

GRADE 8
PERFORMANCE ASSESSMENT

MATHEMATICS

Student Booklet

Task Title: **Give Me A Break!**

Student's Name: _____

GRADE 8 - PERFORMANCE ASSESSMENT

MATHEMATICS

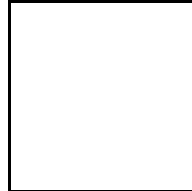
TASK: Give Me A Break!

MATERIALS:

Calculator Straight Edge

PROBLEM:

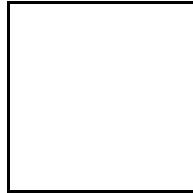
Your best friend has just broken a leg while snowboarding and will be spending the next 3 months in a wheelchair. You have offered to build a ramp to your friend's front door to give easy access to the home. Your reward for designing and building a useable ramp will be unlimited use of your friend's top-of-the-line snowboard for the rest of the winter. After investigating a few wheelchair ramps around town, you have collected the following information. The ramp at the police station has a maximum height of 6 inches and starts 12 feet from the building's foundation. The public library's ramp has a maximum height of 8 inches and starts 16 feet from the foundation. A side view of each ramp is pictured below.



INSTRUCTIONS:

1. For each of the given ramps, describe the ratio of the height to the base of the triangle formed by the side view of each ramp. Use words, pictures, and/or diagrams to explain in detail how you found your answer.

2. You know that the distance from the ground to your friend's front doorstep is 9 inches. In order for your friend's ramp to show the same ratio of height to base as the two public buildings' ramps, how far from the house's foundation will the ramp extend? Use words, numbers, and/or diagrams to explain in detail how you found your answer.



GRADE 8
PERFORMANCE ASSESSMENT

MATHEMATICS

Teacher Booklet

Task Title: **Give Me A Break!**

GRADE 8 - PERFORMANCE ASSESSMENT

MATHEMATICS

TASK: Give Me A Break!

CURRICULUM STANDARD ASSESSED:

Number Sense - Understand and apply the concepts of ratio and proportion

ASSESSMENT PROTOCOL:

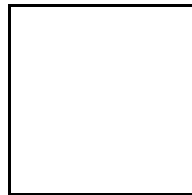
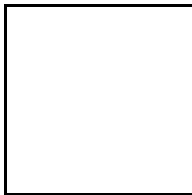
1. Students will read the directions then use the student booklet to write up their solution.
2. All materials listed below should be made available for student use.

MATERIALS:

Calculator Straight Edge

PROBLEM:

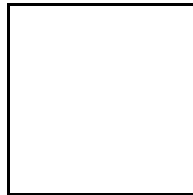
Your best friend has just broken a leg while snowboarding and will be spending the next 3 months in a wheelchair. You have offered to build a ramp to your friend's front door to give easy access to the home. Your reward for designing and building a useable ramp will be unlimited use of your friend's top-of-the-line snowboard for the rest of the winter. After investigating a few wheelchair ramps around town, you have collected the following information. The ramp at the police station has a maximum height of 6 inches and starts 12 feet from the building's foundation. The public library's ramp has a maximum height of 8 inches and starts 16 feet from the foundation. A side view of each ramp is pictured below.



INSTRUCTIONS:

1. For each of the given ramps, describe the ratio of the height to the base of the triangle formed by the side view of each ramp. Use words, pictures, and/or diagrams to explain in detail how you found your answer.

2. You know that the distance from the ground to your friend's front doorstep is 9 inches. In order for your friend's ramp to show the same ratio of height to base as the two public buildings' ramps, how far from the house's foundation will the ramp extend? Use words, numbers, and/or diagrams to explain in detail how you found your answer.



GRADE 8 PERFORMANCE ASSESSMENT

MATHEMATICS

Anchor Paper Commentaries

Task Title: **Give Me A Break!**

GRADE 8 - PERFORMANCE ASSESSMENT

MATHEMATICS

TASK: Give Me a Break!

ANCHOR PAPER 4

Problem Solving:

- 4 This student analyzed and used the necessary information. The student demonstrated an understanding of the concept of ratio by expressing the ratio in both the colon form (6":12') and fraction form (height = length/2). The student realized that the height and length were given in different units, but seemed to forget that fact in question #1's explanation about laying the height down on the length. The student's strategy of creating the formula height = length/2 was an efficient solution method for completing this task.

Communication:

- 3 This student demonstrated understanding of the concept of ratio in a clear and organized manner. The student's use of words, diagrams, formulas, and numbers was appropriate to the task. The student's use of unit labels helped clarify the solution steps.

