the average high temp for May, June and July?
5. How much hotter was the high than the low in November?

Student: _____

Date: _____

Teacher: _____

Ms. Smith's 7th Grade Classes Average Grades per 9-Week Period



1. _____
2. _____
3. _____
4. _____
5. _____

LEVEL: 6.0-8.9

STANDARD: 41.0 Interpret data from graphs, charts, and maps

BENCHMARK: 41.01 Interpret and compare data from pictographs, circle graphs, bar graphs, and line graphs.

MATERIALS: Circle Graphs 1 and 2

PROCEDURE: Have the circle graphs printed on an overhead or make a copy for each student. Have the students answer the questions on graph 1 and then discuss how they got their answers. Have them come up with more questions that could be answered with the data on the graph. Now have them come up with 5 questions from the black graph and trade with another student for answers.

ANSWER KEY:

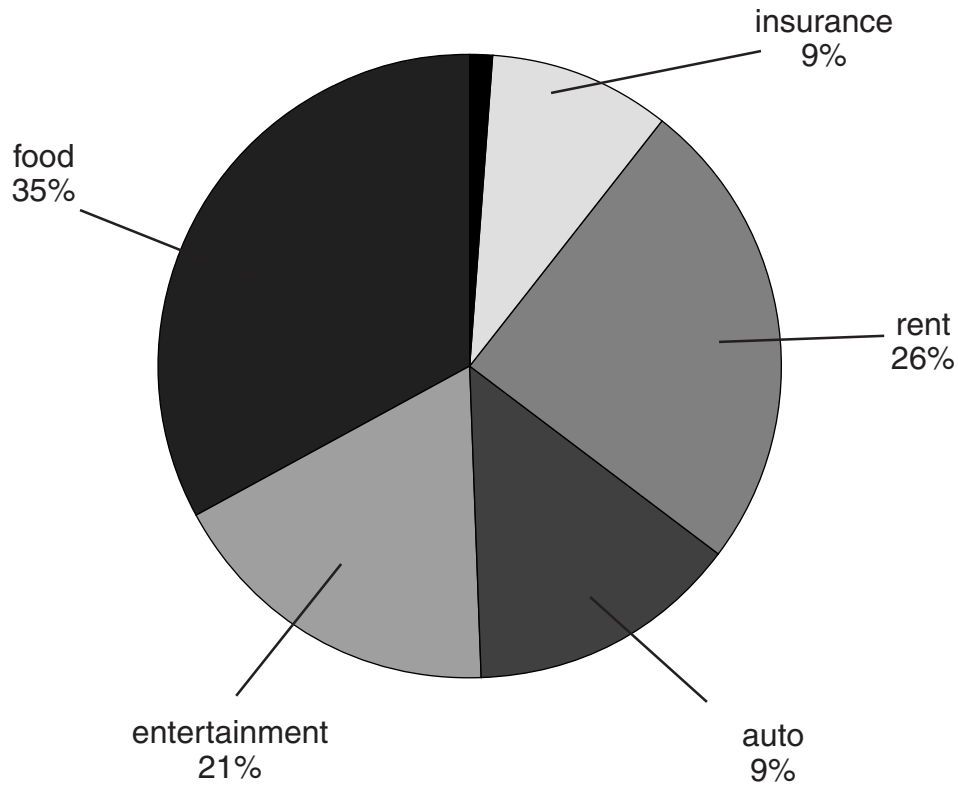
1. \$700
2. Food
3. Car payment, gas, repairs, detailing
4. 13%
5. \$400, yes it is reasonable because that is only about \$100 per week

