| Parallel Model Overview | |
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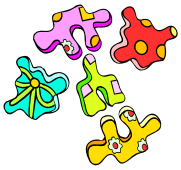
|  | **Lesson Topic: Discovering Math All Around Us**<br><br>**Subject Area(s): Math**<br><br>**Grade Level(s): First Grade** |
|  | **Context:**<br>This unit can be adapted to meet the needs of a mixed-ability general education class, or a group of gifted learners for differentiated services. Although this was designed as a unit each lesson could be taught separately. |
|  | **Length:**<br>2-3 weeks, one hour daily sessions. |
|  | **Lesson Summary:**<br><br>The lessons, included in this unit, address the need for students to see how mathematical ideas are connected rather than consisting of isolated concepts. The unit highlights connections between math and other disciplines, connections among various mathematical topics, and connections between math and daily life. It is essential that students see the relationships and connections among math topics and disciplines to enhance their understanding of the importance of math in their daily lives. |
|  <br>**Content** | **Parallel(s) Targeted:**<br>**Core Curriculum:** Students are introduced/re-introduced to key facts, concepts, principles, and skills in math<br><br>**Curriculum of Practice:** unit requires students to assume the roles of artists, writers, and scientists to investigate the connections between mathematical concepts and these various fields.<br><br>**Curriculum of Connections:** unit addresses the macroconcept of connections between mathematical topics and everyday life, mathematical topics and other disciplines, and connections among mathematical concepts.<br><br>**Curriculum of Identity:** unit encourages students to observe the relationships among mathematical topics and their own lives. It illustrates the importance and usefulness of math in everyday living rather than viewing it as an isolated subject taught in school. |

**Standards:**

PSA 1 Share a real-life event and pose a question that can be answered using the information given in the story, illustrate the number sentence by drawing a picture.
PSA 3 Select appropriate materials and tools to solve a problem (e.g., countables, measurement tools, calculators).
PSA 5 Solve problems by working collaboratively with a partner; explain how/why the solution makes "sense".
PSA 6 Share and explain (verbalize/record/demonstrate)thinking about how the problem was solved.
NCT 8 Understand the concept of addition as demonstrated orally through the use of models. Explore the commutative property.
N groups, take away, and part-part-whole.
NCT 9 Model different subtraction situations including comparison of tow
NCT 10 Explore the relationship between addition and subtraction by modeling and recording fact families in contextual settings.
NCT 15 (1.6) Recognize equal parts. Identify and represent the concepts of one-half and one-fourth using concrete materials.
OPR 4 Find sums for doubles to 9 + 9. Subtract doubles to 12 - 6
DSP 3 (1.18) Organize, record, and interpret data on grids and charts.
GEO 1 Recognize the concept of symmetry.
GEO 2 (1.16) Recognize, identify, and draw 2-dimensional shapes (regular and irregular polygons, and non-polygons). Sort shapes by size, shape, sides, or corners and identify sorting rule.
MEA (1.12) estimate, compare, and measure length using nonstandard units and inches.
PFA 4 Find missing parts in part-whole situations using materials (e.g., "I have 10 M&M's, six are green, and the rest are yellow. How many are yellow?").

**Concept(s):**
Connections

**Generalizations/Enduring Understandings:**

1. Connections help us learn
2. Individuals make connections to personal experiences
3. Connections are everywhere

**Knowledge:** (facts and content knowledge from the Program of Studies)

**Students will…**

- Understand math concepts are connected to your everyday life
- Understand math topics are connected to other disciplines
- Understand that mathematical ideas are connected among each other

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|---|---|
| | • Understand addition and subtraction are the inverse relationship<br><br>**Skills:** (a proficiency, ability, strategy, method, or tool)<br><br>• Compare and contrast similarities and differences among math problems<br>• Make connections among mathematical concepts and their everyday living, other disciplines, and among math topics<br>• Think creatively<br>• Use prior knowledge of math problems to draw connections to new problems<br>• Solve math problems |
|  <br>**Assessment** | The teacher will use pre-assessment, ongoing assessment (both formal and informal), and post assessment to monitor student progress. The teacher will monitor conceptual understandings, factual information, and application of skills at specific intervals throughout the unit. Observations, conversations, and the completed final products will be used to check for effort and competency. Several lessons include released test items from the Virginia Standards of Learning. |
|  <br>***Introduction*** | **Essential Questions:**<br><br>1. Why do we make connections? How does making connections in math help you learn?<br>2. What connections can you make? Why are your connections different than someone else's connections?<br>3. Where can you find connections? |

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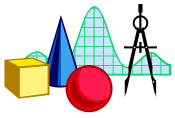
| **Teaching Methods**<br>  | **What are the primary teaching methods you will employ in this unit?**<br>• Direct Instruction<br>• Demonstration/Modeling<br>• Inquiry-Based Instruction<br>• Socratic Questioning<br>Cooperative Learning<br><br>**What learning activities will be used to engage students?**<br>• Analytical Thinking Skills: Identifying characteristics, Making observations, Discriminating between same and different, Comparing and contrasting, Categorizing, Seeing relationships, Finding patterns<br>• Critical Thinking Skills: Inductive thinking, Deductive thinking, Identifying missing information<br>• Executive Processes: Metacognition, Generalizing, Problem Solving<br>• Creative Thinking Skills: |
| **Learning Activities**<br>  | |
| **Flexible Groupings**<br>  | **How will you use flexible instructional groupings to address differences in readiness, interest, and learning preference?**<br>This unit utilizes a variety of grouping strategies (whole class, small groups, pairs, or independent study) that can be used according to readiness level, interest, and learning preference. Pre-assessments will determine readiness and interest-level and will guide the grouping of students. Heterogeneous, whole-class grouping are used to share knowledge, build on each other's ideas, and generate conclusions. Homogenous groups can be utilized when advanced students are ready to move ahead independently and other students may need more assistance. Opportunities for scaffolding instruction are inherent throughout the lessons. |
| **Products**<br>  | **What are the major products that students will produce?**<br>• Math Path Book<br>• Science Experiment<br>• Math Art Project<br>• Fairy Tale Characteristics Chart<br>• Completed Math Worksheets<br>• Original Poem<br>• Completed Math Word Problems<br>• Completed scale drawing project |

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|  **Resources** | **What resources will enhance this unit?**<br>• Career Picture Books<br>• Experiments<br>• Fairy Tales<br>• Poems<br>• Websites<br>• Paintings/Sculptors/Drawings |
|  **Extensions** | **How will you extend student learning?**<br>There are several opportunities for extension activities outlined in the Teacher Reflections. |
|  **Ascending Levels** | Throughout the unit there are opportunities to meet individual students' needs. Questioning, scaffolding, and grouping can be utilized to provide extra support for students. The unit also addresses the needs of advanced learners by providing them with extensions to delve deeper into the material being studied. For example, students who show an interest in working towards expert levels in a field may select an occupation to research on how that profession uses math skills. Other extensions are outlined in the teacher reflections portion of the unit. |