ANCHOR PAPER 3

Problem Solving:

- 3 This student used all the applicable information to correctly describe the ratio in words. However, unit labels were omitted in the numeric representation of the ratio, making it inaccurate.

Communication:

- 4 This student clearly stated the solution in a manner that showed a good understanding of the situation. The verbal explanations were very clear and the use of diagrams was very effective.

ANCHOR PAPER 2

Problem Solving:

- 2 This student analyzed and used the necessary information. The student's strategy of using fractions and proportions is workable; however, the omission of unit labels in both the numeric and verbal representations makes the solution inaccurate. The ratio is 1":2', not 1:2.

Communication:

- 3 This student demonstrated understanding of the concept of ratio by using fractions, proportions, and words to explain the solution. The manner of presentation was clear and systematic, despite the omission of unit labels.

ANCHOR PAPER 1

Problem Solving:

- 1 This student attempted to make sense of the given information and correctly determined the ratio of height to base for the police station ramp (1:24). However, the student did not correctly use that same strategy for the public library ramp. The student gave the correct response of 18 feet for the base length in question #2, but that response did not follow logically from the accompanying verbal explanation which is based on a ratio of 1:32.

Communication:

- 1 This student's explanation was difficult to understand. There were no calculations or verbal explanations showing how the ratios were determined. Without that information, the solution seemed disorganized.

GRADE 8
PERFORMANCE ASSESSMENT

MATHEMATICS

Student Booklet

Task Title: **That's a Lot of Hats!**

Student's Name: _____

GRADE 8 - PERFORMANCE ASSESSMENT

MATHEMATICS

TASK: That's a Lot of Hats!

MATERIALS:

Straight Edge

Calculator

Graph Paper

PROBLEM:

You are part of a committee that is trying to raise money so that your class can go on a trip to see a Seattle Mariners game. Your principal tells the committee that it will cost \$1200 for your class to go. The committee decides that they are going to sell hats for \$15 a piece to raise the money. The committee contacts a local company to make the hats. The company charges a \$200 equipment set up fee, plus \$5 per hat.

INSTRUCTIONS:

Describe in detail how the committee will figure out how many hats they need to buy and sell to make enough money for the trip. Use words, pictures, and/or diagrams to explain how you found your answer.

GRADE 8
PERFORMANCE ASSESSMENT

MATHEMATICS

Teacher Booklet

Task Title: **That's a Lot of Hats!**

GRADE 8 - PERFORMANCE ASSESSMENT

MATHEMATICS

TASK: That's a Lot of Hats!

CURRICULUM STANDARD ASSESSED:

Number Sense - Understand and apply concepts and procedures (number and numeration, computation)

Mathematical Reasoning - Analyze information

ASSESSMENT PROTOCOL:

1. Students will read the directions then use the student booklet to write up their solution.
2. All materials listed below should be made available for student use.

MATERIALS:

Straight Edge
Calculator
Graph Paper

PROBLEM:

You are part of a committee that is trying to raise money so that your class can go on a trip to see a Seattle Mariners game. Your principal tells the committee that it will cost \$1200 for your class to go. The committee decides that they are going to sell hats for \$15 a piece to raise the money. The committee contacts a local company to make the hats. The company charges a \$200 equipment set up fee, plus \$5 per hat.

INSTRUCTIONS:

Describe in detail how the committee will figure out how many hats they need to buy and sell to make enough money for the trip. Use words, pictures, and/or diagrams to explain how you found your answer.

GRADE 8
PERFORMANCE ASSESSMENT

MATHEMATICS

Anchor Paper Commentaries

Task Title: **That's a Lot of Hats!**

GRADE 8 - PERFORMANCE ASSESSMENT

MATHEMATICS

TASK: That's a Lot of Hats!

ANCHOR PAPER 4A

Problem Solving:

- 4 This student analyzed and used the necessary information. The student calculated the total costs for the trip and company charges, determined the profit per hat, and then used that information to calculate the total number of hats that needed to be sold. The use of an algebraic equation shows a high level of understanding. The student validated the answer by working backwards.

Communication:

- 4 This student clearly described in words how the profit and total costs were determined and then organized the information and calculations into table format. In the algebraic equation, the variable was clearly defined and all solution steps were shown.

ANCHOR PAPER 4B

Problem Solving:

- 4 This student analyzed and used the necessary information. The student calculated the total costs for the trip and company charges, determined the profit per hat, and then used that information to calculate the total number of hats that needed to be sold.

