COMMON CORE-ALIGNED TASK
WITH INSTRUCTIONAL SUPPORTS

Mathematics

GRADE 4 MATH: FARMER FRED

UNIT OVERVIEW

This approximately 4-week unit centers around understanding fractional parts of a whole and using fractions and mixed numbers to solve problems.

TASK DETAILS

Task Name: Farmer Fred

Grade: 4

Subject: Mathematics

Depth of Knowledge: 3

Task Description: Students use fractional parts of a whole, properties of shapes, congruency, and computation using fractions and money to determine the fair value and total worth of eight fields.

Standards:
4.NF.2 Compare two fractions with different numerators and different denominators, e.g., by creating common denominators or numerators, or by comparing to a benchmark fraction such as 1/2. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model.
4.NF.3c Add and subtract mixed numbers with like denominators, e.g., by replacing each mixed number with an equivalent fraction, and/or by using properties of operations and the relationship between addition and subtraction.
4.NF.3d Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators, e.g., by using visual fraction models and equations to represent the problem.
4.NF.4c Solve word problems involving multiplication of a fraction by a whole number, e.g., by using visual fraction models and equations to represent the problem.
4.G.2 Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize right triangles as a category, and identify right triangles.

Standards for Mathematical Practice:
MP.1 Make sense of problems and persevere in solving them.
MP.3 Construct viable arguments and critique the reasoning of others.
MP.6 Attend to precision.
MP.7 Look for and make use of structure.

NYC Department of Education
Dennis M. Walcott, Chancellor

COMMON CORE-ALIGNED TASK
WITH INSTRUCTIONAL SUPPORTS

Mathematics

TABLE OF CONTENTS

The task and instructional supports in the following pages are designed to help educators understand and implement tasks that are embedded in Common Core-aligned curricula. While the focus for the 2011-2012 Instructional Expectations is on engaging students in Common Core-aligned culminating tasks, it is imperative that the tasks are embedded in units of study that are also aligned to the new standards. Rather than asking teachers to introduce a task into the semester without context, this work is intended to encourage analysis of student and teacher work to understand what alignment looks like. We have learned through this year's Common Core pilots that beginning with rigorous assessments drives significant shifts in curriculum and pedagogy. Universal Design for Learning (UDL) support is included to ensure multiple entry points for all learners, including students with disabilities and English language learners.

Acknowledgements: The unit outline was developed by David Graeber (CFN 534) with input from Curriculum Designers Alignment Review Team. The tasks were developed by the schools in the 2010-2011 NYC DOE Elementary School Performance Based Assessment Pilot, in collaboration with Exemplars, Inc. and Center for Assessment.

NYC Department of Education
Dennis M. Walcott, Chancellor

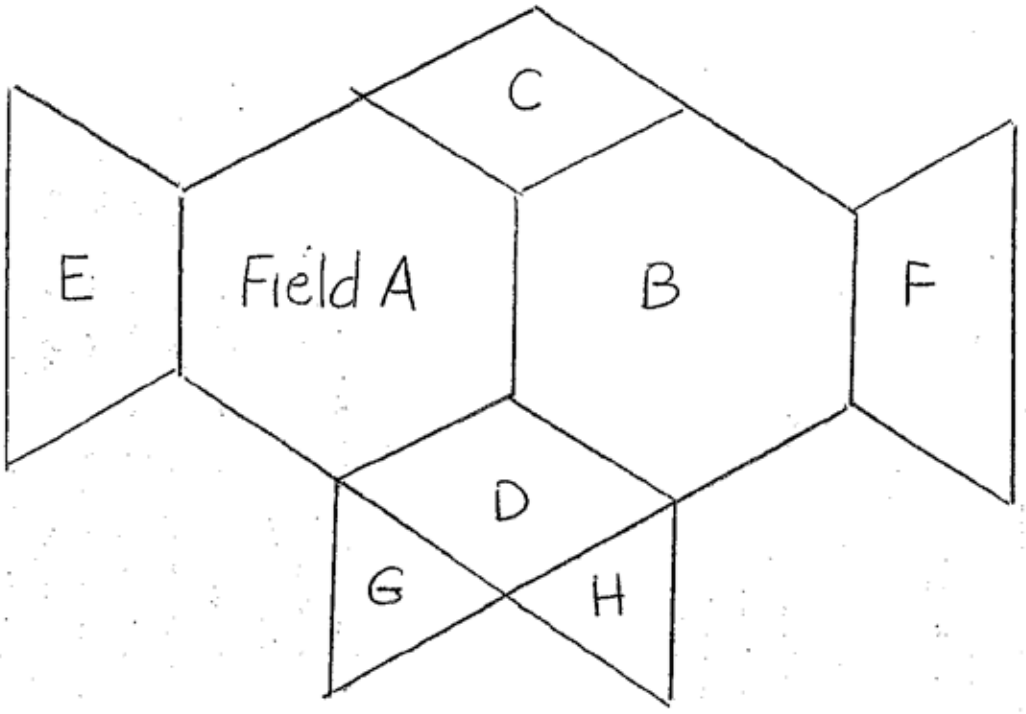
GRADE 4 MATH: FARMER FRED PERFORMANCE TASK

NYC Department of Education
Dennis M. Walcott, Chancellor

Name_____

Farmer Fred

Farmer Fred's fields are worth twelve hundred dollars total. The fields are formed with the same properties as your pattern blocks. Each field's value is based on its size. What fraction of the total value is each field worth? How much is each field worth? Show and explain all of your mathematical thinking.



GRADE 4 MATH: FARMER FRED
UNIVERSAL DESIGN FOR LEARNING (UDL) PRINCIPLES

Math Grade 4 – Farmer Fred
Common Core Learning Standards/
Universal Design for Learning

The goal of using Common Core Learning Standards (CCLS) is to provide the highest academic standards to all of our students. Universal Design for Learning (UDL) is a set of principles that provides teachers with a structure to develop their instruction to meet the needs of a diversity of learners. UDL is a research-based framework that suggests each student learns in a unique manner. A one-size-fits-all approach is not effective to meet the diverse range of learners in our schools. By creating options for how instruction is presented, how students express their ideas, and how teachers can engage students in their learning, instruction can be customized and adjusted to meet individual student needs. In this manner, we can support our students to succeed in the CCLS.