UNIT SEQUENCE, DESCRIPTION,
AND TEACHER REFLECTIONS

| Unit Sequence | Teacher Reflections |
|---|---|
| **Lesson 1: Session 1**<br>1. Begin the lesson by asking students where they see math in the classroom. Create a list of math concepts that are highlighted within the classroom. | |
| 2. Ask students what a connection is. Explain to students that we can make connections from a topic to ourselves, from a topic to another topic, or from a topic to our environment. Hold up a picture of a bike and ask students if this picture reminds them of anything that has happened in their lives. Allow students to respond. Explain that they have made a connection between the picture and themselves. These types of connections are personal connections and they help us relate to something. | Students may be familiar with connections from reading. You could then relate making connections in math to making connections in reading. |
| 3. Tell the students that we make connections to help us understand. For example, while we are reading we are making connections to better understand the story. In the same way we make connections in math. | |
| 2. Tell the students that we are going to be looking for connections between math concepts and our everyday lives. Ask students how they use math in their every day lives and add responses to the list. Discuss student responses and ask students for specific examples of problems people may use. | |
| 5. End the session by telling students that math concepts are all around us. Explain that we will begin a journey that helps us to see how math is in our environment. Ask students how finding math examples in our surroundings will help us learn math? | We want students to realize the importance of math in our daily lives. We want them to view it as useful information. |

| Unit Sequence | Teacher Reflections |
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**Lesson 1: Session 2**

1. Remind the students of the lesson we previously completed by asking them for examples of math in our everyday lives.
2. Ask the students, "What is a path?" Tell the students that we will create a math path that illustrates all of the places we can find math concepts. Explain that we will begin our math path by taking a walk around the school and taking pictures of anything that may relate to math. Ask students why we are going to make connections to our everyday life and math. Will these connections be helpful? Why?
3. As a class, walk around the predetermined path. Have students point out places of interest that may be related to math and discuss possible problems that could be created along the trail. For example, if one of your pit stops is the playground you could ask, "How many different shapes can be found on the playground? What shape is found the most frequently?" Have the students discuss how they would solve the problem. Students may first sort the shapes into groups. Then count the number of shapes. Lastly the students may graph results. At each pit stop have students verbalize possible math problems they could create about the location. Take pictures of these locations.
4. After you have completed the math path return to the classroom. Tell the students that the next time you meet you will be working in groups to develop math problems that involve the pit stops along the math path.

The idea for a math path was adapted from the National Math Trial Project. The following is a website where you can read more about the project and view completed books.
http://www.nationalmathtrail.org/

We want students to become aware of the interconnectedness of mathematics and its importance in other areas of study. This awareness will illustrate the usefulness of math in various applications of life and expand student knowledge among mathematical ideas.

Prior to the beginning of the lesson, determine the route of the math path that your students will follow. The path can be in the classroom, around the school, or within the school grounds. It could also be a remote location outside of school grounds if allowed.

If a digital camera is not available you may have students draw pictures of the locations.

| Unit Sequence | Teacher Reflections |
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**Lesson 1: Session 3**

1. Share the photos taken previously along the math path. Explain that today we will be working in groups to develop problems relating to what we saw at the pit stops. Pick a photo and as a class generate a list of possible problems. For example, if one of your pit stops was the cafeteria a list of possible questions may be:
*Each table in the cafeteria sits 10 students. In Mr. Garrett's class there are 30 students. How many tables will they need so every students has a seat?
* Lunch cost $0.75 how many quarters will Tommy need to pay for lunch? What other coins could he use?
* Every Friday the cafeteria serves pepperoni, cheese, or sausage pizza. What are the students' favorite pizzas topping?
2. Divide the students into groups. Distribute a photo to each group. Allow the students time to develop problems related to the photo. Encourage students to think of more than one problem for each photo. Have students share ideas with the rest of the group. As a class you can record problems created for each photo.
3. After students have created their problems explain that they need to develop the solutions. As a class discuss how they would solve some of the previous problems you all have created.
Have students work in their group to create solutions to their problems. Share solutions with the class for accuracy and record along with the problem.
4. Tell the students that we will be creating a Math Path book. The book will include the photographs taken of each pit stop with a brief description of what the

**Modifications for Learners Needs.**
Teachers can select how to group students. Some students may benefit from working in small groups or partners whereas other students may benefit from working alone.

location is, the problems created, and the solutions. The book should also include a cover and a map of the math path. Students can type their problems and solutions using a word processor.

5. End the lesson by discussing what students learned about math. Ask students what math is connected to. Ask students how making connections to math and our everyday lives help us learn?

You will only have one cover and one math path for the entire book.

This portion of the lesson could take several sessions.

Mathematical connections can relate mathematical ideas to students' daily lives, to other mathematical topics or to other disciplines. This lesson emphasized connections made between mathematical topics and students' daily lives. The later lessons will highlight connections among mathematical topics and connections among math and other disciplines. These connections help students understand mathematics better and see it as useful and interesting material rather than an isolated subject.

| Unit Sequence | Teacher Reflections |
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***Lesson 2: Session 1***

1. Tell the students that we are now going to investigate how various careers use mathematical concepts.
2. Have students brainstorm a list of various careers. Record students' responses on chart paper.
3. Using the examples students provided ask what type of math you think individuals may use to complete their jobs.
4. Select a career picture book to read with the students. As you read the book stop at various points and ask the students what math concepts the specific individual may need to complete certain tasks. You can add student responses to original brainstorming list.
5. Lead a discussion on careers and math concepts involved in that career. After students have listed several tasks have them create a math problem that involves the task.
7. End the session by telling students that math concepts are all around us. Explain that we will begin a journey that helps us to see how math is in our environment. Ask students how finding math examples in our surroundings will help us learn math.

The school librarian can help select career books that would be appropriate for your students.

For example, tell the students that part of a principal's job is talking with parents. A problem involving this task could be Mrs. Smith talks with five parents a day. How many parents will she talk with in one week?

You want students to realize the importance and usefulness of mathematics in the real world. If the mathematical tasks we provide are embedded in real-world applications, students see mathematics as part of their everyday experience, rather than an isolated subject they study in school.

