Title:	**Art Project**
Grade:	**4**
Claim(s):	**Claim 4: Modeling and Data Analysis** Students can analyze complex, real-world scenarios and can construct and use mathematical models to interpret and solve problems. **Claim 3: Communicating Reasoning** Students clearly and precisely construct viable arguments to support their own reasoning and to critique the reasoning of others. **Claim 2: Problem Solving** Students can solve a range of well-posed problems in pure and applied mathematics, making productive use of knowledge and problem-solving strategies.
Assessment Target(s):	**Claim 4** **A.** Apply mathematics to solve problems arising in everyday life, society, and the workplace. **D.** Interpret results in the context of a situation**.** **E.** Analyze the adequacy of and make improvements to an existing model or develop a mathematical model of a real phenomenon. **Claim 3** **C.** State logical assumptions being used. **E.** Distinguish correct logic or reasoning from that which is flawed and—if there is a flaw in the argument—explain what it is. **Claim 2** **A.** Apply mathematics to solve well-posed problems in pure mathematics and arising in everyday life, society, and the workplace.
Standard(s):	Item 1 - C4TE 4.OA.1 Item 2 - C2TA 4.MD.1 Item 3 - C3TC 4.MD.2 Item 4 - C4TA 4.NF.3c Item 5 - C3TE 4.NBT.6 Item 6 - C4TD 4.OA.3, 4.NBT.6 4.OA.1, 4.OA.3, 4.MD.1, 4.MD.2, 4.NF.3c, 4.NBT.6
Mathematical Practice(s):	1, 2, 3, 4, 6, 7
Blooms Taxonomy Level:	Analyze - 4
DOK Level:	Strategic Thinking/Reasoning - 3
Score Points:	10 points possible
Difficulty:	Medium
Resources:	N/A
Notes:	N/A
Task Overview:	Students will solve problems using the four operations applied to fractions and multi-digit numbers.
Teacher Preparation/Resource Requirements:	None required
Time requirements:	Approximately 60-80 minutes

Prework:	None

Sample Top-Score Response (Session 1)	You are working with the rest of the fourth graders in your school to design a piece of artwork for a wall in the cafeteria. In this task, you will use math to look at different parts of your art project. **Part A** **1.** Before starting your art project, your teacher wants you to use your art tools to practice multiplication. Which situation is represented by the equation 5 × 3 = _____? **A.** You have five paint brushes and three paint colors. How many objects do you have in all? **B.** Myles has five pairs of scissors. Tony has three more pairs of scissors than Myles. How many pairs of scissors does Tony have? **C.** Mary was given five paint trays. Sally was given three times more paint trays than Mary. How many paint trays does Sally have? **D.** Daryl is painting five trees on his picture. Anabel painted three trees on her picture. How many trees were painted in all? **A. Mary was given five paint trays. Sally was given three times more paint trays than Mary. How many paint trays does Sally have?** **2.** The art piece that you are creating will be hung with the rest of your classmates on a wall in the school library. You found out that your piece of art can be 32 inches long. Which of the following statements about your art piece is correct? **A.** The art piece will be between 1 and 2 feet long. **B.** The art piece will be between 2 and 3 feet long. **C.** The art piece will be between 3 and 4 feet long. **D.** The art piece will be between 4 and 5 feet long. **B. The art piece will be between 2 and 3 feet long.**

Part B:

3. Your teacher estimated that it would take 90 minutes for each student to complete two pieces of art for the wall. What assumption did your teacher use to make this estimation?

My teacher made the assumption that each student can finish one piece of art in 45 minutes.

4. Your teacher found left over paint from an art project she completed at home. She had 1 1/4 of a gallon of red paint left and 1 2/4 of a gallon of blue paint left. How many gallons of paint did she have in all? Explain how you know.

She had 2 3/4 gallons of paint in all. I found this by first adding the whole numbers (1 + 1) and then adding the numerators of the fractions (1 + 2). Together, I got 2 3/4.

5. Ryan decided to paint rows of dots as a part of his art piece. Ryan painted 4 rows of dots with 1342 dots in each row. Jane said that Ryan had painted a total of 1346 dots because 1342 + 4 is equal to 1346. Is Jane's reasoning correct? If Jane's reasoning is correct explain how you know. If it is not correct, find the correct total and explain how you know.