Below are some ideas of how this Common Core Task is aligned with the three principles of UDL; providing options in representation, action/expression, and engagement. As UDL calls for multiple options, the possible list is endless. Please use this as a starting point. Think about your own group of students and assess whether these are options you can use.

REPRESENTATION: *The "what" of learning.* How does the task present information and content in different ways? How students gather facts and categorize what they see, hear, and read. How are they identifying letters, words, or an author's style?

In this task, teachers can...

- **Pre-teach vocabulary and symbols, especially in ways that build a connection to the learners' experience and prior knowledge** by providing text based examples and illustrations of fields. Integrate numbers and symbols into word problems.

ACTION/EXPRESSION: *The "how" of learning.* How does the task differentiate the ways that students can express what they know? How do they plan and perform tasks? How do students organize and express their ideas?

In this task, teachers can...

- **Anchor instruction by pre-teaching critical prerequisite concepts** through demonstration or models (i.e. use of two dimensional representations of space and geometric models).

ENGAGEMENT: *The "why" of learning.* How does the task stimulate interest and motivation for learning? How do students get engaged? How are they challenged, excited, or interested?

In this task, teachers can...

- **Optimize relevance, value and authenticity** by designing activities so that learning outcomes are authentic, communicate to real audiences, and reflect a purpose that is clear to the participants**.**

Visit http://schools.nyc.gov/Academics/CommonCoreLibrary/default.htm to learn more information about UDL.

GRADE 4 MATH: FARMER FRED RUBRIC

The following section contains two rubrics that were used to score student work: a content rubric and a process rubric. The content rubric describes student performance according to the content standards in the CCLS. The process rubric describes student performance according to the National Council of Teachers of Mathematics (NCTM) process standards. Students' were given a score based on their achievement on the CCLS content rubric and the process rubric. Given that the process rubric is not in the language of the Common Core's Mathematical Practices, we have also included a document that NCTM has posted regarding the relationship between the NCTM process standards and the Standards for Mathematical Practice.

CCSS Mathematics Content Standards Rubric

Students apply mathematical reasoning, knowledge, and skills in problems-solving situations and support their solutions using mathematical language and appropriate representations (data).

NOTE: Anchor papers illustrate how descriptors for each performance level are evidenced at each grade.

Grades K &1: Focus on measurement; comparing and ordering numbers; addition & subtraction

Gr K-1 CCSS Math Criteria by Strand	Novice	Apprentice	Practitioner	Expert (*work is exceeding grade level expectations*)
Number & Operations in Base Ten	Recognizes number symbols and names, but lacks counting sequence (K) Uses place value to show 10 or less (gr 1) A correct answer may be stated, but is not supported by student work (e.g., solves problems without applying properties of operations; copies numbers)	Some parts of problem correct and those parts supported by student work Represents and solves addition and subtraction using counting, models, visuals, manipulatives, number lines, sounds May apply commutative property	***Counts to compare: determines greater than/less than*** ***Represents, compares, and solves using addition and subtraction to 10 (K) or to 20 (gr 1)*** ***Composes/ decomposes (10s and ones)*** ***Minor computation flaws do not affect outcome of a correct solution***	All parts of problem correct, precise, and supported by student work Represents, compares, and solves using numbers greater than 20; uses place value to expand numbers (gr 1) Apply properties of operations - associative & commutative properties
Measurement	Still demonstrates limited number sense (e.g., difficulty estimating; representing quantities; recognizing measurement attributes) Tells time to the hour using a digital clock	Recognizes and uses 1 measureable attribute to compare or classify Tells time to hour, & half hour (gr 1) using a digital clock	***Describes & compares measurable attributes: compares 2 or 3 (gr 1) objects, classifies objects using more than 1 attribute*** ***Measures and compares lengths indirectly (gr 1)*** ***Tells time - digital and analog clocks (gr 1)***	Uses a variety of strategies to estimate, measure, and compare Measures and compares lengths of more than 2 objects and determines the difference in lengths

Grade 2: Focus on measurement; addition & subtraction

Gr 2 CCSS Math Criteria by Strand	Novice	Apprentice	Practitioner	Expert (*work is exceeding grade level expectations*)
Number & Operations in Base Ten	A correct answer may be stated, but is not supported by student work (e.g., copies numbers) Lacks understanding of place value (e.g., all digits have same value regardless of place)	Some parts of problem correct and those parts supported by student work Adds and subtracts correctly without regrouping	***Uses strategies, place value, & properties of operations to represent and solve addition and subtraction problems*** ***Minor computation flaws do not affect outcome of a correct solution***	All parts of problem correct, precise, and supported by student work Uses a variety of representations (e.g., concrete models, diagrams, equations)
Measurement	Still demonstrates limited number sense (e.g., difficulty estimating; representing or using measures/data)	Measures correctly, but may select the wrong tool, incorrect scale or representation (e.g., dollar and cents signs; line diagrams with	***Measures, compares, & estimates lengths, time, money*** ***Represents & interprets data; uses***	Uses a variety of strategies to estimate, measure, and compare

		unequal unit spacing)	***data to make predictions and support solutions***	

Grades 3 & 4: Focus on fractions; multiplication and division

Gr 3 and 4 CCSS Math Criteria	Novice	Apprentice	Practitioner	Expert (*work is exceeding grade level expectations*)
Number & Operations in Base Ten	Applies flawed strategies (e.g., attempts to form groups when multiplying, but does not use equal sized groups or repeated addition) Selects the incorrect operation to perform or major inaccuracies in computation lead to an incorrect solution Still demonstrates limited number sense (e.g., difficulty estimating; representing part-whole) A correct answer may be stated, but is not supported by student work	Some parts of problem correct and those parts supported by student work Uses additive reasoning to solve or interpret most problems May include limited explanations Uses visual models (number line, area, sets) to represent parts of whole	***Expresses whole numbers as fractions*** ***Generates equivalent fractions and explains why they are equivalent (e.g., using visual models- number line, area, sets; comparing to benchmarks)*** ***Uses addition, subtraction, and multiplication to solve problems with whole numbers, fractions (gr 3-4) and mixed numbers (gr 4)*** ***Minor computation flaws do not affect outcome of a correct solution***	All parts of problem correct, precise, and supported by student work Extends understanding of equivalence of fractions by identifying proper and improper fractions Interprets meaning of the products (gr 3-4) and remainder (gr 4) when dividing Uses a variety of strategies to solve problems
Operations & Algebraic Thinking			***Uses 4 operations in solving problems and explaining patterns using whole numbers*** ***Solves multi-step & word problems***	Uses multiple representations of the same problem (visual models, equations, decomposing fractions)