**Optional Extension**: Students who show an interest or who display readiness for independent research may want to select a career to research on how that occupation uses mathematical concepts. They can select and complete a final product to share with the class,

| Unit Sequence | Teacher Reflections |
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***Lesson 3: Session 1***

1. Tell students that today we will be conducting a science investigation. Explain that as we complete the experiment we will be examining the connections that exist between math and science.
2. Students will be completing an experiment to determine on which side of a penny you can heap more drops of water.
3. Place a penny on the paper towel with the heads-side up.
4. Fill the eyedropper with water and hold it about 3 cm above the coin.
5. Count the number of drops added until the water spills over the side of the penny.
6. Record the number of drops in a table.
7. Dry the penny and repeat 2 more times for a total of 3 trials.
8. Repeat steps 1-5 using the tails-side of the penny. Record your data in a table. Graph the results. Calculate the average number of drops you placed on each side for the three trials.

| Side of Penny | Number of Drops Trial | | | Average Number of Drops |
|---|---|---|---|---|
| | 1 | 2 | 3 | |
| Heads | | | | |
| Tails | | | | |

9. Lead a discussion on the connections between math and science students observed while conducting the experiment.

You may want to choose another science experiment that correlates with the topics currently being studied rather than the one outlined. You can follow the similar format that is provided with any experiment.

Discuss reading data on charts with students as well as reading graphs with students.

Math topics include:

- Counting
- Collecting data
- Graphing
- Adding/subtracting/dividing
- measuring

***There are released test items titled, Data Analysis and Statistics Assessment, that correlate with this lesson at the end of the unit.***

| Unit Sequence | Teacher Reflections |
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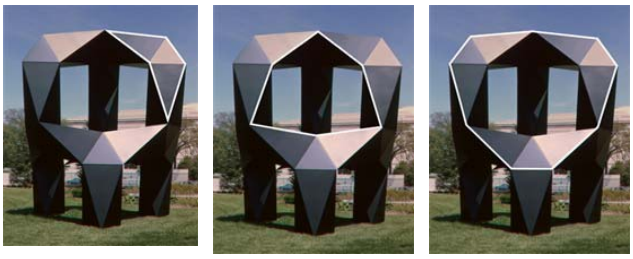
***Lesson 3: Session 2***

1. Explain to the students that they will be examining how artists use math in their creations.
2. Show the students the two overhead pictures of Tony Smith's sculptures: *Moondog and Wandering Rocks.*
3. Ask the students to describe the sculptures in detail. What do they see?
4. Ask students what basic two-dimensional shape is used in *Moondog.*
5. Remind the students what a polygon is and ask if they see any other polygons in the sculpture (pentagon, hexagon, and nonagon).
6. Show students the picture of *Wandering Rocks.* Ask students what math concepts they can find in this sculpture.
7. Share with students examples of other artists' work. Pictures from M. C. Escher have been provided. After showing the pictures to students have them list math concepts they can find in the artwork. A website is provided that will allow you to find other examples of math in art.
8. After you feel students have seen enough examples to firmly grasp the various math concepts used in artwork have them create their own work of art using one or more of the math concepts observed in the artists work.

You may want to keep a chart listing on the various math concepts you find throughout the artwork examined.

There are equilateral, scalene, and isosceles triangles. It may be helpful to outline each triangle with an overhead marker. You can select a specific color for each type of triangle.



Students should notice that each rock is a polyhedron. Have students point out the faces, edges, and vertices of the rocks

The following is a website that lists various artists who used mathematical concepts in their work. It also gives descriptions of the math topics utilized.
http://www.ams.org/featurecolumn/archive/art1.html

***There are released test items titled, Geometry Assessment and Symmetry Assessment, that correlate with this lesson at the end of the unit.***

| Unit Sequence | Teacher Reflections |
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***Lesson 3: Session 3***

1. Explain to the students that today you will be investigating math concepts found in literature.
2. Using the poems provided read each one to the students and then tape to the chalkboard.
3. After all of the poems have been read ask students if anyone sees similarities among the poems. Ask if anyone could group some of the poems together.
4. Have students categorize the poems. Ask students why they put certain poems in the same category. How were they able to tell what poems went together? What common attributes do the poems in one group share?
5. Ask students if they can recognize any connections between math and poetry. Ask students if they think poets use math concepts while writing their poems. If so, what math concepts?
6. Explain to students that there are patterns in math as well as in poetry. Ask students to verbalize the patterns they found in each form of poetry. List the patterns found on chart paper.
7. Tell students that patterns often make a poem more interesting and stylish. Common patterns in poetry consist of: sentence structure, word order, number of lines, sound/vocal inflection, rhythm, stress, and number of syllables.
8. Tell the students that will be thinking like poets as well as mathematicians to create an original poem. Students may select which type of poem they would like to write. Make sure students are aware of the patterns in all of the forms of poetry discussed prior to writing.
9. Give students time to complete their poems. Have students share poems with the class.
10. Lead a discussion on what type of math skills they used while writing their poems.

Several poems have been provided or you may use your own poems for this session.

It may be helpful to print the poems prior to the lesson and have them laminated. You could then add magnetic tape to the back so you can manipulate them easily.

The poems provided were: limericks, haikus, cinquains, and diamantes.

We want students to come to the conclusion that patterns exist in math and in poetry.

The Diamante text forms the shape of a diamond.
Line 1: Noun or subject - one word
Line 2: Two Adjectives that describe line 1
Line 3: Three 'ing words that describe line 1
Line 4: Four nouns - the first two are connected with line 1; the last two are connected with line 7
Line 5: Three 'ing words that describe line 7
Line 6: Two adjectives that describe line 7
Line 7: Noun Synonym for the subject

A haiku is an unrhymed 17 syllable poem of Japanese origin.
line 1 - 5 syllables
line 2 - 7 syllables
line 3 - 5 syllables

A limerick has five lines.
The last words of lines one, two, and five rhyme. The last words of lines three and four rhyme. A limerick has to have a pattern of stressed and unstressed syllables.

The traditional cinquain is based on a syllable count.
line 1 - 2 syllables
line 2 - 4 syllables
line 3 - 6 syllables
line 4 - 8 syllables
line 5 - 2 syllables

| Unit Sequence | Teacher Reflections |
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**Lesson 3: Session 4**

1. Remind the students how in the previous lesson they learned that patterns exist in both math and poetry.
2. Tell the students that today you will be investigating whether or not patterns exist in other forms of literature.
3. Read the students two or three fairy tales. Tell them you want them to be looking for common characteristics among the three stories.
4. After you have read the fairy tales have students brainstorm the common attributes they found. List the attributes on chart paper.
5. Tell the students that they will be reading fairy tales and looking for patterns and common attributes in the stories.
6. Distribute the *Elements of a Fairy Tale* chart to the students.
7. Have each student read several fairy tales and complete the chart.
8. After students have read and completed the chart discuss and share results found.
9. Ask students if anyone noticed math topics while reading. Do authors use math while writing fairy tales? If so, how?
10. Lead a discussion on other types of patterns found in literature. For example, mystery writing has a formula…or pattern. Plots follow a pattern, introduction, rising action, climax, falling action resolution. Short stories have common elements. Authors use common themes in all of his/her writings.