Communication:

- 4 This student clearly described in words how the profit and total costs were determined and then organized the calculations in a labeled, step-by-step format. The student showed a good understanding of the problem situation by addressing the issue of possibly selling more than the required number of hats.

ANCHOR PAPER 3A

Problem Solving:

- 3 This student used all the applicable information to correctly calculate the profit per hat, total cost of trip including the hat set up fee, and the number of hats required to earn the total. The student showed an understanding of the problem by clearly stating the answer in words.

Communication:

- 3 This student labeled calculations clearly and arranged them in an organized manner. The student clearly stated the solution in a manner that showed a good understanding of the situation.

ANCHOR PAPER 3B

Problem Solving:

- 3 This student used all the applicable information to correctly calculate the profit per hat, number of hats needed to pay the set up fee, and number of hats needed to earn the trip cost. The student added the 120 hats and 20 hats to determine the total number of hats, although that calculation was not shown.

Communication:

- 3 This student clearly described in words how the profit, total costs, and total number of hats were determined. The student clearly labeled and circled the answer.

ANCHOR PAPER 2A

Problem Solving:

- 2 This student analyzed and used the necessary information. The student determined the profit per hat, number of hats needed to earn the trip cost, and number of hats needed to pay the set up fee. However, the student did not combine the two hat numbers to determine the total number of hats that needed to be sold.

Communication:

- 2 This student explained the process of calculating some of the values needed to solve the problem. The explanation is slightly difficult to follow as the solution steps are not presented in a sequential order. The total number of hats required is not mentioned in the explanation.

ANCHOR PAPER 2B

Problem Solving:

- 2 This student analyzed and used the necessary information. The student understood that the total cost, including company fees and trip cost, needed to be determined. The student divided that total by the cost of one hat. However, the student's strategy contained flaws, such as neglecting to address the \$10 profit per hat.

Communication:

- 2 This student clearly communicated the strategy used; however, the numeric expression does not correspond with the written explanation.

ANCHOR PAPER 1

Problem Solving:

- 1 This student attempted to make sense of the given information and correctly determined that the total cost was \$1400. However, the student did not follow a workable strategy in determining the total number of hats.

Communication:

- 1 This student's explanation is difficult to understand. For example, no verbal or computational explanation is given to justify using 700 for the number of hats.

GRADE 8
PERFORMANCE ASSESSMENT

MATHEMATICS

Student Booklet

Task Title: **Party On!**

Student's Name: _____

GRADE 8 - PERFORMANCE ASSESSMENT

MATHEMATICS

TASK: Party On!

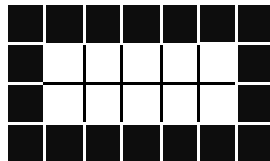
MATERIALS:

- Calculator
- Straight edge
- Black and white tiles (optional)

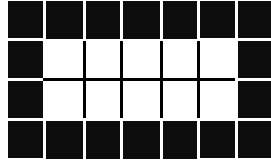
PROBLEM:

Your parents are planning to build an in-the-ground hot tub in your backyard. They have decided to have you practice your algebra skills by letting you help with the design process. If you complete the required tasks successfully, your reward will be a weekly hot tub party for you and five friends. The hot tub will be rectangular in shape and lined with square tiles with side length of one foot. Your parents would like the bottom of the hot tub to consist of white tiles surrounded by a border of black tiles. (See diagram below.)

Hot Tub Floor
(4 feet by 7 feet)



Hot Tub Floor
(4 feet by 7 feet)



INSTRUCTIONS:

1. Without counting each tile individually, determine how many black tiles your parents need for the 4-foot by 7-foot hot tub floor pictured above. Use mathematical operations such as, addition, subtraction, multiplication, or division. Use words, numbers, pictures, and/or diagrams to explain in detail how you found your answer. If you use the paper tiles provided, be sure to sketch and label your tile arrangements.

2. Sometime in the near future, your parents plan to increase the length of the hot tub so that they can use it for swimming laps. The width will remain at 4 feet. They are not yet sure what the new length will be, but they want you to come up with a rule, or mathematical expression, for determining the total number of black border tiles. Once they decide on the new length, they should be able to enter that value into your mathematical expression to quickly calculate the total number of black border tiles in the enlarged hot tub. Use words, pictures, and/or diagrams to explain in detail how you found your rule (mathematical expression). If you use the tiles provided, be sure to sketch your tile arrangements.

3. If your parents decide to extend the hot tub to a length of 40 feet, how many black tiles will be in the border? Substitute the number 40 for the variable in your rule (mathematical expression) from question 2 and then calculate your answer. Show your work in the space below.

