Afterschool Curriculum

Mathematics
Grades 4-6

Learner Expectation	Show-Me Standards	Suggested Activity
Numeration Compare/Order: Rational Numbers The learner will be able to compare and order rational numbers using physical or illustrated models.	MA 5, 1.10, 3.3	**Math War** Materials: -Deck of cards for each pair of students -Scrap paper for keeping score if desired Objective: Review of basic facts (+,-,x) while comparing and ordering rational numbers. 1. Assign values to face cards J=11, Q=12, K=13 or remove them if desired. 2. Each pair of students deals cards as if playing war (whole deck evenly). Students do not look at cards. 3. Each player flips up two cards and adds (subtracts or multiplies) the two numbers. They announce to their partners the answer. 4. The player with the highest sum (etc.) wins the trick. If the students disagree on an answer, the teacher can be the referee. Play for a set time and the player with the most cards wins, or play until one player possesses all the cards.

Estimate: Decide/Justify/Reasonableness The learner will be able to decide and justify the reasonableness of solutions by approximating prior to actual computation with whole numbers.	MA 3, 3.1, 4.1	**Would You Rather Have?** *Process can be done individually, in pairs, or small groups Materials Needed: Pencil Paper Calculator Nickels and Pennies Ruler Description: Part I Allow children to work in pairs. Distribute materials to each pair of students. Pose the question "Would you rather have... a) your height stacked in pennies (or), b) your height in nickels stacked end to end. Ask the students to first estimate an answer and write it down somewhere they can refer to it later. Then ask the children to solve the problem using any of the materials provided in any way most comfortable for them. Have the students check their actual calculated answer with their estimate to see if their estimation was accurate. Some students will finish faster than the others. Have those who finish move on to the second part.

		Part II As a second part of this activity, pose the question, "Using which ever coin you decided that you would like your height stacked in, estimate the total price of you or your partner's height. Have the students write this estimation down in a safe place. Using any of the materials provided have the students calculate the actual answer and check their estimation to see if they correctly estimated. Conclusion: When everyone is finished with Part I (or Part II if you wish that the activity last longer), let each pair of students with the correct answer have a turn explaining their answer and comparing their estimation aloud to the class. For those students who were quick and completed Part II, have them do the same, explaining their estimation and answer aloud. Note: The second part of this activity is not necessary when completing this activity, but may be helpful in occupying those students who have quickly mastered the first part. Extensions: This activity may be altered by using different coin values or different objects.
Pattern: Geometric/Numeric The learner will be able to extend and finish both numeric and geometric patterns.	MA 4, 1.6, 4.1	**Spring Egg** OBJECTIVES · Students will create and continue a pattern.

Patterns: Identify/Explain/Represent The learner will be able to identify, explain, and represent number and geometric patterns and relationships	MA 4, 1.6, 3.6	MATERIALS · Black Construction Paper (8 ½ x 11) · One Bottle of Elmer's or Sparkle Glue per student · One Box of Pastels (Colored Chalk) Per Table Group · One Bottle of Hair Spray · One Pencil Per Student · Paint Shirts PREPARATION Cut a traceable, egg shape pattern out of thick, cardstock. The egg pattern should be as tall as an 8 ½ x 11 piece of construction paper. Trace at-least one onto black construction paper per student. A few extras wouldn't hurt! LESSON OUTLINE DAY 1 1. Have the student's close their eyes and imagine an Easter egg. Ask: What colors do you see on the egg? What patterns/shapes do you imagine on the egg? What colors do you usually associate with Easter? Make a list on the board. (Explain what pastels are.) 2. Pass out the black construction paper with the egg outlined on it. Ask: What do you think you are going to do with this? 3. First have the kids write their names on the back. Next, have them whisper draw (draw lightly) patterns inside the egg outline. Circles, straight and squiggly lines are all OK. Make sure that they don't draw the lines to close together or spend too much time on their patterns. 4. Next, have the students cover their pencil lines with a bead of glue. Set aside and let dry over night. The glue will dry clear. The next day they will fill in-between the lines with pastel colors. 5. Review pastels.

		DAY 2 1. Create a pattern using students in front of the class. Example, line up a boy, girl, boy, girl, etc. Ask the remaining students to identify the pattern. 2. Show a spring egg and the pastel chalk. Ask: How could you create a pattern using these pastels and the spring egg? 3. Demonstrate how to fill in-between the dry, glued, lines with pastels to create a pattern. (This is messy! Paint shirts should be worn.) 4. Pass out their egg patterns and one box of pastels per table group. 5. Lay the eggs in a well-ventilated area and spray with hair spray. The hair spray sets the pastels and prevents it from rubbing off when touched. 6. Mount the spring eggs onto construction paper for display!
Number Theory Equivalent Fractions/Decimals/Percents The learner will be able to illustrate fractions as decimals and percents using physical and pictorial models.	MA 1, 3.3	**Ordering Fractions & Decimals** Aim/Objective: Students will be able to convert and sequentially order fractions and decimals. Grouping: Whole class instruction followed by groups of 4-5 students. Whole instruction will be used to review converting fractions into decimals and groups will be used to practice the topic with a hands-on activity.