Select your favorite fairy tales to use. It is helpful to select stories that have a majority of the common elements listed below:

Common Fairy Tale attributes include:

- Special beginning and/or ending words - Once upon a time...and they lived happily ever after.
- Good character
- Evil character
- Royalty and/or a castle usually present
- Magic happens
- Problem and a Solution
- Things often happen in "threes" or "sevens"

**Modifications for Learner Need**. If students are unable to read independently this portion of the lesson can be completed as an entire class or a small group. Students who are independent readers may complete this activity independently.

We want students to come to the conclusion that fairy tales, as a genre, has its own special kind of patterns.

**Optional Extension:** You could extend the lessons by investigating patterns among various genres. Or, you could investigate patterns a specific author uses in his/her stories.

***There are released test items titled, Pattern Assessment that correlate with this lesson at the end of the unit.***

| Unit Sequence | Teacher Reflections |
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| ***Lesson 3: Session 5***<br>1. Begin the lesson by review all of the disciplines previously discussed and how they utilize math.<br>2. Ask students if they think there are any other disciplines that use math that we have not discussed.<br>3. Create a list of the disciplines on chart paper.<br>4. After students have named several disciplines ask students what math concepts they think each discipline would use. Try and relate the discussion to specific units you are currently studying. For example, you could ask the students, "What math skills have we used while studying past and present?" One skill used may have been categorizing and sorting various items into past or present groups. Or, you could ask the students, "When we were studying the seasons what math concepts did we use?" Examples of math skills could include: patterns in the season, measuring precipitation, collecting data for the temperatures, and graphing weather.<br>5. Remind the students that so far we have examined how math is connected to our daily lives as well as to other disciplines. Tell the students that we will next be looking at how topics within math are connected. Emphasize to the students math is not an isolated subject but rather a fundamental cornerstone to almost every aspect of our lives. | If students have difficulty listing other disciplines you could provide examples such as: music, social studies, writing. and economics are a few examples. |

| Unit Sequence | Teacher Reflections |
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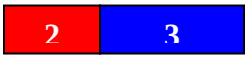
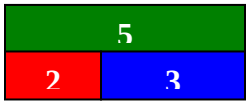
***Lesson 4: Session 1***

1. Explain to the students that today you will be investigating connections that exist among math topics.
2. Using Cuisenaire Rods show the following display to the students.




If you do not have Cuisenaire Rods you may draw the pictures on the board or overhead. You could also make visuals using construction paper.

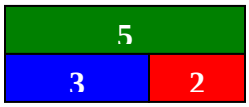
3. Ask the students to create an addition equation using the two numbers above. Write the following equation on the board: 2 + 3 = 5
4. Using the Cuisenaire Rods show the students the following visual that matches the addition equation.



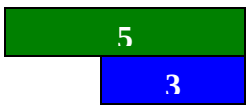

5. Using Cuisenaire Rods show the following display to the students.


6. Ask the students to create an addition equation using the two numbers above. Write the following equation on the board: 3 + 2 = 5
7. Using the Cuisenaire Rods show the students the following visual that matches the addition equation.

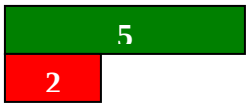
You want students to make the connection that the addends and the sum are the same for both equations but the order of the addends is different.




8. Ask the students what is similar about the two equations. What is different about the two equations?
9. Begin by showing students the visual using all three rods. Next show the students the following visual. While showing the visual to the students say, "5 – 2 = 3"

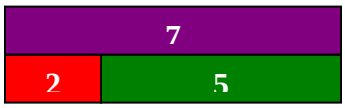


10. Begin by showing the visual using all three rods. Take away the blue rod and ask if anyone can write a subtraction equation that illustrates the visual.



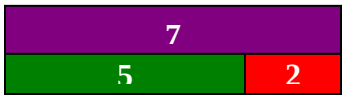

11. Students should verbalize 5 – 3 = 2.
12. Ask the students how the two subtraction equations are similar to the addition equations. Ask the students how they are different.
13. Using Cuisenaire Rods show the following display to the students.


14. Ask the students to create an addition equation using the two numbers above. Write the following equation on the board: 2 + 5 = 7
15. Using the Cuisenaire Rods show the students the following visual that matches the addition equation.




16. Using Cuisenaire Rods show the following display to the students.

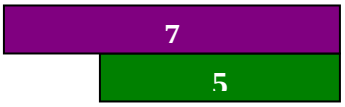

17. Ask the students to create an addition equation using the two numbers above.
Write the following equation on the board: 5 + 2 = 7
18. Using the Cuisenaire Rods show the students the following visual that matches the addition equation.




19. Ask the students what is similar about the two equations. What is different about the two equations?

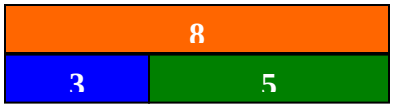
Students should realize that the same numbers are used, the same fact family in all of the problems. The difference is the first two problems use addition while the last two problems use subtraction. They may also notice that in the subtraction equation the largest number comes first.

20. Begin by showing students the visual using all three rods. Next show the students the following visual. While showing the visual to the students say, "7 – 2 = 5"




21. Begin by showing the visual using all three rods. Take away the green rod and ask if anyone can write a subtraction equation that illustrates the visual.


22. Students should verbalize 7 – 5 = 2.
23. Ask the students how the two s addition equations. Ask the students how they are different.
24. Show students the following visual: Cover one of the rods and ask the students to write an equation to represent the visual. Cover another rod and ask the students to write an equation. Repeat procedure until four different equations have been written.




subtraction equations are similar to the
25. Ask students how the equations are similar ask students how they are different. Tell the students that the four facts used make up a fact family. Ask students if they see any connections between addition and subtraction. How does this relationship help them?

Elicit that once they know one fact, that fact can help them find out the rest of the facts in the family.

***There are released test items titled, Number Computation Assessment that correlate with this lesson at the end of the unit.***

| Unit Sequence | Teacher Reflections |
|---|---|

***Lesson 4: Session 2***

1. Write the following problems on the board:

**Problem 1**

2 children were eating in the cafeteria. 9 more children come to eat. How many children are eating in the cafeteria in all?

**Problem 2**

11 children are eating in the cafeteria. 2 children left. How many are still eating in the cafeteria?

**Problem 3**

Some children were eating in the cafeteria and 9 more children came to join them. Then there were 11 children all together. How many children were there at the start?