Student: _____

Date: _____

Teacher: _____

The Johnson's Monthly Budget by Category



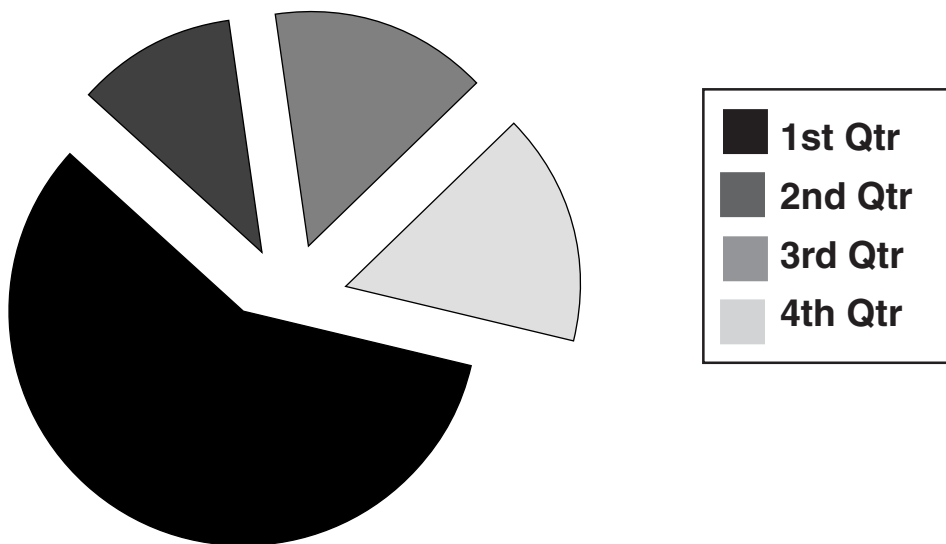
1. If the Johnson's make \$2500 a month, how much do they spend on food each month?
2. Which expense takes up over $\frac{1}{4}$ of their income?
3. How many different auto expenses can you list that might be included in that category?
4. How much more do the Johnson's spend on food than utilities?
5. If the Johnson's make \$2500 a month, how much do they spend on entertainment?
Does this seem reasonable? Why or why not?

Student: _____

Date: _____

Teacher: _____

Make up a title and information that fits this graph. Then write 5 questions concerning the data.



1. _____

2. _____

3. _____

4. _____

5. _____

LEVEL:	6.0 – 8.9
STANDARD:	41.0 Interpret data from graphs, charts, and maps
BENCHMARK:	41.02 Use data from charts and tables to solve real-world problems, e.g., determine tax on purchases using a sales tax table or calculate tax from a withholding tax schedule or income tax schedule. 42.03 Compute discounts and sale prices.
ACTIVITY:	To use tables and graphs to describe meaningful representations of a real-life experience. Using cell phone rates, we will chart, graph, and examine the relationship of cost and time.
MATERIALS:	Graph paper Calculators Computer spreadsheet Activity pages
PROCEDURE:	<i>Role of the Teacher:</i> Facilitate the activity Evaluation: Discussion of results by group Explanation of reasoning by individual Computer printouts of finished products <i>Role of the Students:</i> Read and follow directions <i>Variation:</i> Change values on tables Write equations from the activity

Student: _____

Date: _____

Teacher: _____

Cell Phone-Rate Function

A cell phone company list rates for calls. The table below lists daytime rates of \$1.28 for the first minute and \$0.79 for each additional minute. It shows the relationship between the length of a call in minutes and the cost of the call. Complete the table and draw a graph showing the relationship between the length of a call in minutes and the cost of the call.

Time of Call	Cost of Call
0.5	1.28
1.0	1.28
1.5	2.17
2.0	2.17
2.5	
3.0	
3.5	
4.0	
4.5	
5.0	

The cost of a call stays the same for any part of a minute.

1. Between 6 pm and 12 am, the rates are reduced to \$0.97 for the first minute and \$0.83 for each additional minute. Complete a table of values and make a graph showing the relationships between time and cost.
2. On Saturday and Sunday, rates are reduced to \$.66 for the first minute and \$.38 for each additional minute. Complete a table of values and make a graph.
3. For calls using a Roamer, a \$1.98 charge is added to the regular charges. Complete a table of values and make a graph for Saturday and Sunday using a Roamer.
4. Describe the relationships among the graphs.

