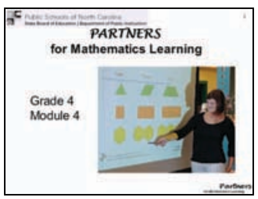
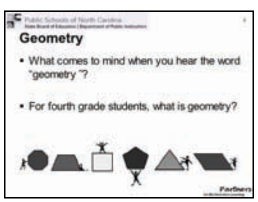
General Materials and Supplies:

large sheet of paper per group
cutout of "Transformer Says" per participant
8 sets of five Penshancies
40-50 foot piece of rope
2 yard sticks
8 sets of square tiles (50-60 per table)
Various colors of 9x12 construction paper (See Slides 10 and 20)
Set of bulletin board letters (2 of each letter per site)
rulers (at least one per group)
mirrors
1 yard string per group
box with lid
1 set of pattern blocks: 1 hexagon, 3 trapezoids, 3 triangles, and 3 parallelograms per pair
tan rhombus pattern blocks (20 per table)
2 sheets inch square paper, Handout 6, per table (one color per table, at least 3 different colors per site)
pairs of 2 or 3 large shapes, cut out and attached together with a brad
1 piece $8\frac{1}{2}$ x11 paper per participant
masking tape

Slide	Tasks/Activity	Personal Notes
	(Slide 1) **Grade 4 Module 4** Geometry: Greet participants. With the title slide open, ask participants to take 5 minutes to look through the geometry section of the Essential Standards for 4^{th} and 5^{th} grades and to look briefly back at 3^{rd} grade to see what children coming into 4^{th} grade will have been expected to learn. Note that perimeter and area may be moved from geometry to measurement but that we will cover it in this module. Then tell them to think about the process standards as you go through this module and to look for problem solving, reasoning and proof, connections to other strands, representations, and opportunities for communication.	
	(Slide 2) **Geometry** Ask the questions and have participants briefly discuss at their tables and report out. See next slide.	

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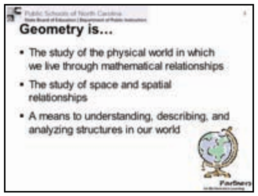
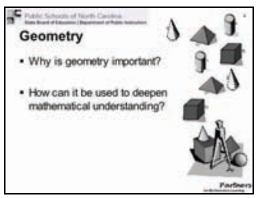
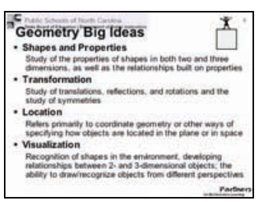
<tr><td>
</td><td>(Slide 3) Geometry is…
Quickly review the ideas on the screen. Geometry is about understanding the spatial world, considering how things look, their arrangement, location, and movement.
Geometry is NOT just naming shapes and learning formulas.</td><td></td></tr>
<tr><td>
</td><td>(Slide 4) Geometry
Ask participants to respond to the question on the slide in small groups and then share. Some possible responses include: Multiple rich experiences help develop spatial sense and a tool for understanding the world around us. It offers an aspect mathematical thinking that is different from the world of numbers and provides a spatial context in which to develop other mathematical concepts. It builds on spatial strengths to foster enthusiasm for mathematics. According to the March 2009 NCTM Bulletin, U.S. students have performed more poorly in Geometry than in number, data, and algebra over the past 2 decades when compared internationally.