**Problem 4**

2 children were eating in the cafeteria and some more children came. Then there were 11 children all together. How many children came?

You may want to create a worksheet with the problems on it as another option.

2. Have the students complete each of the problems individually.

3. After students have completed the problems ask the students if there is a pattern they notice among the problems. Then ask students how the problems are the same. Finally, ask how the problems are different.

The main similarity in these problems is that they use the same numbers, therefore are the same fact family. Some of the differences are the operation that is used (addition or subtraction) and the wording of the problems.

4. Discuss problem 3 with the children. Ask students how they found the answer. Hopefully, some students solved by using addition while other used subtraction. For examples, children may have solved this problem by adding __ + 9 = 11 whereas some students may have subtracted 11 – 9 = 2 to arrive at the answer.

Part –Part - Whole problems where the initial part is unknown seem to give children a lot of difficulty.

5. Ask students if using one operation is better than another. Does it matter which operation you select? Why

If students only used addition to solve the problem then show the subtraction equation or if students only used subtraction show them addition equation.

doesn't it matter? Why would someone select addition over subtraction?
6. Distribute the math worksheet to the students. Give students time to complete the worksheet independently.
7. After students have finished the worksheet review the strategies they used to solve the problems. Make sure to highlight connections between the previous problems we solved and how these connections helped them solve these problems.
8. End the session by discussing the importance of connections in math. Explain that connections can help students solve problems by using information they already have from previous problems.

We want students to realize the connection between addition and subtraction that they are the inverse relationship.

We want students to realize that connections can help us solve new problems based on our previous knowledge. You may also want to ask the students the following questions:

- Which problem does not belong? Why?
- How is this problem different?
- Why is this problem different from the other three problems?
- How did you solve this problem?

| Unit Sequence | Teacher Reflections |
|---|---|

***Lesson 5: Session 1***

1. Distribute a set of pattern blocks to each student. Students will need the hexagon, trapezoid, rhombus, and triangle.
2. Use the following questions to investigate the relationships between the pattern blocks.
    - How many triangles are in one rhombus?
    - How many triangles are in one trapezoid?
    - How many triangles are in one hexagon?
    - How many rhombuses are in one hexagon?
    - How many trapezoids are in one hexagon?
3. If students were working in pairs or independently have everyone regroup together as an entire class. Have students share their findings and relationships they found among the pattern blocks.
4. Ask the students the following questions to focus on the identifying fractional parts of the region.
    - How many green triangles are in one blue rhombus? The green triangle is what fraction of the blue rhombus?
    - How many green triangles are in one red trapezoid? The green triangles is what fraction of the red trapezoid?
    - How many green triangles are in one yellow hexagon? The green triangles is what fraction of the yellow hexagon?

**Modification for Learner Needs:**
The questions could be completed as an entire class using an overhead, in small groups, or with partners depending on the needs of your classroom.

You could further the questioning by asking students how many blue rhombuses are in a yellow hexagon, how many red trapezoids are in a yellow hexagon. You could also have students expand the number of fractions they can represent with pattern blocks by increasing the whole. Instead of representing the whole with one yellow hexagon, the students explore fractional relationships when two, three, and four yellow hexagons constitute the whole.

5. Tell students that they will be working on a word problem today and that the knowledge of pattern block relationships may help them solve it.
6. Distribute the word problem to the students. The word problem is titled "Who Owns the Most Land?"
7. Orally read the problem to the students and ask if anyone has questions.
8. Allow students time to complete the word problem.
9. After students have finished solving the problem share solutions with the class.
10. Have different students verbalize how they solved the problems communicating his/her strategies.
11. Lead a discussion on connections among various math topics students discovered. The following questions may be used to elicit responses:

- Did this problem remind you of any other problems we have solved? How did knowing the pattern block relationships help you solve the problem?
- What math skills did you need to know to solve this problem?
- How did knowing fractions help you solve this problem?
- How did knowing geometry help you solve this problem?

The word problem is a problem that was adapted from a Math Exemplar.

Students should have access to pattern blocks to help them solve the problem.

***There are released test items titled, Fraction Assessment, that correlate with this lesson at the end of the unit.***

| Unit Sequence | Teacher Reflections |
|---|---|

***Lesson 5: Session 2***

1. On the board write the word RATIO. Ask students what they think the word means and list responses on chart paper.
2. Ask several students to come to the front of the room. Divide them into groups by gender. Have seated students count the number of boys and girls. Write the numbers above each group, separated by a colon. Explain that this expression identifies the ratio of boys to girls called to the front of the room. Physically structure two additional examples (ex: students by hair color, buying lunch to bringing lunch, students who walk or ride the bus.) Label examples. Return to the term on the board and student comments. Have students identify which, if any, ideas identified what a ratio is. Guide pupils in defining the term.

A ratio is a comparison of two numbers. Ratios tell how one number is related to another number. A ratio may be written as A:B or A/B or by the phrase "A to B".

3. Using M & M's ask students what the ratio of one color is to another color. Write responses in all three ways.

You may use any manipulative you choose.

4. Hold up the clip art picture of the basketball player. Ask students if this is how big the player really is. Ask why didn't they make it as big as the actual player? Tell the students that using the scale we can determine how tall the player actually is.
5. Write the scale on the board. The scale is 1 in: 12 in. Tell students that one inch in the drawing represents 12 inches.

It may be helpful to write the ratio as follows:

$$\frac{\text{Drawing height}}{\text{Actual height}} \quad \frac{1 \text{ in.}}{12 \text{ in.}}$$

6. Measure the drawing. It should be close to 6 inches. Tell the students that the drawing is 6 inches.
7. Ask the students what the scale is. Students should respond 1 inch to 12 inches.

8. Hand out several 12 inch rulers to students. Use a ruler to mark one inch on the drawing. Ask the students how many inches that represents in actuality. After students respond 12 inches have a student lay down his/her ruler on the ground.
9. Explain that we have only measured one inch of the drawing and that it is longer than an inch. Mark of another inch on the drawing and have another student lay a ruler down. Reinforce the idea that so far the drawing is 2 inches so you have 24 inches representing the actual height.
10. Continue measuring the drawing and laying down rulers until you have 6 rulers lying down which would represent 6 feet or 72 inches.
11. Ask the students to compare the size of the drawing and the length of the rulers lying down. Which one looks more like the height of a basketball player? Ask students where else they may have seen scale drawings. Record Reponses on chart paper.
12. Ask the students how ratios and scales are similar. Ask what other math skills we used to complete this activity?

You may also tape the ruler to a wall so students can visually see the height.