		Prior Knowledge: Students are able to sequentially order numerals. Students are able to convert decimals into fractions and fractions into decimals. Materials: • Fraction and Decimal flashcards • Record Sheets Procedure: 1. Review at the board how to convert fractions into decimals. Students will be expected to verbalize exactly what to do next as a class. 2. Practice problems at board as whole class and on paper as individuals. 3. Explain instructions for group activity. 4. Distribute materials. 5. Monitor group work and be readily available to answer any questions the students may have. Follow up: Students will create their own flashcards for homework. The following day, students will exchange flashcards and quiz each other just as we did in class. --- Name: _____ Class:_____ Math: Fractions and Decimals (least to greatest) 1. Look at your cards.

		2. Change all fractions into decimals on scrap paper. 3. Put your cards in order from least to greatest on your desk. 4. Copy the numbers on your cards into the boxes in order from least to greatest.
Equivalent Forms: Compose/Decompose The learner will be able to create equivalent representations for the same number through decomposing and composing numbers.	MA 1, 3.6	**Stardard Form vs. Expanded Form** Take a four or five digit number and place it at the top of piece of paper. Ex. 6466. Then put expanded form standard form how many digits and ask if the number is odd or even. example: 6466 standard form:_____ expanded form:_____ Odd or Even? _____ Word form:_____ How many digits?_____ Then copy this on a sheet of paper and have the children do one of these a day so they always remember these words and what they mean. This is a major part of the profiency test. It's Very important that the children remember the difference in these words.

Classify Numbers: Explain The learner will be able to explain classes of numbers based upon their attributes.	MA 1, 5, 1.10	**Prime and Composite Numbers/Prime Factorization** Objective: The student will identify numbers as prime or composite and complete prime factorization of composite numbers. Materials: construction paper, markers, cleared desktops, paper, pencil, several small, colorful pieces of poster board, masking tape Procedures: 1. Focus: The teacher will have two prime numbers written on small poster boards. She will put both numbers on the board and ask students what is special about the numbers. She will ask students if either of the numbers have any factors, other than one and the numbers themselves. She will explain that in today's lesson they will learn about prime and composite numbers. 2. Input: The teacher will display the definitions of prime and composite numbers. She will go over the definitions and give examples on the board. She will also introduce prime factorization of composite numbers. She will provide students with examples. 3. Model: The teacher will have numbers written on small squares of poster board, with masking tape on the back. (The number squares need to be small, but large enough for everyone to easily see). She will also have the (x) multiplication symbol written on several pieces of poster board. She will model prime factorization, using the colorful poster board. She will display the squares on the white board. (You could use a chalk board, if you don't have a dry/erase board). 4. Check for Understanding: The teacher will check for understanding by orally asking questions, listening and observing student response, throughout the lesson.

		5. Guided Practice: The students will create theirs on construction squares. Each child will write the numbers 1-20 on construction paper. The construction paper should be divided into small squares. The students will need around five of each number and around ten multiplication signs. They will cut the numbers out. The teacher will display a number on the white board. The students will then display the same number, using their construction squares, on their desks. They must first decide if the number is prime or composite. If it is composite, they will demonstrate prime factorization, again using their construction squares. The teacher will walk around the room to ensure student understanding. 6. Independent Practice: The students will put construction squares away. (The best thing to do is give each child their own Ziploc bag). The teacher will write several examples on the board for students to complete with paper and pencil, independently. She will also assign a few examples for homework. 7. Closure: The teacher will complete one more examples on the board, using her poster board squares. She will remind students of the definition of prime and composite numbers and explain that future lessons will build on this lesson. She will ask students to raise their hands if they have any last questions. Assessment: The teacher will ask oral questions throughout the lesson. She will also walk around the room to observe students as they complete examples. She will review each child's work completed during independent practice. Reflection: This lesson worked really well. The students just have to get used to working with the construction squares. I would recommend having them put them in piles before they begin to try any problems.

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<tr><td></td><td></td><td>For example, put all the ones in a pile and all the twos in a pile, etc. Once they get the hang of using the squares, they enjoy them, and it gives them a hands-on activity.</td></tr>
<tr><td>Algebraic Concepts

Operations: Understand/Arrays
The learner will be able to understand that arrays can illustrate multiplication, areas, and division.</td><td>MA 5, 3.4, 4.1</td><td>Expressing Multiplication as Repeated Addition

In this lesson, you will learn how to express multiplication as repeated addition.

Step 1: Print and hand out a copy of a blank multiplication table.

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		Step 2: Explain to the students that after they do this investigation, they will copy their answers on this worksheet. Step 3: For each multiplication fact (except for the 0 table), you will draw circles to "model" its repeated addition. Use the following definition to guide how to model each multiplication fact: 3 x 4 = 12 3 = a number 4 = how many sets of that number 12 = total or product example: o o o o o o = 3 + 3 + 3 + 3 = 12 o o o o o o Step 4: Review the definition above, and tell the students to use it as a guide for when you model each multiplication fact. Step 5: After they finish, probably the next day, review the commutative property, and give them an example. Then explain to them that even if two facts might the same answer, they have different repeating additions. Here is an example of it: 3 x 4 = 12 ; 4 x 3 = 12 3 + 3 + 3 + 3; 4 + 4 + 4