- LEVEL:** 6.0 – 8.9
- STANDARD:** 41.0 Interpret data from graphs, charts, and maps
- BENCHMARK:** 41.03 Understand and apply the concepts of mean and median.
- ACTIVITY:** To use data bank information to display and determine measures of central tendency for interpretation. Working with predetermined data banks of information included on the activity sheets, student groups will calculate measures of central tendency (mean, median, and mode) and graph stem-and-leaf plots, frequency tables, histograms and line plots to best describe the data.
- MATERIALS:** Large chart tablet page or poster boards for displaying graphs, charts, measures of central tendency, findings and conclusions per group
Typing paper for graphs, charts, plots
Magic Marker (for data display on chart)
Calculator(s)
Computer/spreadsheet program (optional)
- PROCEDURE:** Using the data banks for the height, weight, hair color and eye color of the Cyberspace Middle School Students, student groups will organize data to determine what the average CMS student looks like. Surprises may be in store!
- Measures of central tendency (mean, median, mode and range) can be calculated once the group has translated the data banks (height, weight) into ordered stem-and-leaf plots, frequency tables, histograms and line plots.
- Next, student groups should look at the data banks for hair and eye color. What measure of central tendency best describes this data? (mode) Each group should now draw what their “average” Cyberspace Middle Student looks like.
- Role of the Teacher:***
Teacher should lead a preliminary class discussion reviewing measures of central tendency —mean, median, mode, and range.
Discussion should also include a review of stem-and-leaf plots, frequency tables, histograms and line plots so students will be ready to use these tools for analysis.
Oversee the compilation of charts, and graphs.
Lead a discussion to determine groups’ interpretations of their data analysis.
Evaluation: Class discussions: Which measure of central tendency is most appropriate for the weight data bank? Why? The height data bank? Why? The hair color bank? Why? The eye color bank? Why? Is “average” the best title for this group of students? Why or Why not? What does the term “average” mean

to most people? What does it mean to you? When is it more appropriate to use the mode? The median? The mean? When is the mean misleading? What do outliers do to the mean? How does this relate to you making a zero on a grade?

Role of the Students:

Read and follow directions.
Participate in class discussions
Work cooperatively in groups
Formulate data interpretation and graphs
Participate in group drawing and report

Variation:

Use more data to compare Cyberspace Middle School students with those from Information Highway High School (who are not as tall as CMS students). Find the measures of central tendency for the compilation of both groups (You supply the data banks).
This information could be displayed on a spreadsheet if convenient.
Use metric measures—cm and kilograms
Combine data from all 3 classes to find mean, median, mode and range, stem-and-leaf plot
Use outliers. Discuss possible reasons why the CMS student is so old.

“What’s Average?”

Student Activity Sheet

Height Data Banks For 3 Classes From Cyberspace Middle School

Grade 8

101"	72"	99"	81"
76"	78"	73"	93"
75"	77"	74"	74"
79"	76"	72"	75"
75"	77"	92"	80"
72"	80"	81"	72"

Grade 7

96"	79"	101"	84"
90"	85"	88"	90"
86"	93"	85"	92"
91"	87"	84"	84"
84"	91"	93"	89"
86"	72"	106"	85"

Grade 6

72"	81"	96"	106"
87"	97"	90"	92"
98"	110"	108"	91"
93"	99"	101"	94"
100"	103"	108"	102"
105"	105"	105"	100"

“What’s Average?”

1. On typing paper make an ordered stem-and-leaf plot for each set of height data. (See example under “weight”) Put on your Big Sheet.
2. What can we tell from this distribution? What happens to their height as CMS get older? (Answer on typing paper under plot)
3. Make each stem-and-leaf plot into a frequency table (First, determine a scale by finding your range. Divide your scale into equal intervals.) Put on Big Sheet