**Optional Extension:**
Investigate the use of scale farther by studying map scales. Students could determine the drawing and actual distance of various locations. You could select a scale that would be simpler than the one provide, for example, 1 in.: 1 mi

A website is also provided that discusses how a designer uses a scale to create toy cars. This would be a good connection to math and real professions. https://www.thefutureschannel.com/hot_quotes/toy_cars2.htm

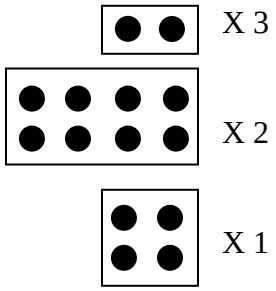
We want to continue to emphasize the connections among math topics as well as among previous problems.

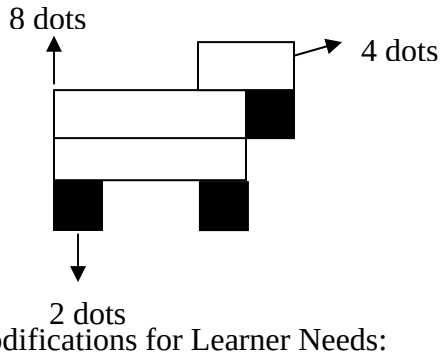
| Unit Sequence | Teacher Reflections |
|---|---|

**Lesson 5: Session 3**

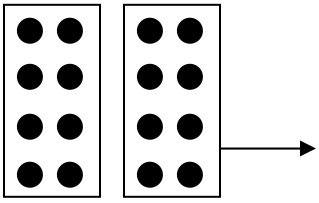
13. Show students the example of your little lego lamb. Tell them they you want all of them to create a lamb that is exactly twice as big. The scale will be 1:2.
14. Explain to the students that the 2 dot lego is the unit of measure. The little lamb uses three of these legos. The little lamb uses 2 of the 8 dot lego and 1 of the 4 dot lego. (The illustration on the right shows the pieces and completed lamb).
15. Ask the students if you had to double the lamb's foot what pieces would you use. Remind them the length, width, and height need to be twice as tall. Give students an opportunity to create a foot that is twice as long. The new foot would use two 8 dot legos stacked on each other. However students may have used different size legos to achieve this which would allow for you to talk about equivalents.

It is helpful to complete the little lamb and big lamb prior to the lesson.




Modifications for Learner Needs:
Depending on individual needs, students may work independently or in pairs to complete this activity.

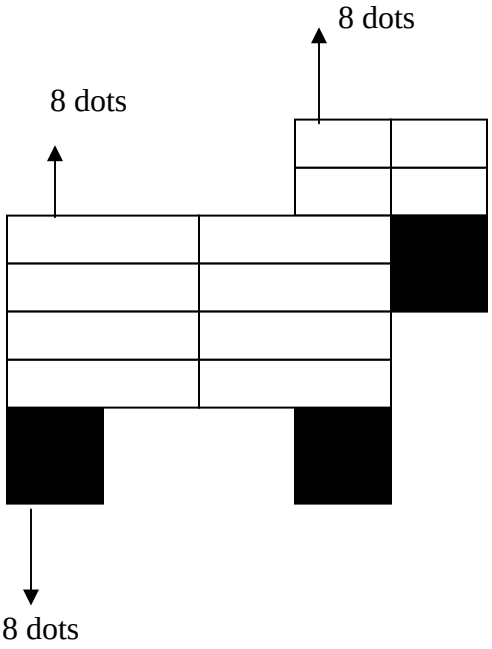


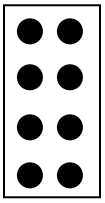
The foot uses two 8 dot legos stacked on each other.

If discussion allows this activity leads itself to the connections of equivalent fractions and multiplication.

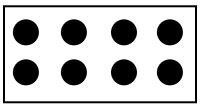
16. Ask the students how long the little lamb's body is. Students should respond 8 dots. Ask students if you doubled the length how long would it be. Students should respond 16. Ask how wide the little lamb's body is. Students should respond 2 dots. Ask student if you doubled the width how long would it be. Students should respond 4. Lastly, ask how tall the little lamb is. Students should respond 2 legos tall. Ask students if you double the height how tall it would be. Students should respond 4 legos tall. Have students create the lamb body.
17. Repeat similar questioning pattern to have students complete the head and face of the lamb.
18. After students have completed the enlargement of the lamb lead a discussion on the math skills used to complete the activity. Highlight the connections to equivalent fractions, repeated addition, doubles, and measurement.

**Modification for Learner Needs:**
Based on individual needs teachers may use the questioning format outlined. However, students who demonstrate an advanced understanding of scale may be encouraged to solve the problem independently.



Each foot uses two 8 dots stacked on each other. The mouth also uses two 8 dots stacked on each other.



The body uses two 8 dot pieces for the length and it is 4 pieces high. However, you will have to use various combinations to get them to connect.

**Optional Extension:**
Students who demonstrate an advanced understanding of scale should be encouraged to create other models using a 1:2 scale.

# MY BEARD

My beard grows to my toes,
I never wears no clothes,
I wraps my hair
Around my bare,
And down the road I goes.

by Shel Silverstein

There was an Old Man in a boat,
Who said, 'I'm afloat, I'm afloat!'
When they said, 'No! you ain't!'
He was ready to faint,
That unhappy Old Man in a boat.

*By Edward Lear*

There was an Old Person of Dover,
Who rushed through a field of blue Clover;
But some very large bees,
Stung his nose and his knees,
So he very soon went back to Dover.

*By Edward Lear*

There was an Old Person of Rhodes,
Who strongly objected to toads;
He paid several cousins,
To catch them by the dozens,
That futile Old Person of Rhodes.

*By Edward Lear*

In the garden pool
dark and still, a stepping stone
releases the moon.

*By Alex Knight*

Clouds sit still above.
Mountains stir a placid sea.
Nature's beauty glows.

***By Alex Knight***

## *November Night*

Listen.
With faint dry sound,
Like steps of passing ghosts,
The leaves, frost-crisp'd, break from the trees
And fall.

***By Adelaide Crapsey***

## *Snow*

Look up. . .
From bleakening hills
Blows down the light, first breath
Of wintry wind. . .look up, and scent
The snow!

***By Adelaide Crapsey***

## *A Threat*

Storm clouds,
casting shadows
over weary soldiers,
threaten to cry heavy buckets
of tears.