Point out that geometry helps students understand other strands of mathematics. For example, arrays can be used to understand multiplication and prime, composite, and square numbers. Similarity helps with proportionality, and graphing helps reasoning about functions.</td><td></td></tr>
<tr><td>
</td><td>(Slide 5) PSSM Geometry Big Ideas
Briefly review the Big Ideas from the Principles and Standards presented on the screen. Have a volunteer read each bullet.</td><td></td></tr>
<tr><td></td><td>(Slides 6) Big Ideas in Geometry
Review Big Ideas from last year on this and the next slide quickly. Remind participants of sorting, guess my rule activities with the Van de Walle shapes last year and the work on finding the number of faces, edges, and vertices on various prisms and pyramids. Explain that we will be addressing perimeter and area in this module, as well as symmetry and transformations.</td><td></td></tr>
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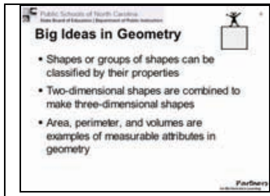
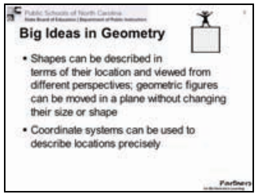
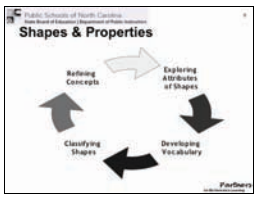
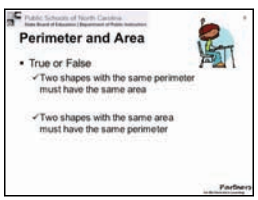
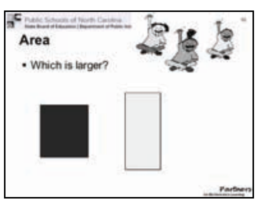
	Point of clarification from Dr. Tim Hendrix concerning attributes and properties. "… an attribute is any type of characteristic that you can use to describe an object, e.g., color, shape, size, number of sides, etc. are all attributes. Properties are commonalities that we notice about those attributes, i.e. squares all have 4 sides. Triangles all have 3 sides, Etc."	
	(Slide 7) **Big Ideas in Geometry** Review slide. Note that we will revisit transformations and symmetry this year, building on last year's work.	
	(Slide 8) **Shapes and Properties** Review the process children should experience when learning the properties of shapes. Point out vocabulary comes after exploration and should not be presented as a list to memorize.	
	(Slide 9) **Perimeter and Area** Have the participants jot down their individual answer to each of the statements on the slide and explain that we will revisit this later. Remind participants once again that perimeter and area are in measurement in the Essential Standards but that we will cover them in this module before moving to the geometry standard. Have them briefly look at the measurement Essential Standard and clarifying objectives that address perimeter and area.	
	(Slide 10) **Area** Previous to this slide, cut a piece of construction paper lengthwise and cut another widthwise. Begin by holding up one of each and ask participants which is larger, how they might prove their answer, and what they think their students will say. This is a somewhat "loaded" question and there may be some discussion about the word "larger". Don't dwell on this but possibly clarify to mean which would take more units to cover. After this brief discussion, direct participants to the handout (Which is Larger?) They are to	

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<td>decide which of each pair is larger. They may cut or fold the rectangles in any way but they must be able to explain how they decided. They may not use measurement of the sides at this point. Have participants share their results and explain how they know.

Ask why it is good to have students do this kind of activity. Activities such as this help students distinguish between shape, length and size (or area). While one object may be longer than another, it may not be larger in area. The activity focuses on the comparing area (measure of covering or the space inside a region) without units.</td>
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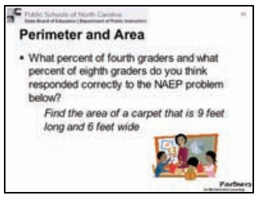
<td>
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<td>(Slide 11) Perimeter and Area
Explain that NAEP is the National Assessment of Educational Progress and is given to samples of fourth and eighth grade students across the nation. It is frequently referred to as the Nation's Report Card. Ask participants to discuss at their tables and then share their ideas with the group, giving the rationale for their estimated percent. Only 19% of fourth graders and 65 % of eighth graders were able to respond correctly. See next slide for continuation of discussion.</td>
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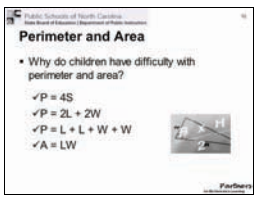
<td>
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<td>(Slide 12) Perimeter and Area
Use the slide to have groups discuss the challenges with perimeter and area, which include lack of understanding of what each is, that both are presented together and children misinterpret the relationship or lack of relationship among the two.
Instruction often begins with presenting formulas and children mix up the formulas because they do not understand the concepts. Formulas need to be developed conceptually in order for children to gain insights into the ideas and relationships. When presented with irregular shapes, children don't believe the shapes have areas because they don't have a length and width.</td>
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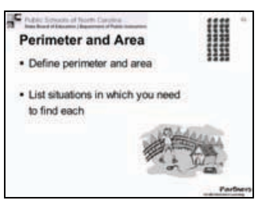
<td>
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<td>(Slide 13) Perimeter and Area
Have participants work in groups to respond to the questions.