GRADE 8
PERFORMANCE ASSESSMENT

MATHEMATICS

Teacher Booklet

Task Title: **Party On!**

GRADE 8 - PERFORMANCE ASSESSMENT

MATHEMATICS

TASK: Party On!

CURRICULUM STANDARD ASSESSED:

Algebraic Sense –

- Recognize, create, extend, and generalize patterns
- Understand, develop, and express rules describing patterns

ASSESSMENT PROTOCOL:

1. Students will read the directions then use the student booklet to write up their solution.
2. All materials listed below should be made available for student use.

MATERIALS:

Calculator

Straight edge

Black and white tiles (optional)

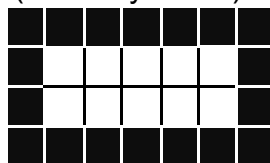
(Make 1" x 1" construction paper, tag board, or plastic squares. Cut out squares from sheet provided if the previous options are not available.)

Suggestion: Place approximately 32 black and 24 white tiles in a small plastic bag. If materials will be displayed in a visible location in the room during testing rather than distributed to each student, provide about half as many tile-filled bags as number of students (more if the class consists of a larger percentage of hands-on learners).

PROBLEM:

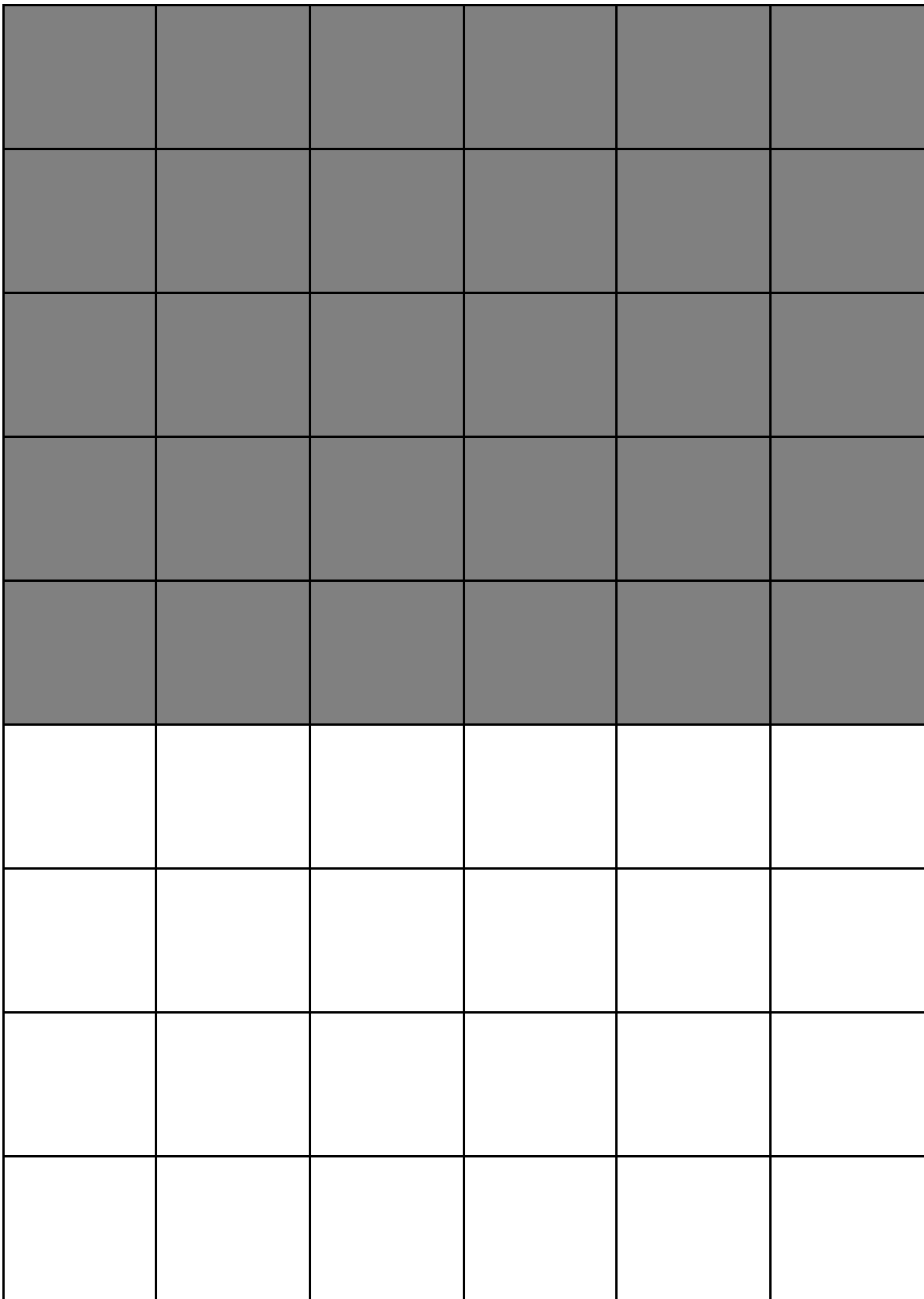
Your parents are planning to build an in-the-ground hot tub in your backyard. They have decided to have you practice your algebra skills by letting you help with the design process. If you complete the required tasks successfully, your reward will be a weekly hot tub party for you and five friends. The hot tub will be rectangular in shape and lined with square tiles with side length of one foot. Your parents would like the bottom of the hot tub to consist of white tiles surrounded by a border of black tiles. (See diagram below.)