***Author Unknown***

Winter
Rainy, cold
Skiing, skating, sledding
Mountains, wind, breeze, ocean
Swimming, surfing, scuba diving
Sunny, hot
Summer

***Author unkown***

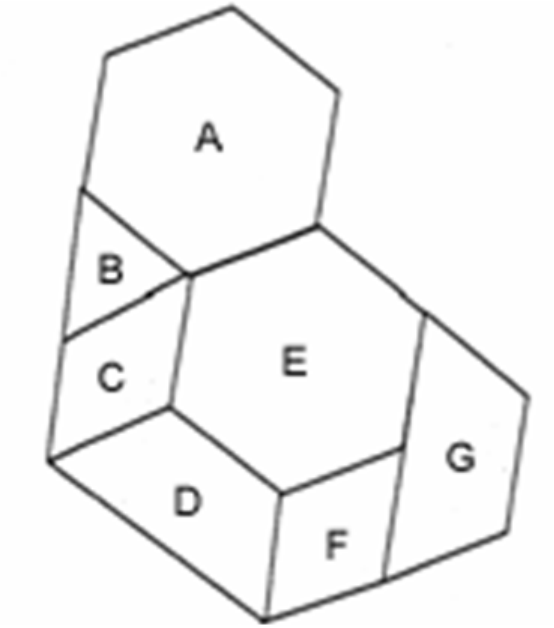
***Take your Time...***

Vacation
Happy, fun
Sleeping, dancing, traveling
Liberty, car, beach, night
Exciting, interesting, moving
Unhappy, boring
Work

***by Rosana Tellini***

# Who Owns the Most Land?

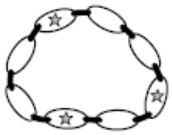
You and your friend are trying to agree on who owns the most land in your neighborhood. You and your parents own Lot A, Lot F, and Lot G. Your friend and his parents own Lot B, Lot C, and Lot D. Who owns more land, and how do you know?



# Fraction Assessment

Which necklace has $\frac{5}{8}$ of the beads with stars showing?

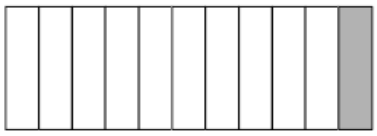
F 

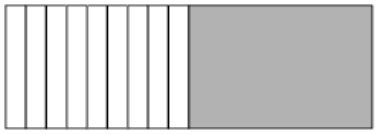
G 

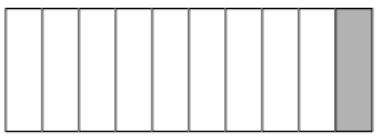
H 

J 

9 Which figure shows $\frac{1}{10}$ shaded?

A 

B 

C 

D 

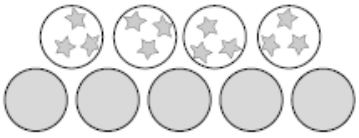
Mary will put vanilla ice cream into exactly $\frac{1}{10}$ of the group of cones shown below.

Into how many cones will she put vanilla ice cream?

F 1
G 2
H 5
J 9

In which group do exactly $\frac{4}{5}$ of the beach balls have stars on them?

A 

B 

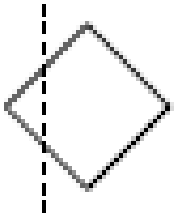
C 

D 

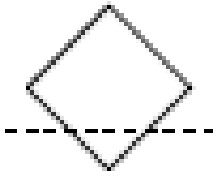
# Symmetry Assessment

1 Which figure shows a line of symmetry?

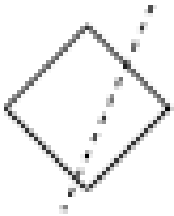
F



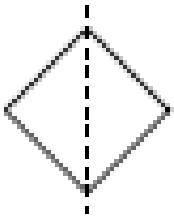
G



H

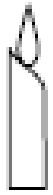


J

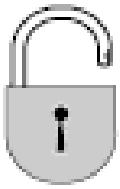


In which of the figures below is it possible to draw a line of symmetry?

A

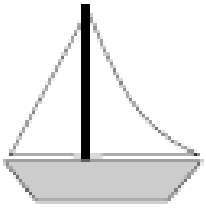


B



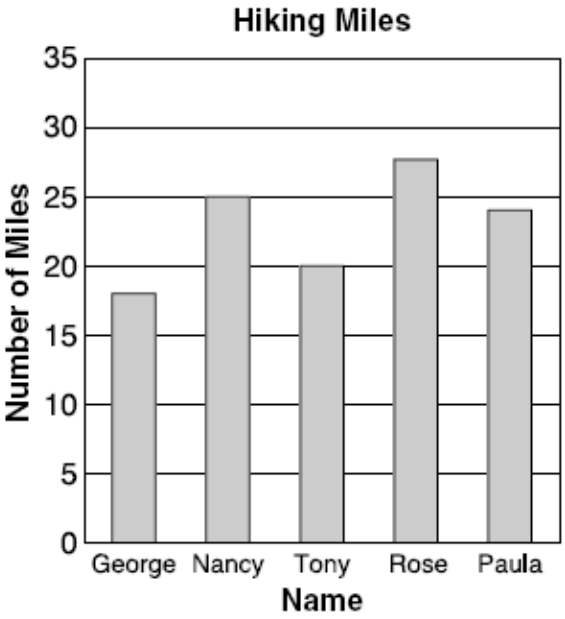
C

D



# Data Analysis and Statistics Assessment

**The bar graph below shows the number of miles each member of a club hiked in one week.**




**Which is CLOSEST to the number of miles Paula hiked?**

A 5
B 14
C 20
D 24

**The table below shows the length o some of the longest rivers in the world.**

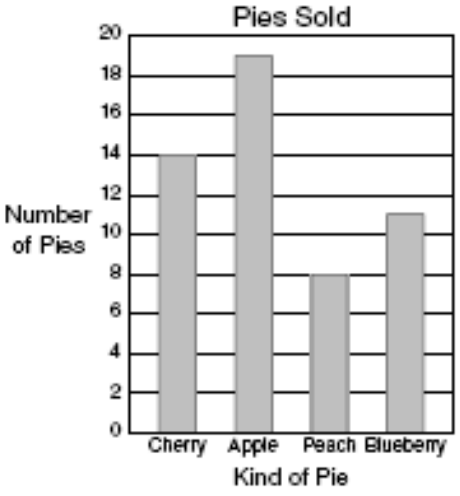
River Lengths

| Name of River | Length in Miles |
|---|---|
| Mississippi | 2,340 |
| Nile | 4,145 |
| Yangtze | 3,964 |
| Amazon | 4,000 |
| Yenisei | 3,442 |

**The Amazon River is 4,000 miles long. This is LESS THAN the lengtl of which river?**

A Mississippi River
B Nile River
C Yangtze River
D Yenisei River

**The bar graph shows the number of pies sold during a bake sale.**




**How many more apple pies were sold than peach?**

F 5
G 8
H 10
J 11

# Number Computation Assessment

4 **Sara can use the fact 12 − 6 = 6 to help solve a related problem. Which of the following could be the problem she is trying to solve?**