Have the groups share their definitions first and then do a round robin with each group sharing a use of perimeter until all responses have been shared.

Repeat with applications for area.</td>
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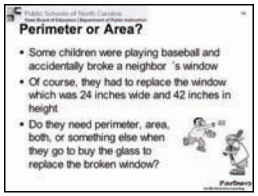
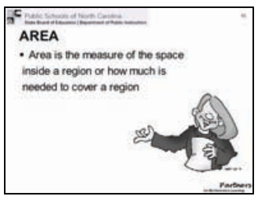
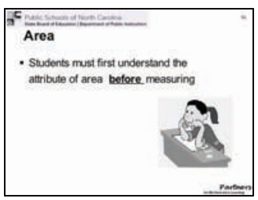
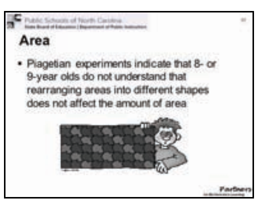
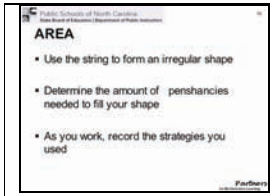
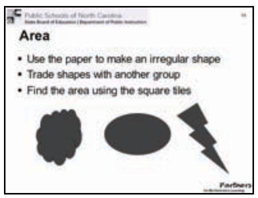
	(Slide 14) **Perimeter or Area?** Ask participants to read the problem and think about what their student will say. Children often argue for one response or another when in reality they need the dimensions of the window, not the perimeter or the area. When asking children for uses of perimeter or area this kind of response often occurs. Ask what this tells us about their thinking.	
 	(Slides 15 and 16) **Area** Review each of the points on the next 2 slides. (Credit information to John Van de Walle)	
	(Slide 17) **Area** After reviewing the information on the slide, ask participants to give an example of this kind of thinking (e.g. a child with a fixed number of pattern blocks thinks the area is larger when arranged in a "spread-out " design than when arranged in a more "compact" design).	
	(Slide 18) **Area** This is a small group activity. Distribute approximately a yard of string and one set of 5 Penshancies to each group. They are to use the string to form an irregular shape. There should be no straight sides. Explain that each group is to determine the how many Penshancies are needed to cover their shape. Make sure they understand that they must keep track of how they	



determined their answer.

Circulate as they work to find a variety of strategies. After each group has finished, call on select groups to explain how they completed the task. Discussion should address the limitation of 5 Penshancies. Some groups will iterate the Penshancies, others use the 5 Penshancies and then estimate the number of groups of five there will be in the shape, etc. Additionally the shape of the Penshancies made the task hard. Ask how this helps students understand area. (It provides a way to compare areas of different shapes without measuring, and provides conceptual understanding of what area is, not the formula to find it.) Remind participants that we are developing the concept of area as a measure of covering. The units can vary—lima beans, coins, pattern blocks, etc.



(Slide 19) **Area**
Explain that the purpose of this activity is to determine the area of an irregular shape, but this time square tiles are the unit. There is flexibility in how to approach this. Working in groups, children could be given a sheet of paper and asked to draw an irregular shape---not too large due to supply of square tiles--- or they could be given masking/painter's tape or yarn and asked to make an irregular shape on a desk or the floor.

After making their shape, groups trade shapes. Their task is to begin by making an estimate in writing of ABOUT how many square tiles will needed to cover their shape. Remind them that they may record their estimate as a range. (For example, between 20 and 25) Next they begin to cover the shape with square tiles. After covering about 1/4 of the shape, allow them to revise their estimate if they choose. However, ask them to keep a record of their first estimate and be ready to explain why they revised it. Ask them to finish the task of finding the area of their shape.

As they work, note how they address parts of the shape where the tiles do not fit completely and probe them to consider how to handle those parts. Have the groups show their shape, report their first and revised (if needed) estimate and their final results. They should also explain how they handled the areas where the square tile would not fit. Ask why it was easier to find the area using the square tiles rather than Penshancies. (More uniform and easier to piece uncovered areas into parts of the square tiles) Reiterate that the purpose of this activity is to develop area as a measure of covering and that formulas should not be introduced.