Hot Tub Floor
(4 feet by 7 feet)



INSTRUCTIONS:

1. Without counting each tile individually, determine how many black tiles your parents need for the 4-foot by 7-foot hot tub floor pictured above. Use mathematical operations such as, addition, subtraction, multiplication, or division. Use words, numbers, pictures, and/or diagrams to explain in detail how you found your answer. If you use the paper tiles provided, be sure to sketch and label your tile arrangements.
2. Sometime in the near future, your parents plan to increase the length of the hot tub so that they can use it for swimming laps. The width will remain at 4 feet. They are not yet sure what the new length will be, but they want you to come up with a rule, or mathematical expression, for determining the total number of black border tiles. Once they decide on the new length, they should be able to enter that value into your mathematical expression to quickly calculate the total number of black border tiles in the enlarged hot tub. Use words, pictures, and/or diagrams to explain in detail how you found your rule (mathematical expression). If you use the tiles provided, be sure to sketch your tile arrangements.
3. If your parents decide to extend the hot tub to a length of 40 feet, how many black tiles will be in the border? Substitute the number 40 for the variable in your rule (mathematical expression) from question 2 and then calculate your answer. Show your work in the space below.



GRADE 8
PERFORMANCE ASSESSMENT

MATHEMATICS

Anchor Paper Commentaries

Task Title: **Party On!**

GRADE 8 - PERFORMANCE ASSESSMENT

MATHEMATICS

TASK: Party On!

ANCHOR PAPER 4A

Problem Solving:

- 4 This student thoroughly investigated the situation presented in question #1 and constructed an efficient strategy that incorporated the relationship between number of border tiles and perimeter. In answering question #2, the student first extended the relationship from question #1 by applying it to a 4-foot by 8-foot hot tub. The student then generalized the relationship by coming up with a correct mathematical expression. A verbal description helped clarify the expression.

Communication:

- 4 This student clearly described the solution strategy in a variety of modes. The combination of diagrams, words, numbers, and algebraic expressions was organized in a very systematic manner. Diagrams were neat and clearly labeled, as were the calculation steps in question #3.

ANCHOR PAPER 4B

Problem Solving:

- 4 This student thoroughly investigated the situation presented in question #1 and constructed a strategy based on the concept of area. In answering question #2, the student generalized that strategy by writing an algebraic expression. This expression showed that subtracting the number of white tiles from the total number of floor tiles resulted in the number of black border tiles. Even though the student's algebraic expression was not in simplest form, it was still an acceptable way of expressing the pattern's rule.

Communication:

- 3 This student clearly described the solution strategy in words. A diagram would have helped clarify the verbal explanation for question #1. The first half of the answer to question #2 showed that the student discovered a relationship between number of black tiles and number of white tiles. However, the answer to question #2 was somewhat confusing since, contrary to the statement directly below the diagram, the student did not base the algebraic expression on that information.

ANCHOR PAPER 4C

Problem Solving:

- 4 This student thoroughly investigated the situation presented in question #1 and constructed a workable strategy. The student used a second strategy to come up with an equation for question #2 and then verified its correctness by using the 4-foot by 7-foot hot tub. A verbal description and two additional examples helped clarify the equation.

Communication:

- 4 This student clearly described the solution strategy in a variety of modes. The combination of diagrams, words, numbers, and mathematical expressions was organized in a systematic manner. Diagrams were neat and clearly labeled.

ANCHOR PAPER 3A

Problem Solving:

- 3 This student investigated the situation presented in question #1 and constructed a workable strategy. The student used that strategy to construct a verbal rule but did not translate that rule into a mathematical expression. The verbal explanations and mathematical calculations showed that the student had at least a basic understanding of the problem.