Grade 5: Focus on decimals; 4 operations

Gr 5 CCSS Math Criteria by Strand	Novice	Apprentice	Practitioner	Expert (*work is exceeding grade level expectations*)
Number & Operations in Base Ten	Consistently flawed understanding of decimals/place value Decimal representations not appropriate for task Incorrect computational strategies used or major inaccuracies in computation lead to an incorrect solution A correct answer may be stated, but is not supported by student work	Some parts of problem correct and those parts supported by student work (e.g., uses visual models to represent fractional or decimal parts of a whole) Mostly consistent understanding of place value and representation of decimals Displays some inaccuracies in computation	***Clear and consistent application of place value and representation of decimals (e.g., to the thousandths, using money concepts, rounding)*** ***Some minor flaws performing 4 operations with whole numbers and decimals to hundredths, but does not affect outcome of a correct solution***	All parts of problem correct, precise, and supported by student work Demonstrates higher order understanding of decimals and relating them to fractions, percents, or other abstract concepts beyond the scope of the specific task (e.g., explaining the solution or approach using alternative models)

Operations & Algebraic Thinking			***Writes and interprets numerical expressions*** ***Analyzes patterns and relationships***	Uses multiple representations of the same problem

Exemplars® Standards-Based Math Rubric*

	Problem Solving	Reasoning and Proof	communication	connections	Representation
Novice	No strategy is chosen, or a strategy is chosen that will not lead to a solution. Little or no evidence of engagement in the task present.	Arguments are made with no mathematical basis. No correct reasoning nor justification for reasoning is present.	No awareness of audience or purpose is communicated. or Little or no communication of an approach is evident or Everyday, familiar language is used to communicate ideas.	No connections are made.	No attempt is made to construct mathematical representations.
Apprentice	A partially correct strategy is chosen, or a correct strategy for only solving part of the task is chosen. Evidence of drawing on some previous knowledge is present, showing some relevant engagement in the task.	Arguments are made with some mathematical basis. Some correct reasoning or justification for reasoning is present with trial and error, or unsystematic trying of several cases.	Some awareness of audience or purpose is communicated, and may take place in the form of paraphrasing of the task. or Some communication of an approach is evident through verbal/written accounts and explanations, use of diagrams or objects, writing, and using mathematical symbols. or Some formal math language is used, and examples are provided to communicate ideas.	Some attempt to relate the task to other subjects or to own interests and experiences is made.	An attempt is made to construct mathematical representations to record and communicate problem solving.

*Based on revised NCTM standards.

Exemplars® Standards-Based Math Rubric (cont.)*

	Problem Solving	Reasoning and Proof	Communication	Connections	Representation
Practitioner	A correct strategy is chosen based on mathematical situation in the task. Planning or monitoring of strategy is evident. Evidence of solidifying prior knowledge and applying it to the problem solving situation is present. Note: The practitioner must achieve a correct answer.	Arguments are constructed with adequate mathematical basis. A systematic approach and/or justification of correct reasoning is present. This may lead to... • clarification of the task. • exploration of mathematical phenomenon. • noting patterns, structures and regularities.	A sense of audience or purpose is communicated. and/or Communication of an approach is evident through a methodical, organized, coherent sequenced and labeled response. Formal math language is used throughout the solution to share and clarify ideas.	Mathematical connections or observations are recognized.	Appropriate and accurate mathematical representations are constructed and refined to solve problems or portray solutions.
Expert Work at this level is exceeding grade-level expectations	An efficient strategy is chosen and progress towards a solution is evaluated. Adjustments in strategy, if necessary, are made along the way, and / or alternative strategies are considered. Evidence of analyzing the situation in mathematical terms, and extending prior knowledge is present. Note: The expert must achieve a correct answer.	Deductive arguments are used to justify decisions and may result in formal proofs. Evidence is used to justify and support decisions made and conclusions reached. This may lead to... • testing and accepting or rejecting of a hypothesis or conjecture. • explanation of phenomenon. • generalizing and extending the solution to other cases.	A sense of audience and purpose is communicated. and/or Communication at the Practitioner level is achieved, and communication of argument is supported by mathematical properties. Precise math language and symbolic notation are used to consolidate math thinking and to communicate ideas.	Mathematical connections or observations are used to extend the solution.	Abstract or symbolic mathematical representations are constructed to analyze relationships, extend thinking, and clarify or interpret phenomenon.

*Based on revised NCTM standards.

National Council of Teachers of Mathematics (NCTM) Process Standards and the Common Core State Standards for Mathematics

From ***NCTM Action on the Common Core State Standards for Mathematics***

by NCTM President J. Michael Shaughnessy

"The preeminent message in both the NCTM *Principles and Standards for School Mathematics* (2000) and CCSSM is the importance of nurturing mathematical thinking and reasoning processes in our students. No bulleted list of specific content standards will hold together as a coherent, meaningful whole, or make any significant contribution to our students' growth in mathematics, without interweaving mathematical "practices." Mathematics curricula must show students the power of reasoning and sense making as they explore mathematical structures, of communication as they construct viable arguments, and of multiple representations as they engage in mathematical modeling. The close connections between the NCTM Process Standards and the CCSSM Standards for Mathematical Practice are represented in the chart below.

The upcoming NCTM publication, *Making it Happen*, will provide a deeper analysis of the connections between the NCTM Process Standards and detail the potential of the existing NCTM resources to interpret and implement CCSSM."