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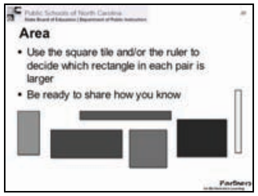
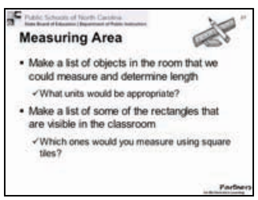
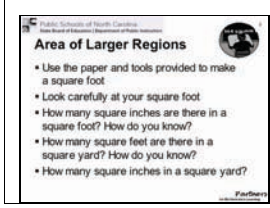
<tr><td></td><td>(Note that step-by step directions are in their handouts)</td><td></td></tr>
<tr><td>
</td><td>(Slide 20) Area
Assign pairs of rectangles with differing dimensions but close or the same in area (ex.: 4 x10 and 5 x 8, 7 x 7 and 5 x 10 and 4 x 6 and 5 x 5) to pairs of participants. If possible, use 2 different colors of paper. Next have the groups trade pairs with another group. Provide a single square tile and ruler. Explain that they are to determine which of the pair of rectangles is bigger or if they are the same in area using the square tile and/or ruler.
They should be prepared to tell how they arrived at their answer. Share the strategies used by the groups.
Ask how this activity is different from the previous two. It pushes children to connect multiplication (arrays) as a means of finding area. Ask how children might do this. Some will attempt to use the single square tile, drawing them in. Some students will use the rulers to see the number of square tiles that will fit along the length and width and make the connection to arrays. However, not all students will use a multiplicative strategy. Sharing of strategies will help these children make the connection. Note that this kind of activity is to be done after children have developed an understanding of area as a measure of covering.</td><td></td></tr>
<tr><td>
</td><td>(Slide 21) Measuring Area
Ask participants to work in groups to devise a list objects in the room that could be measured to determine the length. Discuss the common units of length (feet, yards, inches, millimeters, centimeters and meters) we could use to measure length. Next have them match the appropriate units with the objects.
Then have participants select rectangles they see in the room. Note that some areas are small and using square tiles would be appropriate. However, for some larger units are needed. Ask what square units could be used? This leads to the next activity of making square feet and square yards.
Do not dwell too long on this activity, paying attention to time.</td><td></td></tr>
<tr><td>
</td><td>(Slide 22) Area of Larger Regions
NOTE: A copy of the information below is on the handout for teachers.
Use three different colors of paper to make copies of 1" graph paper. Distribute 2 sheets of 1" graph paper of the same color, scissors, and tape to pairs of participants. Review that a square foot is one foot long on each side and that one-foot is equal to 12 inches. Direct participants to make a square foot. Ask how many square inches there are in a square foot. Note that while</td><td></td></tr>
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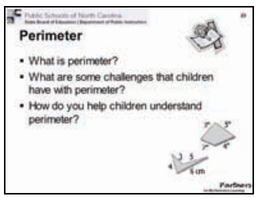
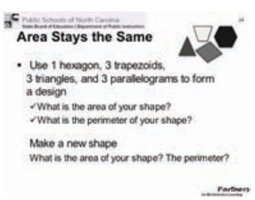
many children will readily see a 12X12 array and get 144 square inches, some may count. Next ask how many feet make a yard. Tape 2 yardsticks on the board to form the length and the width of a square yard. Have participants take turns fastening square feet to the board inside the yardsticks until a square yard is formed. (Choose a variety of colors, arranging them so that it is easy to see each of the square feet) Count to check there are 9 square feet in the square yard. Ask how many square inches there are in a square yard. Encourage participants to show different ways to figure this out. POSSIBLE ANSWERS: 9 X 144, OR 12 X 12 + 12 X 12 + 12 X 12 + 12 X 12 + 12 X 12 + 12 X 12 + 12 X 12 + 12 X 12 + 12 X 12 OR 36 X 36, etc. Record all equations. (Students could check using a calculator) The square yard model may be displayed for reference.
Note that this activity should be repeated for square units in metric system.