Number Sentence: Recognize/Write The learner will be able to recognize or write the suitable operation or number sentence to obtain a solution to a story problem.	MA 4, 1.6, 3.1	Step 6: Ask a student to refer back at the definition, and explain why 3 x 4 is different from 4 x 3, in relation to the definition. Step 7: To wrap things up, ask another student if he / she understands multiplication better, after the modeling and filling out a copy of the multiplication table, based on those results. **Writing a Math Story** Description: After learning how to add and subtract decimals, the students will listen to a story about money and then write their own story that involves adding and subtracting money. Objectives: The students will write a story that involves adding and subtracting decimals (money) and then show their math work. Materials: "Alexander Who Used to be Rich Last Sunday" by Judith Viorst 1. The students will listen as I read "Alexander Who Used to be Rich Last Sunday". 2. We will discuss the steps that happened in the story to cause Alexander to not be rich anymore. 3. The students will write their own story either about themselves or a made up character that involves the addition and subtraction of money. 4. I will give them an example: I started with $200 that I got for my birthday. I wanted to buy this really cool CD so I did. It cost $15.95.

Properties: Apply The learner will be able to apply the properties of addition and multiplication including commutative, identity/addition, associative, identity/multiplication, and distributive property.	MA 5, 1.6, 1.10	That left me with $184.05. I had to babysit for my neighbor on Tuesday and I made $12. Now I have $196.05. 5. When they are finished they must turn in their story and on a separate sheet of paper, their math work for each step of the problem Assessment: The students will be assessed on the accuracy of the math work in the story. **The Commutative Property** Materials -- Cans -- Flashcards -- Blank bulletin board -- Small bags of buttons -- Grid paper -- Construction paper -- Crayons -- Small stickers Anticipatory Set I will begin with an array of cans (4 x 6) stacked on the table at the front of the room. I will ask the students if they have ever seen something similar to this. Where? I will explain that this is called an 'array': an arrangement of items in a number of equal-sized rows. I will ask the students where else they have seen arrays of items. I will challenge the students to identify arrays that are in the classroom (I will make sure that there are a number of possibilities before beginning the lesson). Finally, I will point out a blank bulletin board and tell the students that they will be making their own bulletin board

		with the work they do today. Guided Practice 1. I will call the students' attention to the array of cans at the front of the room, again. I will ask them how many rows across there are of the cans. How many cans in each row? I will write "4 rows of 6 cans" on the board. How many cans in all? I will write " = 24" next to the existing sentence. Is there another way that I can write this? I will write "4 x 6 = 24." 2. I will have the students get into pairs and I will pass out bags of small buttons to each group. I will tell the class that we are going to practice making arrays with the buttons. 3. I will use a set of flashcards (making sure that the "0" facts are taken out) to pick multiplication problems at random. I will write the problem in large print on the board, and I will ask the students how I could make an array to show this problem. I will use buttons on an overhead to show the students. 4. I will continue to pick cards at random, having the pairs of students make arrays with their buttons. I will call on volunteers to demonstrate what they have done at their desks, using the buttons on the overhead. 5. I will ask if any pair of students has done the problems in a different way. In a perfect situation, the students will have discovered the Commutative Property on their own. If not, I will turn the page on the overhead so that it is sideways. I will ask if this is the same problem. Why or why not? We will discuss how this problem is written and why it is the same. 6. We will repeat this activity, but each group needs to show the two arrays that yield the same answer. Again, students will come up to the overhead to show their work. 7. When I feel that the students have a handle on the subject, I will collect the buttons and separate the pairs of students.

		8. Next, I will use an overhead to show how arrays can be drawn on a grid. We will practice doing this together, and I will be sure to point out the fact that a 2 x 3 array yields covers the same space as a 3 x 2 array. I will also be sure to label each array appropriately. Individual Practice 1. I will pass out grid paper to each student. I will mix up the flashcards, hold them facedown, and have each child pick one. I will give each student the corresponding card as well (i.e. if a student picks 8 x 4, then I will give him/her 4 x 8). 2. I will tell the children that they are to outline and color each array on the grid paper. Then they should cut out each array. 3. While the students are working on this, I will pass out one piece of construction paper to each student. When they are finished, they will need to glue each array onto the construction paper. I will show the students an example that I have already made. 4. As I walk around I will check to see if any students have labeled their arrays, and I will point this out to the other students. If no one has done so, then I will explain to the students why it is important that we do this. 5. Last, I will hand out small stickers that the students can place in each small box of their arrays. Closure When all of the students have finished making and labeling their arrays, I will point to the bulletin board and explain that this is where we will be hanging up our arrays. I will put up the title, "Array for Multiplication!" (Kind of like 'hooray!'). Then, I will have the students come up one by one. Each student should show his/her array to the class, tell us what multiplication sentences that each one illustrates, and then I will hang it up on the board. Assessment

		-- I will observe the students to see that they are actively participating in the guided instruction. -- I will check to see that they have completed the array projects with 100% accuracy. If I see that a child is not doing his/hers correctly, I will have him/her work with an early finisher, who can help the student to understand the concept.
Whole Numbers Multiplication Facts: 12 X 12 The learner will be able to show verbal and/or written ability in applying multiplication facts up to 12 X 12.	MA 1, 1.6	**Multiplication Treasure Hunt** Materials: Something hard to write on, pencil, mulitiplication treasure map Objective: The student will recognize and be able to answer basic multiplication facts. Procedure: Pick out a destination you want you students to get to. Secondly, you need to decide the path you want them to take to their destination. Next, you need to count the steps to each turn and record it on a peice of paper. Finally, when you get back to your class, make up some basic multiplication facts to be the steps. For example, on the treasure map you could type: • Go 3x4=___ steps and turn right. • Go 5x9=___ steps and turn left. ... and so on ... Below is an example: • Go 4x2= ____ steps and turn left. • Go 8x5= ____ steps and turn left. • Go 5x2= ____ steps and turn right. • Go 9x3= ____ steps and turn right.