NCTM Process Standards and the CCSS Mathematical Practices

NCTM Process Standards	CCSS Standards for Mathematical Practice
Problem Solving	1. Make sense of problems and persevere in solving them. 5. Use appropriate tools strategically.
Reasoning and Proof	2. Reason abstractly and quantitatively. 3. Critique the reasoning of others. 8. Look for and express regularity in repeated reasoning
Communication	3. Construct viable arguments
Connections	6. Attend to precision. 7. Look for and make use of structure
Representations	4. Model with mathematics.

GRADE 4 MATH: FARMER FRED
ANNOTATED STUDENT WORK

This section contains annotated student work at a range of score points, student summaries, and implications for instruction for each performance level. The annotated student work and student summaries demonstrate performance at different levels and show examples of student understandings and misunderstandings of the task that can be used with the implications for instruction to understand how to move students to the next performance level.

Grade 4 Math: Farmer Fred
Annotated Student Work: Expert

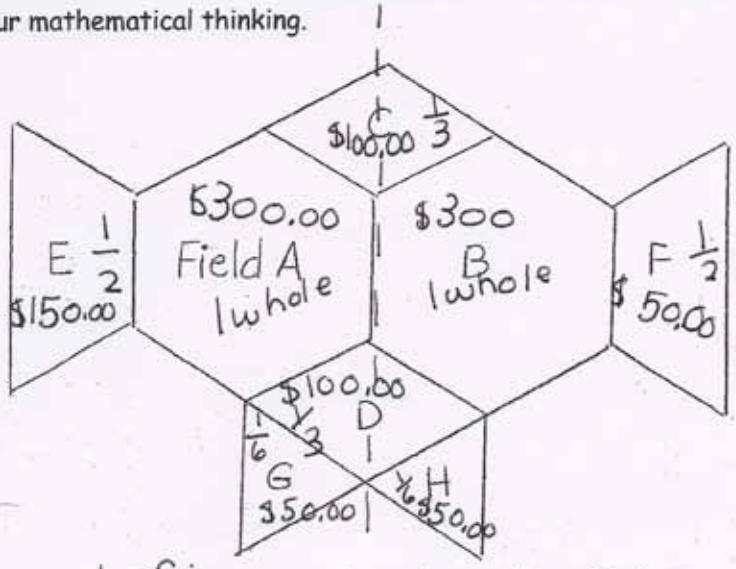
This student is an Expert according to both the Exemplars Rubric and the CCSS Content Standards Rubric, (both included in the supporting materials).

Expert, Student 1 Grade 4

Name_____

Farmer Fred

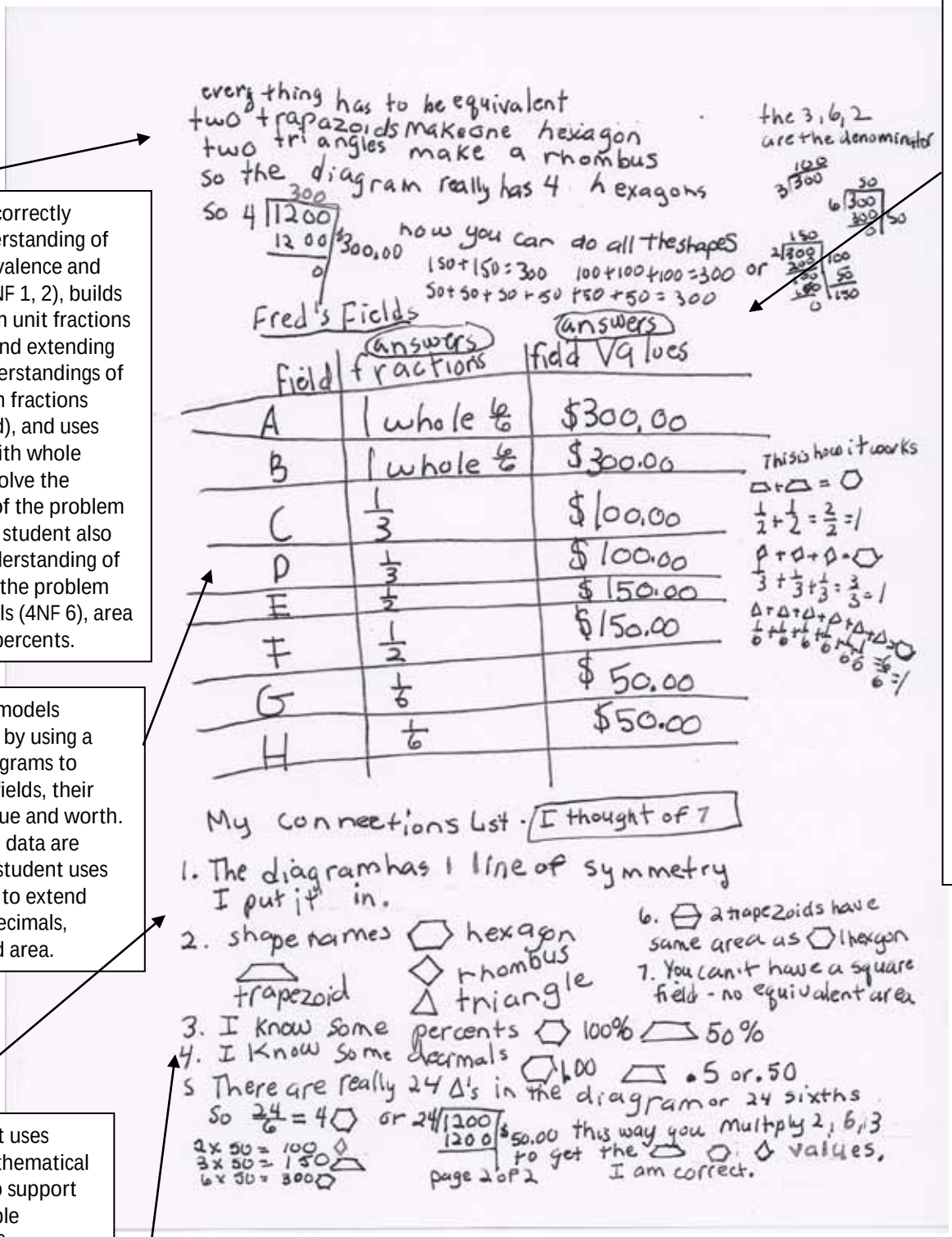
Farmer Fred's fields are worth twelve hundred dollars total. The fields are formed with the same properties as your pattern blocks. Each field's value is based on its size. What fraction of the total value is each field worth? How much is each field worth? Show and explain all of your mathematical thinking.



