

Equations with Symbols from Star Quilts

Subject: Mathematics
Strand: Patterns and Relations

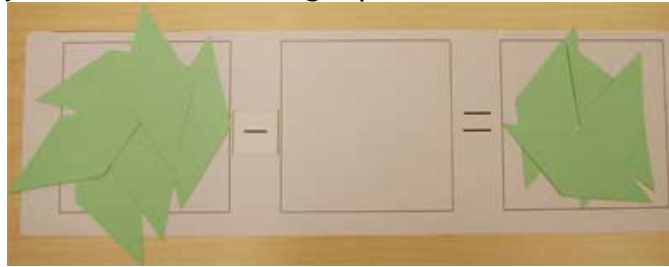
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Grade: 4

Content (topic)	
Exploring one-step equations with variables	
<p>Outcomes</p> <p>P 4.2: Demonstrate an understanding of equations involving symbols to represent an unknown value by:</p> <ul style="list-style-type: none"> • Writing an equation to represent a problem solving one-step equation • Solving one-step equation 	<p>Indicators</p> <p>P 4.2c: Identify the unknown in a story problem, represent the problem with an equation, and solve the problem concretely, pictorially, or symbolically.</p> <p>P 4.2e: Solve a one-step equation using manipulatives.</p> <p>P 4.2g: Explain what is meant by “one-step equations with one unknown.”</p> <p>P 4.2h: Represent and solve an addition or subtraction problem involving a “part-part-whole” or comparison context using a symbol to represent the unknown.</p>
<p>Mathematical Processes</p> <ul style="list-style-type: none"> • Communication • Connections • Problem Solving • Reasoning 	
<p>Lesson Preparation</p> <p>Equipment/materials:</p> <ul style="list-style-type: none"> • A variety of small diamond shape cutouts in various colors. See N 4.7 star quilt • An equation template from Appendix 1 for each group of four students. • One plus sign and one minus sign for each group of four students. <p>Advanced Preparation:</p> <ul style="list-style-type: none"> • Print the pdf version of Appendix 1 on 8.5 x 14 paper and cut along the line to produce two templates. • Print the pdf page on 8.5 x 11 paper and cut along the lines. 	
<p>Presentation</p> <p>Set</p> <ul style="list-style-type: none"> • Tell the students that the star is meaningful to Lakota people, as stars 	

are seen in the Lakota culture as a traditional symbol and central to many celebrations and ceremonies. The Star quilt is known and respected as a powerful symbol, binding the community together and strengthening ties between generations.

Development

- Split the students up in groups of four. Each group will receive a variety of small diamond shaped cutouts, a copy of the equation template from Appendix 1, as well as a plus sign and a minus sign.
- In each group of four students, have two students work together to create an equation using the diamonds, the template, a plus or minus sign, and an empty square to signify the unknown. For example, a group of two may create the following equation:



- The other team of two students must write the equation down in their notebooks, using a symbol such as a triangle or circle and solve the equation. In this case, if a triangle is used for the variable, the equation is $6 - \Delta = 4$.
- Have the teams reverse roles and create another equation.
- Design questions that use the diamonds where students can set up equations using variables in order to describe situations that require equations. See Appendix 2.
- Have each group of four students work together to represent the problem with an equation, and solve it using the diamonds and symbolically.

Appendix 1
Equation Template

$$\square = \square$$

$$\square = \square$$

$$\square = \square$$

Appendix 2

Sample Questions

1. Mary needs 15 light blue diamonds for her design. She has cut out 8 light blue diamonds. How many more does she need to cut out? Write an equation to represent this problem. (Answer: $8 + \Delta = 15$)
2. Bob cut out 12 green diamonds and gave some to Jack. Bob counted the green diamonds he has left and got 5. How many did he give to Jack? Write an equation to represent this problem. (Answer: $12 - \Delta = 5$)
3. Alison needs 10 yellow diamonds to finish her design on the quilt. She has 2 yellow diamonds. How many more diamonds will she need to cut out? Write an equation to represent this problem.
4. Jake cut out 20 black diamonds, however during recess, 7 diamonds fell off his desk. How many diamonds does Jack have left?
5. Amy needs 45 diamonds in total; she has 12 red diamonds, 13 blue diamonds, 3 black diamonds and 4 yellow diamonds. How many diamonds does Paige need to reach 45?
6. Katherine forgot to keep count when she was cutting out her diamonds. She only needed 23 diamonds in total. However, she cut out 4 purple diamonds, 12 black diamonds, and 12 yellow diamonds. How many extra diamonds did Katherine cut out? She this as an equation.

7. Lidia needed 16 purple diamonds to finish her design. She had cut 10 purple diamonds. How many more does she need to cut out? Write an equation to represent this problem.