Communication:

- 2 This student used words and mathematical calculations in a manner appropriate to the task. The solution presentation showed a basic understanding of the situation; diagrams and detailed verbal explanations would have enhanced the solution. The student should have written the answer to question #1 at the end of the verbal explanation; it was barely noticeable written next to the original diagram.

ANCHOR PAPER 3B

Problem Solving:

- 3 This student investigated the situation presented in question #1 and constructed a strategy based on the concept of area. The verbal explanation for question #1 and the mathematical calculations showed that the student understood the problem. Step #2 of question #2's solution indicated that the student realized that width had a constant value in this problem. However, the student used the variable w in the algebraic expression in place of the constant value 4.

Communication:

- 4 This student used words, an example, and mathematical calculations to present the solution. The student presented the solution in a manner that showed an understanding of the situation.

ANCHOR PAPER 2A

Problem Solving:

- 2 This student thoroughly investigated the situations presented in questions numbers 1 and 3 and found workable strategies for those parts of the problem. However, the student misunderstood question #2 and attempted (unsuccessfully) to come up with an equation for calculating additional, rather than total, number of black border tiles.

Communication:

- 2 This student explained the strategy for question #1 using a combination of words, numbers, and a diagram. The student's explanation for question #2 was very sparse – a more thorough presentation (diagrams, more words, etc.) might have helped the student realize that the question had been misinterpreted.

ANCHOR PAPER 2B

Problem Solving:

- 2 This student found a workable strategy for answering question numbers 1 and 3. However, the student was unable to generalize that strategy to come up with a mathematical expression for question #2. Instead, the student investigated the use of ratios, not realizing that, since the width remained constant, the hot tub dimensions were not being enlarged proportionally.

Communication:

- 2 This student relied very heavily on mathematical calculations to present the problem solutions. The lack of verbal explanations made the student's work in all three sections of the problem difficult to understand. The solution to question #3 contained some calculations and some answers that apparently did not contribute to the final answer, but the student did not clearly indicate which parts of that solution were correct.

ANCHOR PAPER 1A

Problem Solving:

- 1 This student calculated the area of the hot tub floor for each section of the problem. The only explanation given was for question #2, but that did not indicate the reason for the incorrect answers. The student might have misunderstood the problem and thought the task was to determine total number of tiles. Another possibility is that the student did think that multiplying the length and width resulted in number of black border tiles.

Communication:

- 1 This student gave only final answers for question numbers 1 and 3 even though the problem directions specifically asked for solution explanations. The student explained the mathematical expression for question #2 but too briefly to indicate reasons for the student's strategy choice.

ANCHOR PAPER 1B

Problem Solving:

- 1 This student investigated the situation presented in question #1 and constructed a workable strategy for that section. However, the student was unable to extend that strategy to create a general rule for determining number of border tiles; the brief attempt was unsuccessful. The student's response for question #3 was incorrect.

Communication:

- 2 This student's response to question #1 was presented in an understandable manner; mathematical sentences were clearly labeled. However, the responses to question numbers 2 and 3 lacked verbal explanations.

GRADE 8
PERFORMANCE ASSESSMENT

MATHEMATICS

Student Booklet

Task Title: **Deckin' It Out**

Student's Name: _____

GRADE 8 - PERFORMANCE ASSESSMENT

MATHEMATICS

TASK: Deckin' It Out

MATERIALS:

Grid Paper
Ruler

PROBLEM:

You are a new and struggling graphic artist. One day while working away you get a call from a friend. The friend tells you that the skateboard company that he works for is looking for a new design for the skate board decks. This could be your big break! You call the company and ask about submission requirements. You receive the following guidelines in the mail the next day.

Logo Design Submission Requirements

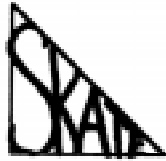
According to recent research done by our marketing department, skateboard deck designs that include transformational geometric designs are outselling non transformational geometric designs 3 to 1.

Therefore, **only** new designs that include the following elements of transformational geometry – reflection (flip), rotation (turn), and translation (slide) – will be considered.