I have to figure out what the fields are worth and the fraction of the fields. You can't solve this problem if you don't know fractions. I will make a table and write the answers on it.

page 1 of 2

Grade 4 Math: Farmer Fred
Annotated Student Work: Expert



every thing has to be equivalent
two trapazoids make one hexagon
two triangles make a rhombus
so the diagram really has 4 hexagons
so 4 | 1200 → 300
1200
0
$300.00
now you can do all the shapes
150+150=300 100+100+100=300 or
50+50+50+50+50+50=300
the 3, 6, 2 are the denominator
3 | 300 → 100
6 | 300 → 50
2 | 300 → 150
Fred's Fields
answers fractions / answers field values

Field	fractions	field values
A	1 whole 6/6	$300.00
B	1 whole 6/6	$300.00
C	1/3	$100.00
D	1/3	$100.00
E	1/2	$150.00
F	1/2	$150.00
G	1/6	$50.00
H	1/6	$50.00

This is how it works
△+△=⬡
1/2+1/2=2/2=1
◇+△+△=⬡
1/3+1/3+1/3=3/3=1
△+△+△+△+△+△=⬡
1/6+1/6+1/6+1/6+1/6+1/6=6/6=1
My connections List · I thought of 7
1. The diagram has 1 line of symmetry I put it in.
2. shape names ⬡ hexagon ◇ rhombus △ triangle ▱ trapezoid
3. I know some percents ⬡ 100% ▱ 50%
4. I know some decimals ⬡ 1.00 ▱ .5 or .50
5. There are really 24 △'s in the diagram or 24 sixths
So 24/6 = 4⬡ or 24 | 1200 → $50.00 this way you multiply 2, 6, 3 to get the ▱ ⬡ ◇ values, I am correct.
1200
0
2x50=100 ◇
3x50=150 ▱
6x50=300 ⬡
6. 2 trapezoids have same area as 1 hexagon
7. You can't have a square field - no equivalent area
page 2 of 2

The student correctly extends understanding of fraction equivalence and ordering (4. NF 1, 2), builds fractions from unit fractions by applying and extending previous understandings of operations on fractions (4.NF 3 a, b, d), and uses operations with whole numbers to solve the second part of the problem (4.OA 2). The student also brings an understanding of symmetry to the problem (4.G), decimals (4NF 6), area (4.MD), and percents.

The student is able to make sense and persevere in solving the problem. The student applies correct understanding to determine the fractional value and worth of each field. The student is able to step back and provide a new perspective to the problem by finding the line of symmetry. The student reasons abstractly and quantitatively by extending her/his thinking to decimals, and area. The student evaluates the reasonableness of her/his answer by applying a different property of operation.

The student models mathematics by using a table and diagrams to indicate the fields, their fractional value and worth. All labels and data are correct. The student uses these results to extend thinking to decimals, percents, and area.

The student uses precise mathematical language to support her/his viable argument. Some terms include the names of the shapes, area, and fraction, money, decimal, and percent notation.

The student looks for and makes use of structure and interprets mathematical results in the mathematics model to evaluate the reasonableness of her/his results by verifying her/his answer by using twenty-four triangles to determine four whole hexagons and stating, "I am correct." The student also brings the understanding of percents, decimals and area to her/his solution.

Grade 4 Math: Farmer Fred
Annotated Student Work: Expert

Expert – Student 1 Summary

Achievement Level: Student 1 is an Expert according to both the Exemplars Process Rubric and the CCSS Content Standards Rubric, (both of which are included in the supporting materials). The table below provides a rationale for the student's performance level in each of the criteria identified in the Exemplars Process Rubric.

Criteria and Performance Level	Rationale
Problem Solving Expert	The student's strategy of creating a table to show each field, determining the fractional part of each field and the worth of each field works to solve the problem. The student labels the second column, "answers fractions," and the third column, "answers field values." The student's answer, "Field A and B as 1 whole, 6/6 and $300.00, Field C and D as 1/3 and $100.00, Field E and F as 1/2 and $150.00, Field G and H as 1/6 and $50.00," is correct. The student extends her/his thinking to fractions, decimals, and area. The student also uses different reasoning to verify her/his answer is correct.
Reasoning and Proof Expert	The student demonstrates correct reasoning of the underlying mathematical concepts in the problem. The student applies understanding of fractional parts of a whole. The student determines that all the field shapes can form four hexagons and divides 1200 by 4 for a quotient of 300. The student divides 300 by the denominators 3, 6, and 2 to find the remaining worth of the trapezoid, rhombus and triangle shaped fields. The student draws in the line of symmetry, compares fractions to decimals and percents and uses the concept of area to determine why a field cannot be shaped as a square in this problem. the student also verifies her/his answer by dividing 1200 by 24 (triangles), finds the correct worth of the fields and states, "I am correct again."
Communication Expert	The student correctly uses the mathematical terms-worth, fractions, values, from the problem. The student also correctly uses the terms-equivalent, trapezoids, hexagon, triangles, rhombus, shapes, denominators, whole, line of symmetry, percents, decimals, sixths. The student correctly uses the mathematical notation-6/6, 1/3, 1/2, 1/6, 24/6, 2/2, 3/3, 24/6, 100%, 50%, 1.00, .5, .50, $300.00, $100.00, $150.00, $50.00.