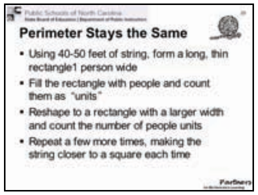
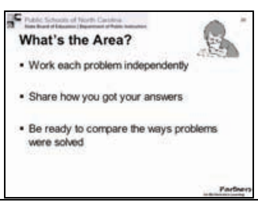


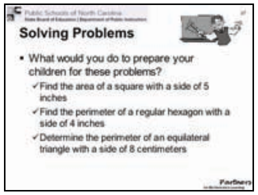
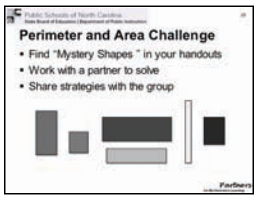
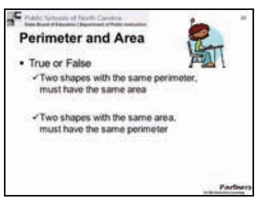
(Slide 23) **Perimeter**
Ask participants to respond to the questions on the slide. Perimeter is the distance around a region or the length of its boundary. Because it is usually presented with area, children confuse the two. Children also become confused as they count the units around a particular object, not knowing where to stop, and corners present challenges. Presenting opportunities to contrast perimeter and area will help students.

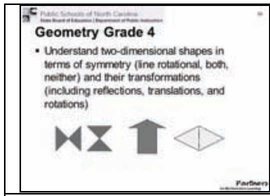


(Slide 24) **Area Stays the Same**
Note: A copy of this is in the handouts for teachers. Begin by having the participants examine the pattern blocks provided. Ask them to determine the area. The responses will depend on the unit they use. Using triangles as the unit, the area is 24.Using parallelograms it is 12 etc. Proceed through this discussion slowly. Connect this to the Compensatory Principle—the larger the unit, the fewer needed. Ask everyone to use the area as 24 triangles for simplicity. Ask participants to find the perimeter of each of the pattern blocks in units the size of a side of the triangle. Make sure they realize that the "long" side of the trapezoid is counted as 2 units.

Have the participants pair up and make a design using all the pattern blocks and record its perimeter and area. Have a volunteer show their design (overhead or doc camera or sketch on board). Have the group determine the perimeter and area. Have a few others share their designs, following same procedure. Ask participants to make a design with the smallest perimeter. Share, noting unchanged area. Then ask them to make a design with the largest perimeter, share, again noting unchanged area. Ask what they notice. (The more "compact", the design, the smaller the

	perimeter.) When the design is "stretched out", the perimeter was larger. Ask if the area changed. Conclude that the area stayed the same but the perimeter changed. If desired, paper may be provided for children to record their designs.	
	(Slide 25) **Perimeter Stays the Same** Note: A copy of this activity is in the handouts. Review the information on the slide briefly so that participants have a "big picture of what they are to do. Move to a large open area, having the participants take paper and pencil with them. Ask 4 participants to use the 40 feet of string to form a long narrow rectangle (about 1 person wide) holding the string about chest high. Note: The amount of string may need to be decreased when working with a small group of participants. Explain that participants will be the area unit. Have participants fill the rectangle and count the number of units (people) needed. Ask participants to sketch the rectangle, record the perimeter (40 feet) and the area (number of people inside). Form a new rectangle that is wider than the first, again filling it with people, counting them, sketching the rectangle, and recording the perimeter and area. Repeat a few times, each time making the rectangle closer in shape to a square. Ask participants to use their sketches to record what they learned about perimeter and area on paper. Follow with a discussion of how the perimeter remained 40 feet but the area (number of people) varied depending on the shape. Ask what they notice about the shapes and area (The closer the shapes comes to a square, the larger the area.) An alternative or additional activity: Give children about 2 feet of string and have them lay out the string, long and narrow, a bit "wider" etc. filling with square tiles.	
	(Slide 26) **What's the Area?** Refer participants to the handouts (Area of Irregular Shapes.) Have them briefly discuss the challenges these kinds of problems provide. Then have them work independently to solve the problems, share their results with a partner or in a group of three. As they work, select a few participants to share their approach. Note that having children	