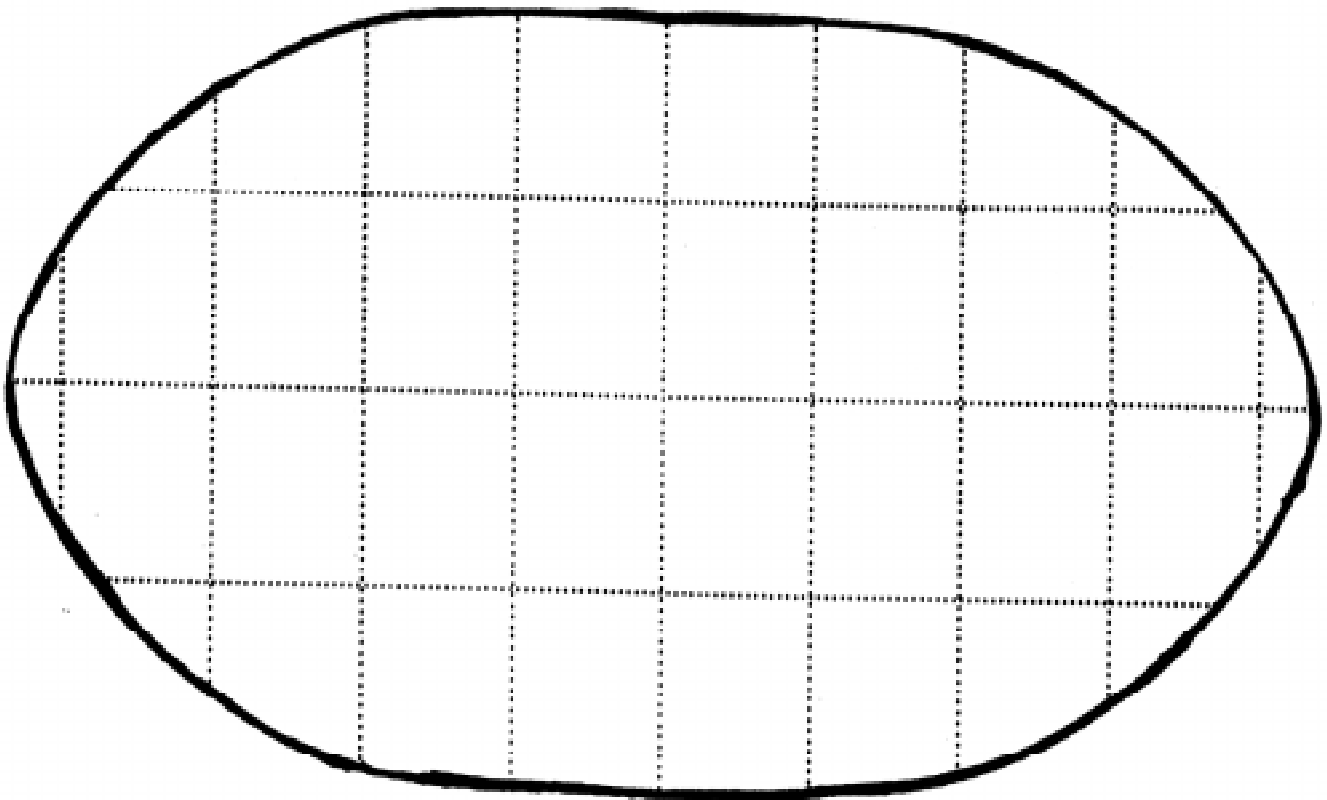
The chosen design will be purchased for \$15,000 with a 10 year copyright.

INSTRUCTIONS:

1. You decide to use the company logo.



On the skateboard deck below, create 1 design that includes 3 reflections (flips), 3 rotations (turns) and 3 translations (slides) with the company logo. Note that the company will fill any white space with a background coloring.



-
2. The company president loves your design but is not sure it meets the requirements. Explain with words how you used reflection, rotation, and translation in your design. Include diagrams that show the line of reflection, point of rotation, and line of translation in your design.

GRADE 8
PERFORMANCE ASSESSMENT

MATHEMATICS

Teacher Booklet

Task Title: **Deckin' It Out**

GRADE 8 - PERFORMANCE ASSESSMENT

MATHEMATICS

TASK: Deckin' It Out

CURRICULUM STANDARD ASSESSED:

Geometric Sense – Understand and construct multiple geometric transformations using combinations of reflection and rotation

ASSESSMENT PROTOCOL:

1. Students will read problems and show final work in student booklet.
2. Materials listed should be provided for student use during testing.

MATERIALS:

Grid Paper
Ruler

PROBLEM:

You are a new and struggling graphic artist. One day while working away you get a call from a friend. The friend tells you that the skateboard company that he works for is looking for a new design for the skate board decks. This could be your big break! You call the company and ask about submission requirements. You receive the following guidelines in the mail the next day.