Connections Expert	The student makes the mathematically relevant Practitioner connections, “the 3, 6, 2 are denominators,” “The diagram has 1 line of symmetry. I put it in,” and, “shape names-hexagon, rhombus, trapezoid, triangle.” The student makes the Expert connection by verifying that her/his answer is correct. The student states, “There are really 24 ▲’s in the diagram or 24 sixths. So 24/6 = 4.” The student then divides 1200 by 24 for a quotient of 50 and states, “This way you multiply 2, 6, 3, to get the trapezoid, hexagon, rhombus values.” The student does the computation on her/his paper and states, “I am correct.” The student also states, “I know some percents. Hexagon 100%, trapezoid 50%,” “I know some decimals. hexagon 1.00, trapezoid .5 or .50.” The student considers area and states, “2 trapezoids have same area as 1 hexagon. You can’t have a square field-no equivalent area.”
Representation Expert	The student’s table is appropriate and accurate with all columns correctly labeled and all entered data is correct. The diagrams the student uses in her/his solution are appropriate and accurate. The student labels all the shapes correctly. The student uses the table and diagrams to support her/his thinking of how to solve the problem a different way to verify her/his answer and to explore area.

Instructional Implications: Farmer Fred, 4

Achievement Level: Expert

Note: Student work identified at this level is exceeding grade-level expectations

The following is a list of instructional implications that you may want to consider for students performing at the Expert level. In addition, you may want to consult the suggestions for the Practitioner level:

- Solve problem more than one way to verify that the answer is correct and link the two strategies together
- Relate problem to a similar one completed and discuss how they are mathematically similar
- Use percents to define the value of each field
- Use decimals to define the value of each field

Provide a total value of all the fields that would require the student to work with decimals/cents to find the worth of each field
Find the line of symmetry in the field
Explain why a field is not in the shape of the orange pattern block (square) or the thin tan pattern block (rhombus)-explore angles, length of side, etc.

Grade 4 Math: Farmer Fred
Annotated Student Work: Practitioner

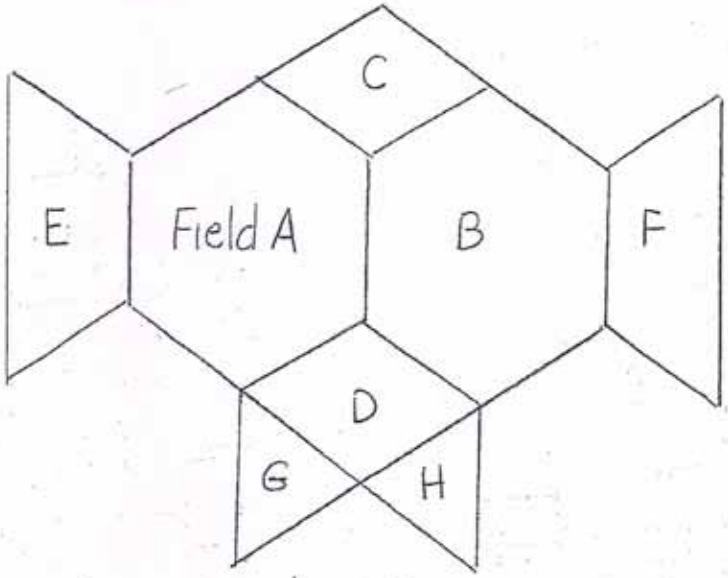
This student is a Practitioner according to both the Exemplars Rubric and the CCSS Content Standards Rubric (both included in the supporting materials).

Practitioner, Student 1

Name_____

Farmer Fred

Farmer Fred's fields are worth twelve hundred dollars total. The fields are formed with the same properties as your pattern blocks. Each field's value is based on its size. What fraction of the total value is each field worth? How much is each field worth? Show and explain all of your mathematical thinking.



I need to find out how much and what fraction each field is worth. I will use a chart for both problems.

page 1 of 2

The student is able to make sense and persevere in solving the problem. The student applies understanding of fractional parts of a whole in determining the correct fractional value of each field and applies correct number and operations thinking to find the correct worth of each field.

Grade 4 Math: Farmer Fred
Annotated Student Work: Practitioner

The student correctly extends understanding of fraction equivalence and ordering (4. NF 1, 2), builds fractions from unit fractions by applying and extending previous understandings of operations on fractions (4.NF 3 a, b, d), and uses operations with whole numbers to solve the second part of the problem (4.OA 2).

The student models with mathematics by using a table to indicate the fields, their worth, and fractional value. All labels and data are correct.

Each field is worth and fraction answers

Field	worth	fraction of field
A	$300.00	1 or 6/6
B	$300.00	1 or 6/6
C	$100.00	1/3 or 2/6
D	$100.00	1/3 or 2/6
E	$150.00	1/2 or 3/6
F	$150.00	1/2 or 3/6
G	$50.00	1/6
H	$50.00	1/6

One connection I will like to make is that you can convert the fractions in the problem. For Ex: 1/2 can be 4/8 and still be the same value. Another connection I will like to do is that A and B is a hexagon. And I know that C and D are Rhombi and that E, F are trapizoids and G, H are triangles. The 8 fields use 4 hexagon shapes. You can't do this Problem if you don't know the pattern blocks. Like $\frac{6}{6}=1$ or $\frac{1}{2}+\frac{1}{2}=\frac{2}{2}=1$. I started with the triangle and added up by 100. It didn't work so I used 50 and it worked I added and times in my head. It wasn't very hard because of the zeros.

page 2 of 2

The student uses precise mathematical language to support her/his viable argument. Some terms include the names of the shapes, fraction and money notation.

The student reasons quantitatively by making the connection, "You can convert the fractions in the problem...."

Grade 4 Math: Farmer Fred
Annotated Student Work: Practitioner

Practitioner – Student 1 Summary

Achievement Level: Student 1 is a Practitioner according to both the Exemplars Process Rubric and the CCSS Content Standards Rubric, (both of which are included in the supporting materials). The table below provides a rationale for the student's performance level in each of the criteria identified in the Exemplars Process Rubric.