	paraphrase a presented strategy, asking who used the same strategy, how two strategies were different, are good ways to encourage listening. (Model this) Ask how they might help students with these kinds of problems. Ex.) Use square tiles or graph/cm paper to make similar designs so the units of area are visible, filling in the units on the shapes, etc.	
	(Slide 27) **Solving Problems** Read the slide and have participants work in groups to respond. Then have the groups share. They may mention such things as the vocabulary (equilateral, regular), the number of sides on each given shape. Students may sketch the shape and label the sides.	
	(Slide 28) **Perimeter and Area Challenge** Direct participants to handout (Mystery Shapes) and have them work with a partner to solve the problems. Walk around the room paying attention to different strategies that might be shared. Share strategies. Stress that as children work, teachers should monitor student reasoning to guide instruction and to select who will share strategies. Discuss how this deepens student understanding of perimeter and area.	
	(Slide 29) **Perimeter and Area** Revisit this slide and have participants prove that each statement is false, using pictures, numbers, and/ or words. Discuss the relationship between perimeter and area. Dimensions are used to determine both. Perimeter is measured in units of length, which is one-dimensional. Area of a shape is how much surface or space it takes up. It needs to be measured in two dimensions, not just length.	
	(Slide 30) **Geometry Grade 4** Remind participants that in the Essential Standards perimeter and area are now in measurement. Read the slide to introduce the two topics, Symmetry and Transformations. Explain that we will begin by looking at transformations and will then move to symmetry.	

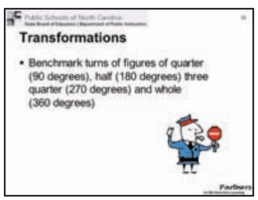


Note: have participants look at the Essential Standards to determine which transformations and symmetries appear in fourth grade.

(Slide 31) **Transformations**
Tell participants that students in grade 4 are expected to work with reflections, translations and rotations. Use the slide questions to introduce transformations. In elementary school we generally define transformations as movements on a plane that do not change the size or shape of the object moved. This is true of the 3 transformations usually studied: reflections, translations, and rotations. However, these are rigid transformations.

Later students will study dilations, which are transformations that will reduce or enlarge a shape. It is best to explain to children that the three transformations they will study do not change the size and shape of the object moved but that there are other transformations that do.

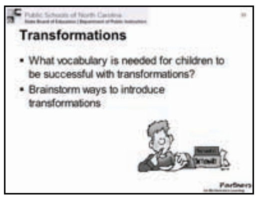
The vocabulary and visualizing the movements can present challenges. Children need multiple experiences with this.



(Slide 32) **Transformations**
Note that the understanding of degrees as a unit of turning needs to be developed. Benchmarks of rotations of a quarter (90 degrees), half (180 degrees), three quarter (270 degrees), and whole (360 degrees) turn as well as the terms clockwise and counterclockwise rotation may need to be addressed. Ask participants how they might develop these.

One kinesthetic activity is to have the class stand and play "Simon Says" using these as directions. Model this by having the group stand and face the front. Quickly call out directions for rotations such as:
Simon says, "Rotate clockwise 90 degrees".
Simon says, "Rotate 180 degrees counterclockwise."
Simon says, "Rotate 270 degrees counterclockwise."
Simon says, "Rotate 360 degrees clockwise."
Simon says, "Rotate 90 degrees clockwise."

Additionally, children could work in groups to write rotation directions and have a group member perform the rotations. Their classmates would then have to identify each move. Quickly model another possibility by having 2 participants come to the front, one facing the group, and another with his back to the group. Ask questions such as, "In order for person A to be positioned like person B, what is 1 turn that will cause this to occur? (A 180 degree turn either clockwise or counter clockwise). What are 2 directions that might cause this to occur? (90 degrees clockwise/counterclockwise then another 90 degrees clockwise/counterclockwise) Who can tell me other directions to have this occur? (360/90,etc) Positioning the 2 participants in different ways will lead to additional kinds turns.