Logo Design Submission Requirements

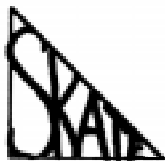
According to recent research done by our marketing department, skateboard deck designs that include transformational geometric designs are outselling non transformational geometric designs 3 to 1.

Therefore, **only** new designs that include the following elements of transformational geometry – reflection (flip), rotation (turn), and translation (slide) – will be considered.

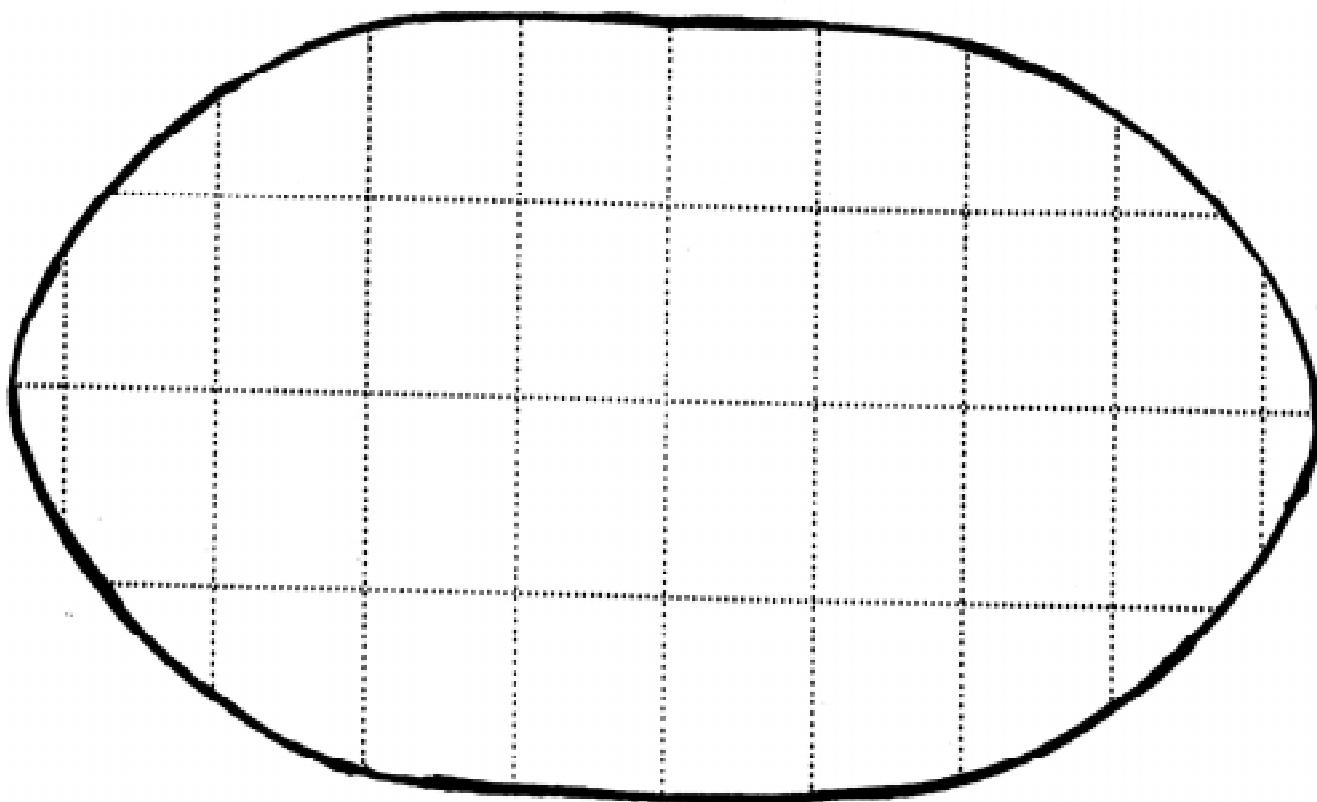
The chosen design will be purchased for \$15,000 with a 10 year copyright.

INSTRUCTIONS:

1. You decide to use the company logo.



On the skateboard deck below, create 1 design that includes 3 reflections (flips), 3 rotations (turns) and 3 translations (slides) with the company logo. Note that the company will fill any white space with a background coloring.



2. The company president loves your design but is not sure it meets the requirements. Explain with words how you used reflection, rotation, and translation in your design. Include diagrams that show the line of reflection, point of rotation, and line of translation in your design.

GRADE 8
PERFORMANCE ASSESSMENT

MATHEMATICS

Anchor Paper Commentaries

Task Title: **Deckin' It Out**