Criteria and Performance Level	Rationale
Problem Solving Practitioner	The student's strategy of creating a table to show each field, using guess and check to find each field's worth, and determining the fractional part of each shape to the hexagon works to solve the problem. The student writes, "Each field is worth and fraction answers," above her/his table. The student's answer, "Field A and B as $300.00 and 6/6, Field C and D as $100.00 and 1/3 or 2/6, Field E and F as $150.00 and 1/2 or 3/6, and Field G and H as $50.00 and 1/6," is correct.
Reasoning and Proof Practitioner	The student demonstrates correct reasoning of the underlying mathematical concepts in the problem. The student applies understanding of fractional parts of a whole when considering the "hexegon," trapezoid, rhombus, and triangle shapes and determines what fraction of the total value each field is worth using sixths and equivalent fractions. The student also states correct reasoning in determining the correct worth of each field.
Communication Practitioner	The student correctly uses the mathematical terms-fraction, worth, value, from the task. The student also correctly uses the terms-chart, hexagon, rhombi, "trapizoids," triangles, shapes. The student correctly uses the mathematical notation-6/6, 1/3, 2/6, 1/2, 3/6, $300.00, $100.00, $150.00, $50.00.
Connections Practitioner	The student makes the mathematically relevant connections, "You can convert the fractions in the problem For Exm: 1/2 can be 4/8 and still be the same value," "A and B is a hexegon," "C and D are Rhombi," "E, F are trapizoids," "G, H are triangles," and, "The 8 fields use 4 hexegon shapes."
Representation Practitioner	The student's table is appropriate and accurate with all columns correctly labeled and all entered data is correct.

Grade 4 Math: Farmer Fred
Annotated Student Work: Practitioner

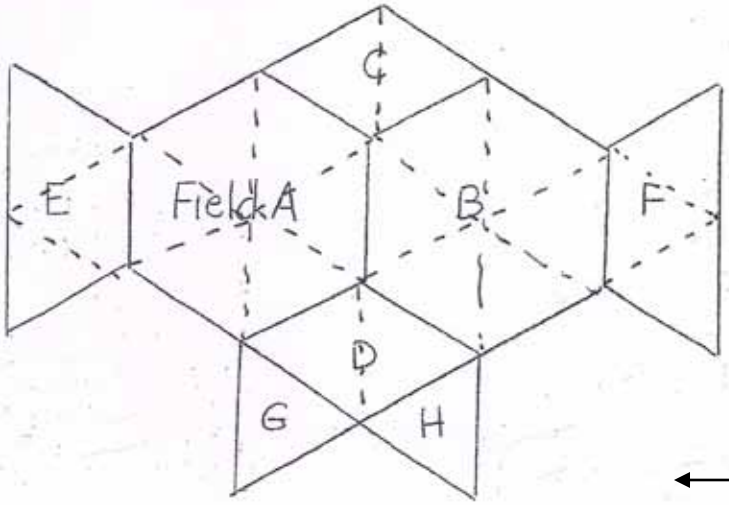
This student is a Practitioner according to both the Exemplars Rubric and the CCSS Content Standards Rubric (both included in the supporting materials).

Practitioner, Student 2 Grade 4

Name_____

Farmer Fred

Farmer Fred's fields are worth twelve hundred dollars total. The fields are formed with the same properties as your pattern blocks. Each field's value is based on its size. What fraction of the total value is each field worth? How much is each field worth? Show and explain all of your mathematical thinking.



I will find out the fraction and how much value each field is. I have to find how many sixths there are. I will use pattern Blocks to figure it out and the diagram.