		• Go 9x7= ____ steps and turn left. • Go 10x3= ____ steps and turn right. • Go 6x5= ____ steps and turn right. • Go 3x3= ____ steps and collect your prize. It will be on your left. It works better if there is some kind of prize or candy at their destination. It could also work well with addition, subtraction, and division.
Integers Integers: Recognize/Positive/Negative The learner will be able to recognize positive and negative numbers and zero.	MA 5, 1.10	**Positive and Negative Integers: A Card Game** Brief Description This adaptation of the card game Twenty-Five provides practice adding and subtracting positive and negative integers. Objectives Students • practice addition and subtraction of positive and negative integers. Keywords integers, positive, negative, numbers, addition, subtraction, game, card game Materials Needed • standard deck(s) of cards Lesson Plan *This card game is a variation of another teacher-submitted card game called Twenty-Five. That game involves simple addition and subtraction of whole numbers and can be played by students of any age. This game requires students to add and subtract positive and negative integers.* Arrange students into groups of two or more. Have students deal out as many cards as possible from a deck of cards, so that each student has

		an equal number of cards. Put aside any extra cards. Explain to students that every black card in their pile represents a positive number. Every red cards represents a negative number. In other words a black seven is worth +7 (seven), a red three is worth –3 (negative 3). Note: If this game is new to students, you might want to discard the face cards prior to dealing. If students are familiar with the game, or if you want to provide an extra challenge, leave the aces and face cards in the deck. In that case, explain to students that aces have a value of 1, jacks have a value of 11, queens have a value of 12, and kings have a value of 13. At the start of the game, have each player place his or her cards in a stack, face down. Then ask the player to the right of the dealer to turn up one card and say the number on the card. For example, if the player turns up a black eight, he or she says "8". Continue from one player to the next in a clockwise direction. The second player turns up a card, adds it to the first card, and says the sum of the two cards aloud. For example, if the card is a red 9, which has a value of -9, the player says "8 + (-9) = (-1)" The next player takes the top card from his or her pile, adds it to the first two cards, and says the sum. For example, if the card is a black 2, which has a value of +2, the player says "(-1) + 2 = 1." The game continues until someone shows a card that, when added to the stack, results in a sum of exactly 25. Extra Challenging Version To add another dimension to the game, you might have students always use subtraction. Doing that will reinforce the skill of subtracting negative integers. For example, if player #1 plays a red 5 (-5) and player #2 plays a black 8 (+8), the sum is -13: (-5) - (+8) = -13

		If the next player plays a red 4, the sum is -9: (-13) - (-4) = -9. [Recall: Minus a minus number is equivalent to adding that number.] Adapting for Special Students For students who find the game too challenging, you might change the sum you're aiming for to a number less than 25. The game will end more quickly. As students become more comfortable with the game, you can gradually increase the numeric goal. Assessment Observe student play. Support students who are having difficulty. After the game ends, have students write about it in their math journals; they might explain the rules in their own words, for example.
Mathematics Processes Modeling: Apply/Multiple Representations The learner will be able to apply multiple representations for situations to translate among diagrams, models, and symbolic expressions.	MA 1, 3.6	**M & M Graphs** INTRODUCTION: I used this as an introductory lesson on creating spreadsheets and graphs. The lesson was done in the Technology/Computer Lab and students were allowed 2 (35 min.) class periods to complete the project. THE PROCESS: Students are given a handful of plain M & M's in a sealed plastic bag and asked to estimate (guess) how many of each color they have. Estimates are recorded on a sheet, noting how many of each color. To make it easier for students to transfer information to a spreadsheet/graph, have them record guesses in colored markers which correspond to the colors of the M & M's. Students set up a spreadsheet with columns/row labeled "Estimate" and "Actual". Then they record their guesses in the "Estimate" column, count the actual number of that particular color M & M, and record the number in the "Actual" column. As each color is counted and

		recorded, have the students change the text color to correspond to the color of the M & M's. It makes for a colorful and easy-to-understand graph. The students then convert the spreadsheet into a bar graph, give it a title, transfer the graph to a new word processing document, and write about the steps in creating the graph. EVALUATION: Students are evaluated on the accuracy of the graph and the written report they give on the steps used to create the graph.
Geometry Shapes: Identify/Draw/Use/Attributes The learner will be able to recognize, draw, and apply symbolic notation to signify the characteristics of geometric shapes including points, parallel and perpendicular lines, planes, rays, and parts of a circle.	MA 2, 1.6	**Geometric Architecture** Resource: Math Games and Activities from Around the World, by Claudia Zaslavsky. ISBN 1-55652-287-8 Rationale This activity is intended to make students aware of the importance of geometric solids and properties in architectural design. Students will plan and construct a design based entirely on geometric figures. Expectations Students will: -construct nets of the geometric solid of their choice, using a variety of materials; -use mathematical language to describe geometric ideas; -discuss geometric concepts with peers. Introduction Review concepts related to geometric solids. "Where do we see