F ☐ + 6 = 12

G ☐ × 6 = 6

H ☐ − 6 = 0

J ☐ ÷ 6 = 12

**Mark had 8 baseball cards. He got some more baseball cards for his birthday. Then he had 17 in all. How many baseball cards did he get for his birthday?**

A 6

B 7

C 8

D 9

**Shauna had some toy cars in a bag. She gave 8 of the cars to Lucas. After that, Shauna had 10 toy cars. How many toy cars were in the bag before Shauna gave any to Lucas?**

A 2

B 9

C 12

D 18

**Lily has 7 blue T-shirts and some red T-shirts in her drawer. There are 16 T-shirts all together. How many T-shirts are red?**

A 8

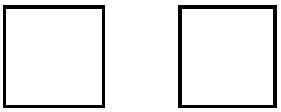
B 9

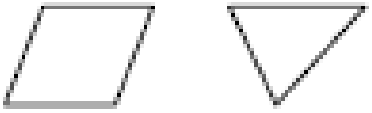
C 11

D 23

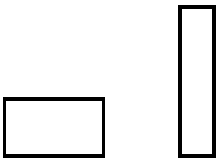
# Geometry Assessment

Look at the pairs of shapes. Which is a pair of triangles?

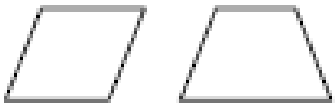
A 

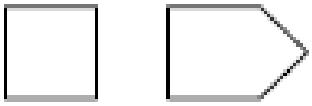
B 

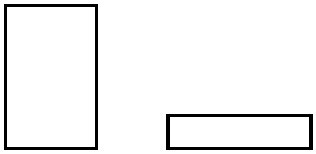
C 

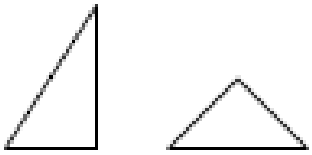
D 

Look at the pairs of shapes. Which is a pair of rectangles?

F 

G 

H 

J 

# Pattern Assessment

**Look at the pattern of shapes below.**

**If the pattern continues in the sam way, what will be the next shape?**

F 

G 

H 

J 

**Look at the pattern of shapes below.**

**If the pattern continues in the sa way, what will be the next shape**

A 

B 

C 

D 

**Look at the pattern of leaves below.**

**If the pattern continues in the same way, what will the next leaf in the pattern look like?**

F 

G 

H 

J 

Name:_____
Date:_____

**Complete the following word problems below.**

1. Jane ate 4 cherries. Sally ate 2 cherries. How many cherries did they eat altogether?

2. If Jane ate 4 cherries and Sally ate 2 cherries, how many more did Jane eat?

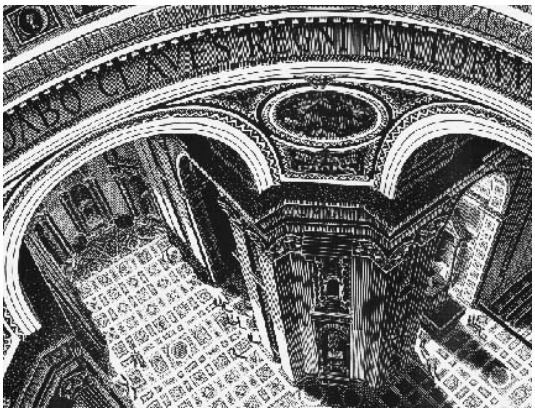
3. Jane and Sally together ate 6 cherries. If Sally ate 2 cherries, how many did Jane eat?

4. Two girls ate a total of 6 cherries. If Jane ate 4, how many did Sally eat?

Tony Smith, Moondog, model 1964, fabricated 1998-1999

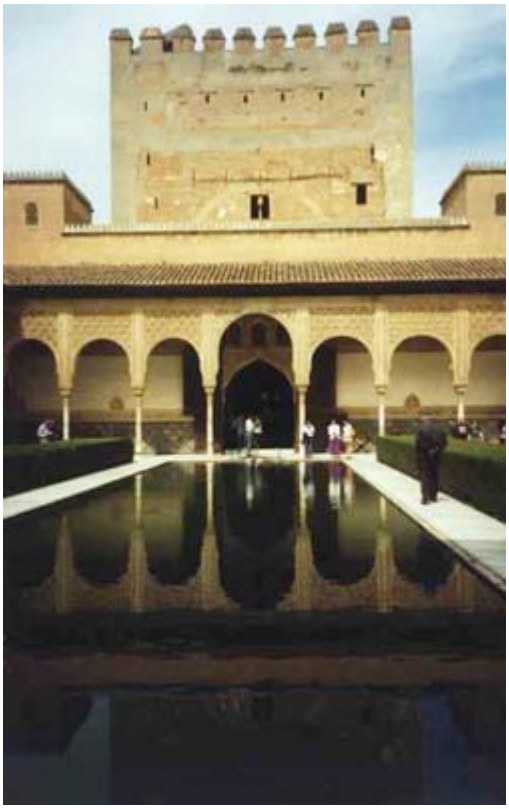
Tony Smith, Wandering Rocks, 1967

M.C. Escher *Puddle*



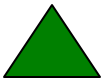
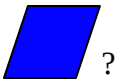
M.C. Escher *St. Peter's*

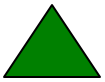
M.C. Escher *Eight Heads*

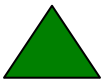
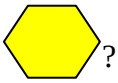


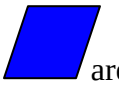
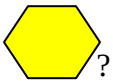
M.C. Escher *The Pond*

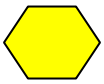
# Pattern Block Relationships Worksheet

1. How many green triangles  are in one blue rhombus  ?

2. How many green triangles  are in one red trapezoid  ?

3. How many green triangles  are in one yellow hexagon  ?

4. How many blue rhombuses  are in one yellow hexagon  ?

5. How many red trapezoids  are in one yellow hexagon  ?

6. Is there a way to represent the red trapezoid using blue and green pattern blocks? Could we cover the red trapezoid using only one color?

7. Are there other ways to represent various pattern blocks? For example, the yellow hexagon using more than one color pattern block?

## The Elements of a Fairy Tale Chart

- **Special beginning and/or ending words** - Once upon a time...and they lived happily ever after.
- **Good character**
- **Evil character**
- **Royalty and/or a castle** usually present
- **Magic** happens
- **Problem and a Solution**
- Things often happen in **"threes" or "sevens"**

**Place an X under each element you find while reading each Fairy Tale.**

| Name of Fairy Tale | Special Words | Good Character | Evil Character | Royalty and/or Castle | Magic | Problem and Solution | 3's or 7's |
|---|---|---|---|---|---|---|---|
| | | | | | | | |
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