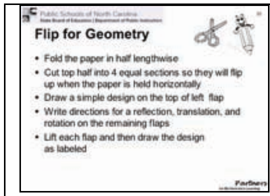
(Slide 33) **Transformations**
Have participants work in groups to generate a list of the vocabulary children may encounter as they work with transformations. (Translations, reflections, rotations, horizontal, vertical, clockwise, quarter and half turns, etc)

Ways to introduce the terms may include overhead modeling, having children use their bodies to show the transformation, playing "What Did I Do? (Show a shape, secretly make a change, partner guesses the change), etc. (Next slide models "Transformer Says").

(Slide 34) **Transformer Says…**
Distribute the prepared shapes (handout Transformer says…) and ask participants to mark the center point.
Begin by calling out a direction such as "Transformer says, "Translate the figure 2 inches to the left". Then Transformer says, " Rotate the shape clockwise a quarter turn (90 degrees)." Then Transformer says, " Reflect the shape to the left over a vertical line of reflection." Note the importance of modeling correct vocabulary.

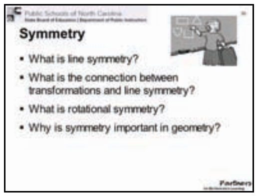
Allow participants to work in groups to practice this, taking turns giving the directions.

(Slide 35) **Flip for Geometry**
Model how to make a "Geometry Flip." Have each participant make one, having a partner test it. Ask what needs to be done prior to this activity. (Practice understanding what each transformation is. In addition, accompanying vocabulary needs to be modeled. For example, rotations may be described in terms of degrees such as rotate 90 degrees or by using ¼, ½, or ¾



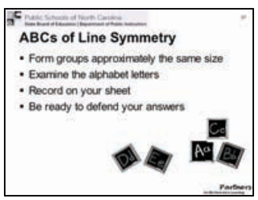
turns terminology.) Discuss the benefits of students making these as opposed to the teacher making them.

Ask for ways to make this more challenging. (The top could be cut into 5 or 6 equal flaps rather than 4 for additional challenge. Students could also predict what every other or the last image will look like without looking under any flaps.)



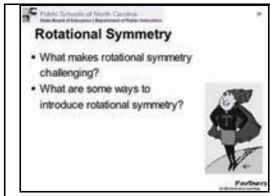
(Slide 36) **Symmetry**
Ask participants to respond to the first 2 slide questions. If a shape can be folded on a line in such a way that the two halves match then it has line symmetry. (Also known as reflective symmetry)

Next address the last 2 questions. A figure has rotational or point symmetry if it can be rotated less than 360 degrees (a full turn) about a fixed point and the image matches the original figure. Line and rotational symmetry are important because when we consider them, we are examining the attributes of the shape. Classifying and comparing shapes by these attributes helps move students through the van Hiele hierarchy. (*Math Matters*)



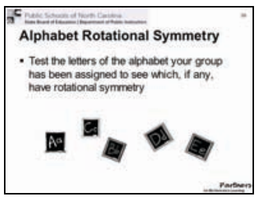
(Slide 37) **The ABCs of Line Symmetry**
Divide bulletin board capital letters randomly into piles of 4 or 5 and spread them out in different areas of the room to make stations. Place mirrors at each station. Direct participants to handout labeled "Alphabet Symmetry". Have participants form groups of approximately the same size. (Modify # of groups as the number of participants dictates) The groups will then rotate from the letter stations and complete the handout. (Note: An answer key is provided in the handouts.) After participants have finished, ask each group to tell the number of letters they have for the varied number of lines of symmetry. Discuss disagreements in number and the correct responses, frequently asking for proof of the number of lines of symmetry for letters. (Credit this to NCTM's Navigating through Geometry.)
Alternate: The handouts contain a paper copy of the alphabet that may be used for student to record the lines of symmetry or in place of the actual letters at stations)

(Slide 38) **Rotational Symmetry**
Read the slide and ask each participant group to discuss and then share ideas with the whole group.



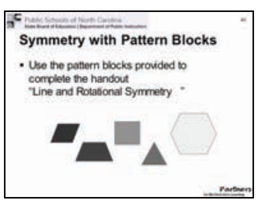
Rotational symmetry has 2 considerations. In the first, a rotation transforms a figure by changing its orientation. For example, a dancer makes a rotation of 180 degrees on the dance floor or a skateboarder performs a 360.