		geometric solids?" Body We will read through information on "Houses in Kenya", "Egyptian Pyramids", and "Pueblo Buildings in the USA". We will compare these forms of architecture with those found in Toronto. Conclusion Students will be introduced to their task, which is to choose a theme of architecture, and work with a partner to create a geometrically-based model. Students will begin planning their task, completing the worksheet provided for them to help them organize their materials and thoughts. (See attached) Materials: information/instruction sheets and chart; pencils; construction paper; glue; cardboard; scissors; paint; toothpicks; marshmallows. **Also, students can be asked to bring in anything they feel will enhance the appearance their model, such as glitter, pom-poms, feathers. Invited students to make use of glossy magazine paper available. Make a plan: 1. What is your theme? -- Houses in Kenya -- Pyramids of Ancient Egypt -- Pueblo Buildings in the USA

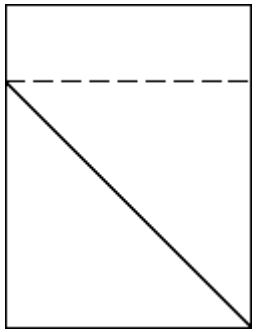
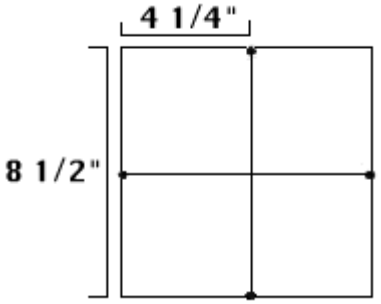
		-- Houses in Canada - brick, log -- Apartment Buildings in Toronto -- Other - make up your own architectural design. It could be the next mall in town, the newest skating arena, or the best looking hospital. 2. Draw a picture of what you want your architectural model to look like. **This is called a "design". 3. What materials do I already have? _____ _____ _____ _____ 4. What do I need? Shape — I need this many: rectangular based pyramid square based pyramid triangular based pyramid cone cylinder cube rectangular prism triangular prism
Combining/Partitioning The learner will be able to study and predict the result of combining and/or partitioning geometric figures by drawing, representing, or describing the figure created.	MA 2, 1.6, 4.1	**Polygon Monster** Objective: Student will demonstrate knowledge of different types of polygons. Procedure: Have class discussion and list on board all the different kinds of

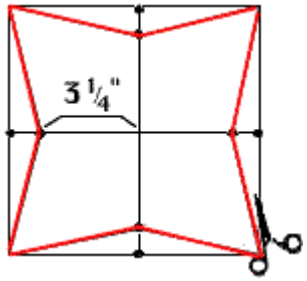
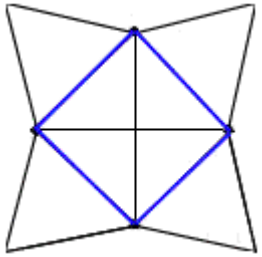
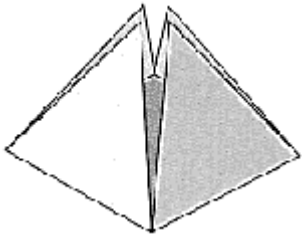
		polygons they have been studying. Tell them they will make a monster using at least one of each of the shapes. Tell the students they must label one of each kind of shape that they use. I do not allow them to draw anything on their finished product. It must be totally constructed. Materials: You can use a variety of things, but I have them make it out of construction paper. I offer 8 - 10 colors and they choose 5 plus a background sheet. You also need scissors and a marker for labeling. Time to do this may vary, but normally we spend 30 minutes at a time over 2 -3 days. As an extension, we sometimes write stories about our monsters. We then attach the story to the monster and hang them in the hall.
Transformations: Investigate The learner will be able to investigate the effect to the size, shape and position of an object after sliding, flipping turning, enlarging or reducing it.	MA 2, 3.6, 4.1	**Building A Geometric Kite** Materials: Wooden dowels string wood glue tape plastic garbage bags or disposable plastic tarp tissue paper crepe paper straws scissors markers Introduction: Lead a discussion about past experiences with kites. Challenge students to brainstorm what helps to make a kite fly (besides wind!).