Jane's reasoning is not correct because she should have multiplied the two numbers rather than adding them to know how many dots Ryan painted. To find this, I multiplied 1342 by 4 to get 5368. Ryan painted 5368 dots rather than 1346.

6. Use the information from your previous answer for this next question. A group of 3 classmates decided to paint dots on their art pieces like Ryan.

- The three classmates painted the same number of dots in each row as Ryan
- The three classmates painted the same number of rows of dots as Ryan

Not including Ryan's art piece, how many combined dots were included on the three classmates' art pieces? Explain how you know.

There were a total of 16,104 dots on the three art pieces. I know this because I multiplied the total number of dots in Ryan's art piece (5368) by 3 to get 16,104.

End of Performance Task

Scoring Rubrics:

Rationales Question 1:
A. Student(s) may not have realized that this situation would require addition opposed to multiplication. B. Student(s) may not have realized that in order to see how many scissors Tony has, they would need to add three to the amount Myles has rather than multiplying the two numbers given. C. Correct answer D. Student(s) may have confused when to use multiplication with when to use addition.

Rationales Question 2:
A. Student(s) may have miscalculated how many inches were in a foot, and student(s) may have thought that there were 16 inches in a foot. B. Correct answer C. Student(s) may have incorrectly assumed there were 8 inches in a foot, rather than 12. D. Student(s) may have misremembered how long a foot was, and may have believed that it was closer to 6 or 7 inches, rather than 12.

Scoring Rubric for Part B:

Scoring Rubric Question 3:	
1 Point:	The student demonstrates thorough understanding of dividing with intervals of time. The student correctly identifies the assumption that each student can finish one art piece in 45 minutes.
0 Point:	The student demonstrates no understanding of dividing with intervals of time. The student does not correctly identify the assumption that each student can finish one art piece in 45 minutes.

Scoring Rubric Question 4:	
2 Points:	The student demonstrates thorough understanding of adding mixed numbers. The student correctly identifies the amount of paint in all and explains their reasoning.
1 Point:	The student demonstrates good understanding of adding mixed numbers. The student correctly identifies the amount of paint in all but does not explain their reasoning.
0 Points:	The student demonstrates no understanding of adding mixed numbers. The student does not correctly identify the amount of paint in all and does not explain their reasoning.

Scoring Rubric Question 5:	
3 Points:	The student demonstrates thorough understanding of multiplying a one-digit number by a four-digit number. The student correctly identifies that Jane is not correct, correctly identifies the number dots in Ryan's art piece, and correctly explains the reasoning.
2 Points:	The student demonstrates good understanding of multiplying a one-digit number by a four-digit number. The student correctly identifies that Jane is not correct and correctly identifies the number dots in Ryan's art piece but does not correctly explain the reasoning. OR The student correctly identifies that Jane is not correct and correctly explains the reasoning but does not correctly calculate the total number of dots in Ryan's art piece.
1 Point:	The student demonstrates limited understanding of multiplying a one-digit number by a four-digit number. The student correctly identifies that Jane is not correct but does not correctly explain the reasoning and does not correctly calculate the number of dots in Ryan's art piece. OR The student does not correctly identify that Jane is not correct but does correctly explain the reasoning for the choice made.
0 Points:	The student demonstrates no understanding of multiplying a one-digit number by a four-digit number. The student does not correctly identify that Jane is not correct, does not correctly explain the reasoning for that choice, and does not correctly calculate the number dots in Ryan's art piece.

Scoring Rubric Question 6*:	
2 Points:	The student demonstrates thorough understanding of solving problems involving multiplication. The student correctly identifies the total number of dots and explains their reasoning.
1 Point:	The student demonstrates good understanding of solving problems involving multiplication. The student correctly identifies the total number of dots but does not explain their reasoning.
0 Points:	The student demonstrates no understanding of solving problems involving multiplication. The student does not correctly identify the total number of dots and does not explain their reasoning.

**A student should receive full credit for this question if they correctly calculate with the incorrect numbers from the previous question(s).*