For the second consideration rotational symmetry is an attribute of shapes and figures. We can use this attribute to analyze and classify them. Figures or shapes may be rotated any number of degrees about a given point. While figures can be rotated about any specific point either inside or outside the figure, in elementary schools we generally use only rotation points that are located in the center of the figure (Giving kids rectangular boxes with lids and turning the lid to see where it will fit the box, making 2 copies of the same figure, fasten together with a brad and turn one to see where it lands on itself; tracing shapes on paper and turning etc. When doing these with kids be sure and demonstrate going clockwise or counterclockwise doesn't affect the outcome.)



(Slide 39) **Alphabet Rotational Symmetry**
Ask participants to consider the capital letter H. (hold it up) Ask if it has rotational symmetry. It will rotate back onto itself with only a half turn (180 degrees). Therefore it has rotational symmetry. Randomly distribute the letters of the alphabet used earlier and have participant groups decide if each of their letters has rotational symmetry. Have them share their findings with the group.

Next address the confusion that occurs when counting the number of turns. If a figure only rotates back on itself at 360 degrees, it does not have rotational symmetry because all shapes will come back on themselves at 360 degrees. (For example, a right triangle) However, a square rotates back on itself at 90 degrees, 180 degrees, 270 degrees and 360 degrees. When counting the number of times this happens, the fourth—360 degrees—is counted.



(Slide 40) **Symmetry with Pattern Blocks**
Direct participants to the handout. Model how to proceed using the hexagon. To expand teacher knowledge, explain that since the hexagon rotates back on itself 6 equal sized turns, it is said to have sixfold rotation. Note that the size of each turn is 60 degrees…360 divided by 6.

Have them complete the handout and then discuss. During the discussion, it is important that the participants note that 5 of the pattern blocks have rotational symmetry. (The poor trapezoid is once again the odd man out!) These five are regular. (Congruent sides and congruent angles) If

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<td>the shape is regular, the number of times it can rotate about its center back onto itself is equal to the number of sides.

Below are some questions you may want to use to guide the discussion.
What do you notice about the five pattern blocks that have rotational symmetry?
What is different about the pattern block that does not have rotational symmetry?
Which pattern blocks have twofold rotational symmetry? (Blue and tan rhombi)
Is there a connection between lines of symmetry and rotational symmetry?
How many lines of symmetry would a regular octagon have? How many turns of rotational symmetry?</td>
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<td>(Slide 41) Design a Logo
Assign one logo in the list to each group and have them present their logo to the group, demonstrating the symmetry assigned. Explain that children could design logos to represent their table group and/or be assigned to find examples of logos with and without line symmetry, rotational symmetry, both, neither, etc. (Example those found on cars like Toyota, Chrysler, etc.)</td>
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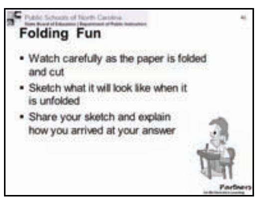
<td>
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<td>(Slide 42) Folding Fun
Use the activity in the handouts (Folding Fun) to lead participants through this activity. Be sure to have them explore and answer questions. You may chose to do a simple example like the one given, discuss, and then do a more complex one. Then have the participants read the handout and respond to it in small group discussion.</td>
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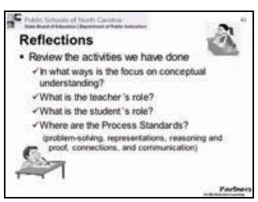
<td>
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<td>(Slide 43) Reflections
Assign one of the following activities to each group.
Slide 18 (Penshancies)
Slide 19 (Area of an irregular shape using square tiles)
Slide 20 (Which is larger)
Slide 35 (Geometry Flip)
Slide 40 (Pattern Block Symmetry)
Slide 41 (Logo design)
Slide 42 (Folding Fun)</td>
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	They are to review the activity and be prepared to discuss their responses to the questions about the activity. Participants should recognize the richness of the activities– the use of the Process Standards to develop an understanding of the math. Hopefully they will also note the shift away from the teacher's role as a "sage on the stage" to more of a "guide on the side" with the children developing their own understandings as they do the activities.	
	(Slide 44-47) **Closing and credit slides**	