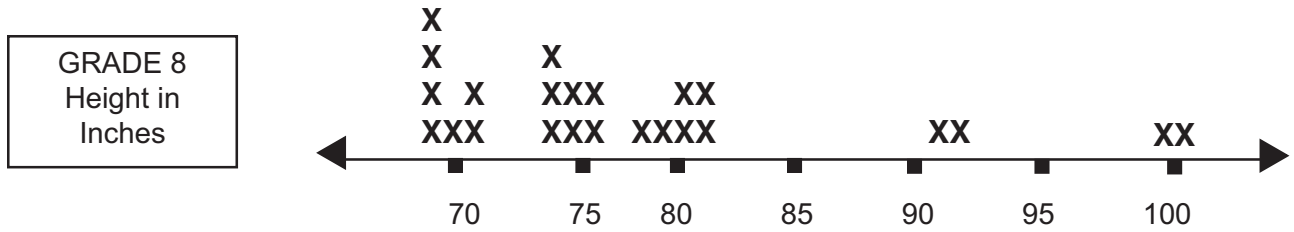
Interval	Tally	total
----------	-------	-------

4. Use the frequency table data to construct a histogram on typing paper for each set of data. Put on Big Sheet.

TITLE: _____



5. Use your height data to construct 3 line plots on typing paper. Put on Big Sheet.



Are there any outliers? What are they? How do you think they affect the mean, median, and range?

6. Calculate the mean, median and range on typing paper. What is/are the mode(s), mean, median, and range for each grade (6,7,8)? Put on Big Sheet.

mode _____ mean _____ median _____ range _____ Grade 6
 mode _____ mean _____ median _____ range _____ Grade 7
 mode _____ mean _____ median _____ range _____ Grade 8

“What’s Average?” (cont.)

Data Bank Weight for CMS Students

Grade 8 Weight in pounds

32	30	36	38
30	40	35	42
35	30	20	36
38	57	37	31
39	38	33	34
30	33	36	33

Grade 7 Weight in pounds

38	38	38	39
37	35	42	36
35	36	34	36
38	32	37	35
35	34	35	33
16	14	20	39

Grade 6 Weight in pounds

40	45	50	55
56	42	57	41
69	48	43	75
36	18	29	36
43	46	39	40
47	50	40	43

7. Make an ordered stem-and-leaf plot for each set of weight data on typing paper. Put on Big Sheet.

Example

Grade	8
2	0
3	00001233345566678889
4	02
5	7

where 5/7 stands for 57 lbs.

8. Make a frequency table on typing paper for each grade level's data. Put on Big Sheet.
9. Make a histogram for each set of grade-level weight data. Put on Big Sheet.
10. On typing paper use the stem-and-leaf data to construct a line plot for each grade's weight. Put on Big Sheet.
11. Calculate the mean, median, and range for each set of weight data

mode _____ mean _____ median _____ range
 mode _____ mean _____ median _____ range
 mode _____ mean _____ median _____ range

Cyberspace Middle School's Data Bank for Hair Color

Grade 8	Grade 7	Grade 6
GREEN IIII II	GREEN III	GREEN IIIII IIIII IIIII I
ORANGE III	ORANGE IIIII IIIII II	ORANGE II
PURPLE IIIII IIIII	PURPLE II	PURPLE II
BLUE IIIII	BLUE IIIII II	BLUE IIIII

12. Which measure of central tendency is appropriate to use in describing the “average” hair color for each grade level? Why?

Cyberspace Middle School’s Eye Color Data Bank

EYE COLOR	GRADE 6	GRADE 7	GRADE 8
RED	||||| I	||	||||
YELLOW	||||| |||||	I	|||
PURPLE	||||	||||| |||	||||| ||||| |||||
ORANGE		||||| ||||| |||	|||

13. Analyzing the data you have compiled in your plots, charts and graphs, formulate a description of the average 6th, 7th, and 8th graders of Cyberspace Middle School. Compare and contrast their heights, weights, hair and eye color using means, medians, modes, and ranges. Place this evaluation on your Big Sheet with your other graphs and charts.

14. NOW...using all information, draw pictures of what your group has calculated that the average Cyberspace Middle School students look like. Draw and label an average 6th grader, 7th grader, and 8th grader. Use color and numbers! Place these pictures on your Big Sheet and turn in after the concluding discussion.