		Lead them to ideas such as material, aerodynamics, durability etc. List their ideas on the board and discuss the pros and cons of examples for each idea. Procedure: Divide students into cooperative groups of 4-5. Inform them that they need to decide who in the group will be responsible for each job in the challenge. The "jobs" are: 1 student is in charge of researching how to build a kite on the internet. These sites can be easily found using yahooligans (or any other) search engines simply by typing in "kites" as a search word. Remind them to find simplistic instructions that can be completed using the materials available in the classroom or brought in from home. You may want to have a list of certain sites that can accommodate the materials you have available, in case students are having difficulty finding appropriate instructions. 1-2 students will be in charge of gathering the needed materials and building the kite. They will follow the instructions given to them by their researcher in the group. (All students will want to do this job, but inform them that the other group members are needed to help the "artist" create the visual design of the kite. They will also be the first to try and fly the group's kite on the playground--that usually stops any bickering) 1 person (with help from other group members) will be responsible for creating a symmetrical design for the kite using only geometric concepts such as polygons, prisms, angles, lines etc. They will use markers and any other materials they need to complete their design. (This usually turns out to be the most popular job in the group)

		1 student will be in charge of making a blueprint of the kite design. They need to label all examples of geometric design used in the creation of the kite. Not only should they label the shapes used in the visual art for the kite, but the structure as well (Example: wooden dowel is a cylinder, angles created by the structure of the kite etc.) Students will need to see an example of how to do this, so make a blueprint of a simple kite with labels outlining the geometric principles before they begin this project. Closing Activity: Take groups outside to test their kites. Have them mark how much string they were able to use to measure how high up they were able to lift their kites. Prepare the students that their kites might deteriorate quickly in the process. Assessment: Have groups present their blueprints labeling all geometric principles used in their kite. Also have them work together to write a reflective journal describing the difficulties in this project. Have them outline what they would do differently the next time they make a kite. Lead this into a discussion about trial and error for builders and inventors.
Symmetry: Draw/Polygons The learner will be able to draw lines of symmetry in polygons.	MA 2, 1.6	**Stained Glass Symmetry** Objective: The student will understand symmetry through a hands-on activity in which they will produce a stained glass replica. Materials: Over-head transparencies film (1 per student), over-head expo markers, black Sharpie markers, shape templates, construction paper, tape. Procedures: Using the black Sharpies, have students trace their design onto a

		transparency film with the templates. Have students design symmetrical patterns. After their patterns have been traced onto a transparency, have students color in the shapes using the expo markers. Yellow hexagons, green triangles, red trapezoids, etc. After they have colored their designs on the transparency film, have them make a circular frame out of the construction paper. (discuss radius and diameter here!) Finally, have students tape their transparency onto the construction paper frame and hang them on the window. After having them hung, discuss the different patterns with your students.
Representation: Recognize/Prism The learner will be able to recognize a two-dimensional representation (net) of a rectangular prism.	MA 2, 3.3	**Building A Pyramid** *Students construct a scale model of the Great Pyramid at Giza. In the extension questions students are asked to use given formulas to calculate the surface area and volume of their model.* **MATERIALS:** 1. Four 8 1/2" X 11" sheets of paper 2. Four scissors 3. Four rulers 4. Four black pencils 5. Four red pencils 6. Four blue pencils 7. Tape **DIRECTIONS:**

		Note: Each student will make a pyramid individually; however, students should help each other as they are completing the task. 1. Following Diagram 1, fold one corner of the paper to the opposite side. Cut off the extra rectangle. The result is an 8 1/2" square sheet of paper.  2. Fold the paper in half and in half again. Open the paper out and mark the midpoint on each side. Draw a line connecting opposite center points.  3. Measure 3 1/4 inches out from the center on each of the four lines. Draw a red line from each corner of the paper to each point you just marked. Cut along these red lines to see what to

		throw away.  4. Draw blue lines as shown below.  5. Neatly print your name at the base of one of the sides of the pyramid (before folding and taping). 6. Fold along the lines. Tape the edges together.  7. Congratulations! You now have a pyramid that is a scale model

		of the Great Pyramid at Giza. **Angles and Geometry Activity**
Angles: Estimate The learner will be able to approximate angles using different angles as benchmarks such as, 45, 90, and 180 degrees.	MA 2, 1.6	In order to further the concept of right, obtuse and acute angles, have the class invent a cheer utilizing arm movements that demonstrate the various angles. The next day ask the students to add on to the cheer arm movements that demonstrate parallel lines, etc.
Real Numbers and the Coordinate Plane Coordinate Systems: Find/Location The learner will be able to use simple two-dimensional coordinate systems to find locations on a map and to illustrate points and basic figures.	MA 2, 1.6, 1.8	**Box and Deliver** The activity gives students an opportunity to practice longitude and latitude plotting skills, mapping skills, and applying math skills for practical use. This activity will take varied length of times depending on the depth of the lesson. 1. Students should have been taught how to plot latitude and longitude. They should also have been taught about time zones. They should also be comfortable with maps and using maps. (This is a practice, not an introductory lesson.) 2. Hand out a road map or atlas for students to use as a resource. Hand out maps of the US for them to write on. Follow the directions for Box and Deliver. 3. Give students time to map their delivery route which should include route signs. After the mapping is complete, the activity can begin or follow other classroom lessons, using 10-15 minutes for the development of the game. The teacher can keep the game short by introducing only one hazard, or can continue the game by introducing another problem or having the students deliver another product. 4. Assessment can be done threefold: teacher observation of group

		activity; student self-assessment on effort and cooperation; and assessment of final products of the student's maps, routes, and solutions to the problems. The teacher can assess understanding of plotting and map skills by reviewing the maps, routes, and timetables in the final product. BOX AND DELIVER! Mapping Challenge Choose a location and product from the teacher's bowl. Next, choose the name of your company. Your group will be known by that name during this exercise. Your company has products boxed and ready to be delivered across country. You need to determine the best route to ship your product. (The product must be shipped by truck.) Using maps, plot your route according to real roads. You will use the map that has been given to you as your final product. You may want to practice plotting your course on another piece of paper. Estimate the time it will take to ship your product based on the distance you are traveling. Make sure this is not a guess, but based on facts about distance, road quality, and weather. Your trip is to take place in October. Watch the weather! Your teacher will be giving you a weather or hazard card during your company meetings. Your company has three days to do the work. Gook Luck and Safe Deliveries! PRODUCT _____ COMPANY LOCATION _____ DESTINATION FOR PRODUCT _____

		COMPANY NAME _____ MEMBERS OF THE BOARD OF DIRECTORS: Chairman _____ Members _____ Preparing for Shipping through Regions: Region #1 Starting Point:_____ Estimated date/time of arrival:_____ States and Routes for Each State: Possible Hazards for Each State: Cut products and their places into strips. Put into a bowl or hat. APPLES Salem, OR deliver to New Orleans, LA COMPUTER PARTS Los Angeles, CA deliver to Chicago, IL LOBSTERS Boston, MA deliver to Helena, MN PEANUTS

		Atlanta, GA deliver to Phoenix, AR SALMON Juneau, AK deliver to Columbus, OH BEEF Austin, TX deliver to Augusta, ME CLAMS Annapolis, MD deliver to Pierre, SD WEATHER AND HAZARD PROBLEMS FOR BOX AND DELIVER Your truck transmission needs to be replaced; you need help! A hurricane hits: major flooding on route; choose different route. You encounter an early snowstorm; snow is three feet deep; truck is stuck! The truck breaks down in the desert; you need help! The route you are on is undergoing construction; choose an alternate route. You get sick and need a day to get well. You are in an accident; you are all right, but your truck is totaled.

Measurement Units: Choose/Metric/Customary The learner will be able to choose suitable customary and metric measurement units for length (include perimeter and circumference), area, capacity, volume, weight, mass, time, and temperature.	MA 2, 3.1, 4.1	**How Much Bigger Is a Blue Whale?** Materials Needed: The book Is a Blue Whale The Biggest Thing There Is? by Robert E. Wells (Albert Whitman, 1993), rulers, tape measures Description of Activity: The purpose of this activity is to allow students to compare lengths using the book Is a Blue Whale The Biggest Thing There Is? This book gives readers a look at the size of things in the world, beginning by introducing the largest creature on earth, the blue whale, which can grow to 100 feet. The teacher will begin the activity by reading the book aloud and asking the students to estimate how many of their lengths would equal the length of a full grow blue whale - 100 feet. Usually, the students estimates range from 10 to 50. To help students revise their estimates, the teacher will have the students think about the - relationship between the teacher's height and 100 feet. He/she will ask: "If I'm 6 feet tall, how many feet would two of my lengths equal?" The teacher will then tell the students that they are going to find out how many of their heights equal the length of a blue whale. A demonstration will be provided to the students on how to measure height: attach a tape measure to the wall, then the teacher will stand with his/her back to the tape and ask a student to hold a ruler on top of his/her head. Students will then work with partners to calculate their height. Next, the teacher will ask the students to find out how many of their heights equal the length of a blue whale and then draw a picture of themselves next to a whale to show it. The class can also compare the blue whale's attributes to other measurement units, such as a weight, mass, volume, etc.

Problem Solving: Time The learner will be able to correctly use customary and invented time units to obtain problem solutions.	MA 2, 3.3	**Tracking Time** Materials Paper Pencil Activity: Track the amount of time and what you do in a 24 hour period of time. Write on your piece of paper what you do from 8am one day until 8am the next day. For instance, write down what you do in 5 or 6 categories such as Sleep, School, Play, Homework, Eat and Read. Then start putting in how much time you use for each one. After you have tracked your time for 24 hours try to make a pie graph showing how you spent your time. Which category has the most?? It might look something like this only in a circle. 45% of the time = sleep 10% of time= homework 20% of time= school 10% = eating 15% = playtime Talk to students about their chart and if it made them realize anything. Did they think they spent more time then they should doing something?? Such as watching T.V. if that was one of their categories or maybe too much time on their Nintendo game?? Display the pie graphs in the room and have the students talk about them in small groups. Discussion: How can collecting data help us? Why do you think scientists collect data? Why would it be important to collect data before releasing a new

		drug in the world? What could happen if we did not have data on drugs and their effect on people?
Problem Solving: Estimate/Measurement The learner will be able to approximate solutions to real world measurement problems, including estimates of time, temperature, and money.	MA 2, 3.1, 4.1	**New Pen at the Zoo** Purpose: As a result of this activity, students will be able to understand relationship between measures (e.g., between length, perimeter, area).
Perimeter/Area: Regular Polygons The learner will be able to solve problems regarding perimeter and area of regular polygons.	MA 2, 1.6, 1.10	Student Product: A drawing of two designs for the camel pen at the zoo. An explanation of the scale they used and a comparison of the perimeter and area of the two drawings. An answer to the question: Which pen gives the camel the most room? Material & Resources: Graph paper, straight edge, pencil Teacher's Note: The students should have previous knowledge of perimeter and area. Activity Explain to the students that they have been hired by a zoo to design the new camel pens. The zoo would like to have two different designs to choose from. The zoo already has the material for the fence; they have exactly 200 ft of fence. Each pen design must use all 200 feet of fence but the shape of the pen may vary. Have the students draw two different designs for the camel pens on graph paper. They must explain the scale they used (for example 1 cm = 1

		foot). They must also explain in writing how the two designs compare in perimeter and area. Which design gives the camel the most room?
Probability/Statistics Data Collection: Answer Questions The learner will be able to gather and organize simple data sets in order to answer questions. Data Analysis: Compare/Sets The learner will be able to compare several data sets in order to develop and test hypotheses, and use the findings to confirm or deny it. Outcomes: Predict/Events The learner will be able to use the set of possible outcomes to predict events.	MA 3, 1.2 MA 3, 3.6 MA 3, 3.1, 4.1	**Which Type Of Ball Bounces The Highest?** Materials needed: • 4 Meter sticks • 4 different kinds of balls -- golf ball, basketball, baseball, soccer ball • 3 sheets of paper per group • Calculators • Experiment Outline Objective: To have students conduct an experiment with various types of balls to determine which bounces the highest. Students will also practice skills learned in math by graphing their results of the experiment. Procedures: • TTW (the teacher will) show the students 4 different balls and ask them to identify what they are and which one they think will bounce the highest. • TTW organize the students into four groups to conduct an experiment to determine which ball bounces the highest. • TLW (the learner will) hypothesize about which ball will bounce the highest and record the information on the Experiment Outline.

		Experiment: • Each group will be given 3 sheets of paper that they will need to tape end to end. The group will tape the paper to the wall so that it is touching the ground. Then the group will draw a line across the paper 100 cm up from the floor. One student will hold the meter stick against the wall, while other students take turns dropping each ball three times from the 100 cm mark. Another student will be responsible for keeping track of how high the each ball bounces and will make a mark on the paper. Everyone will record the height of each bounce on his or her Experiment Chart. Each group will be given one ball at a time and will switch after all groups have finished recording their data. After each ball has been dropped three times and the bounce height has been recorded, each group will figure out the average bounce height of each ball (rounded to the nearest whole number) and record on the chart. Each student will create their own bar graph using the data from the chart. Each student will write a short conclusion based on what was determined during the experiment. • After students have completed the experiment and the Experiment Outline, TTW ask the students to state their hypothesis and compare it to their conclusions. Assessment/Evaluation: • TTW monitor how the students work in groups and follow directions. • TTW ask various questions during the experiment to check for understanding and promote inquiry. • TLW create a chart and graph the data collected during the experiment and turn in the Experiment Outline after the

		experiment is completed.
Data Interpretation Analyzing Graphs: Interpret/Compare The learner will be able to make interpretations of graphs, tables, scales, and charts through comparison and calculations.	MA 3, 1.2, 1.8	**How to Interpret A Bar Graph and a Double Bar Graph** Materials needed: • Chalkboard & chalk • Voting card for each student -- pink for girls, blue for boys • Bag filled with four colored squares for each student • Assignment on double bar graphs Objective: Students will be able to read and interpret bar graphs and double-bar graphs. Procedures: • TTW (The teacher will) introduce bar graphs to the students by discussing the following: • Bar graphs are used to compare different things. • Bar graphs have a title, a label for the scale (vertical axis) and a label for the data (horizontal axis). • TTW tell the students that they will be creating a class bar graph using data that will be collected. • TTW pass out a bag filled with four colored squares to each student. • TTW tell the students they should pick out their favorite color from the bag. Once students have picked out their favorite color, TTW ask

		the students to raise their hand when the teacher names the color they picked.
		
		• TTW record this information on a table on the board.
		• After all the data is collected, TTW create a bar graph with the class to show how the favorite colors in the classroom compare.
		
		• TTW ask various questions about the graph:
		
		  • What does this graph show?
		  • Which color was picked by the most students?
		
		  • Which color was picked by the least amount of students?
		
		• TTW introduce double-bar graphs to the students by telling them that double-bar graphs also compare different things. However, double-bar graphs break the data into two different categories.
		
		• TTW introduce the next activity and explain to the students that they will be creating a class double-bar graph that compares their favorite pizza toppings.
		
		• TTW pass out a voting card to each student – pink cards for girls, blue cards for boys.
		
		• TSW (The student will) circle one favorite topping and TTW collect the cards.
		
		• TTW count the votes by placing them on a graph on the board. When a pink card is picked, it will be put above the appropriate topping. When a blue card is picked, it will be put above the appropriate topping, but next to the pink card.
		
		• TTW explain to the students that they are creating a bar graph that

		not only compares the toppings that are liked by the students, but also how many boys like that topping and how many girls like that topping.
		
		• TTW ask various follow-up questions:
		
		  • According to this double-bar graph, how many boys like pepperoni?
		  • How many girls like pepperoni?
		  • How many students like mushrooms?
		
		TTW ask the students to complete an assignment analyzing double-bar graphs.