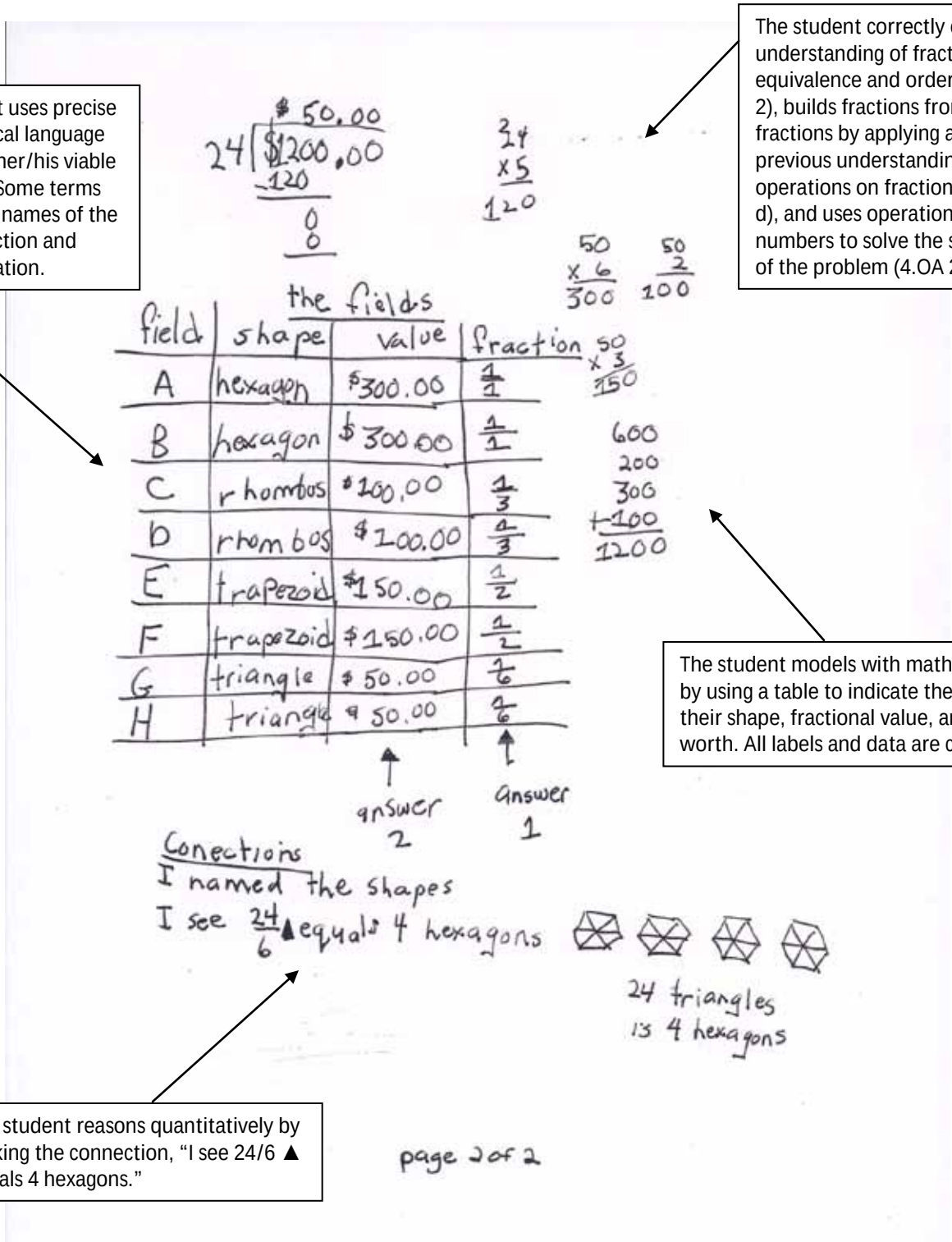
Page 1 of 2

The student is able to make sense and persevere in solving the problem. The student applies understanding of fractional parts of a whole in determining the correct fractional value of each field and applies correct number and operations thinking to find the correct worth of each field.

Grade 4 Math: Farmer Fred
Annotated Student Work: Practitioner

The student uses precise mathematical language to support her/his viable argument. Some terms include the names of the shapes, fraction and money notation.

The student correctly extends understanding of fraction equivalence and ordering (4. NF 1, 2), builds fractions from unit fractions by applying and extending previous understandings of operations on fractions (4.NF 3 a, b, d), and uses operations with whole numbers to solve the second part of the problem (4.OA 2).



$50.00
24 | $1200.00
-120
0
0

24
x5
120

50 x 6 = 300
50 x 2 = 100

the fields

field	shape	value	fraction
A	hexagon	$300.00	1/1
B	hexagon	$300.00	1/1
C	rhombus	$100.00	1/3
D	rhombus	$100.00	1/3
E	trapezoid	$150.00	1/2
F	trapezoid	$150.00	1/2
G	triangle	$50.00	1/6
H	triangle	$50.00	1/6

50 x 3 = 150

600
200
300
+100
1200

answer 2

answer 1

The student models with mathematics by using a table to indicate the fields, their shape, fractional value, and worth. All labels and data are correct.

Conections
I named the shapes
I see 24/6 ▲ equals 4 hexagons

24 triangles
is 4 hexagons

The student reasons quantitatively by making the connection, "I see 24/6 ▲ equals 4 hexagons."

page 2 of 2

Grade 4 Math: Farmer Fred
Annotated Student Work: Practitioner

Practitioner – Student 2 Summary

Achievement Level: Student 2 is a Practitioner according to both the Exemplars Process Rubric and the CCSS Content Standards Rubric, (both of which are included in the supporting materials). The table below provides a rationale for the student's performance level in each of the criteria identified in the Exemplars Process Rubric.

Criteria and Performance Level	Rationale
Problem Solving Practitioner	The student's strategy of creating a table to show each field, the name of the shape of each field, determining the fair value of each field, and the fractional part of each shape to the hexagon works to solve the problem. The student directs arrows to the third and fourth columns to indicate her/his answer. The student's answer, "Field A and B as $300.00 and 1/1, Field C and D as $100.00 and 1/3, Field E and F as $150.00 and 1/2, and Field G and H as $50.00 and 1/6," is correct.
Reasoning and Proof Practitioner	The student demonstrates correct reasoning of the underlying mathematical concepts in the problem. The student applies understanding of fractional parts of a whole. The student uses the fractional value of the triangle, 1/6, to determine what fraction of the total value each field is worth. The student divides $1200.00 by the twenty-four triangles found in the 8 fields. The student multiplies the quotient, $50.00, by the number of triangles there are in a hexagon, trapezoid, and rhombus.
Communication Practitioner	The student correctly uses the mathematical terms—fraction, value—from the task. The student also correctly uses the terms-sixths, diagram, shape, hexagon, rhombus, trapezoid, triangle, equal. The student correctly uses the mathematical notation-1/1, 1/3, 1/2, 1/6, 24/6, $300.00, $100.00, $150.00, $50.00.
Connections Practitioner	The student makes the mathematically relevant connections, "I named the shapes," "I see 24/6 ▲ equals 4 hexagons," and, "24 triangles is 4 hexagons."
Representation Practitioner	The student's table is appropriate and accurate with all columns correctly labeled and all entered data is correct. The student's diagram is appropriate and accurate. The student defines the diagram by stating, "24 triangles is 4 hexagons."

Grade 4 Math: Farmer Fred
Annotated Student Work: Practitioner

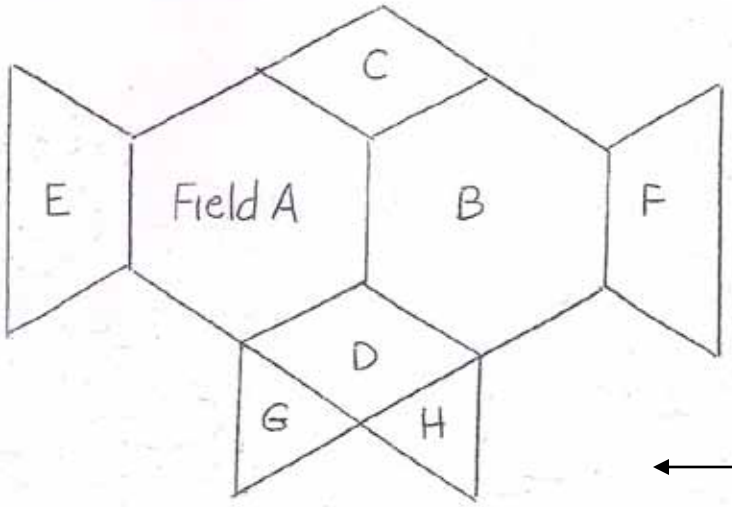
This student is a Practitioner according to both the Exemplars Rubric and the CCSS Content Standards Rubric, (both included in the supporting materials).

Practitioner, Student 3

Name_____

Farmer Fred

Farmer Fred's fields are worth twelve hundred dollars total. The fields are formed with the same properties as your pattern blocks. Each field's value is based on its size. What fraction of the total value is each field worth? How much is each field worth? Show and explain all of your mathematical thinking.



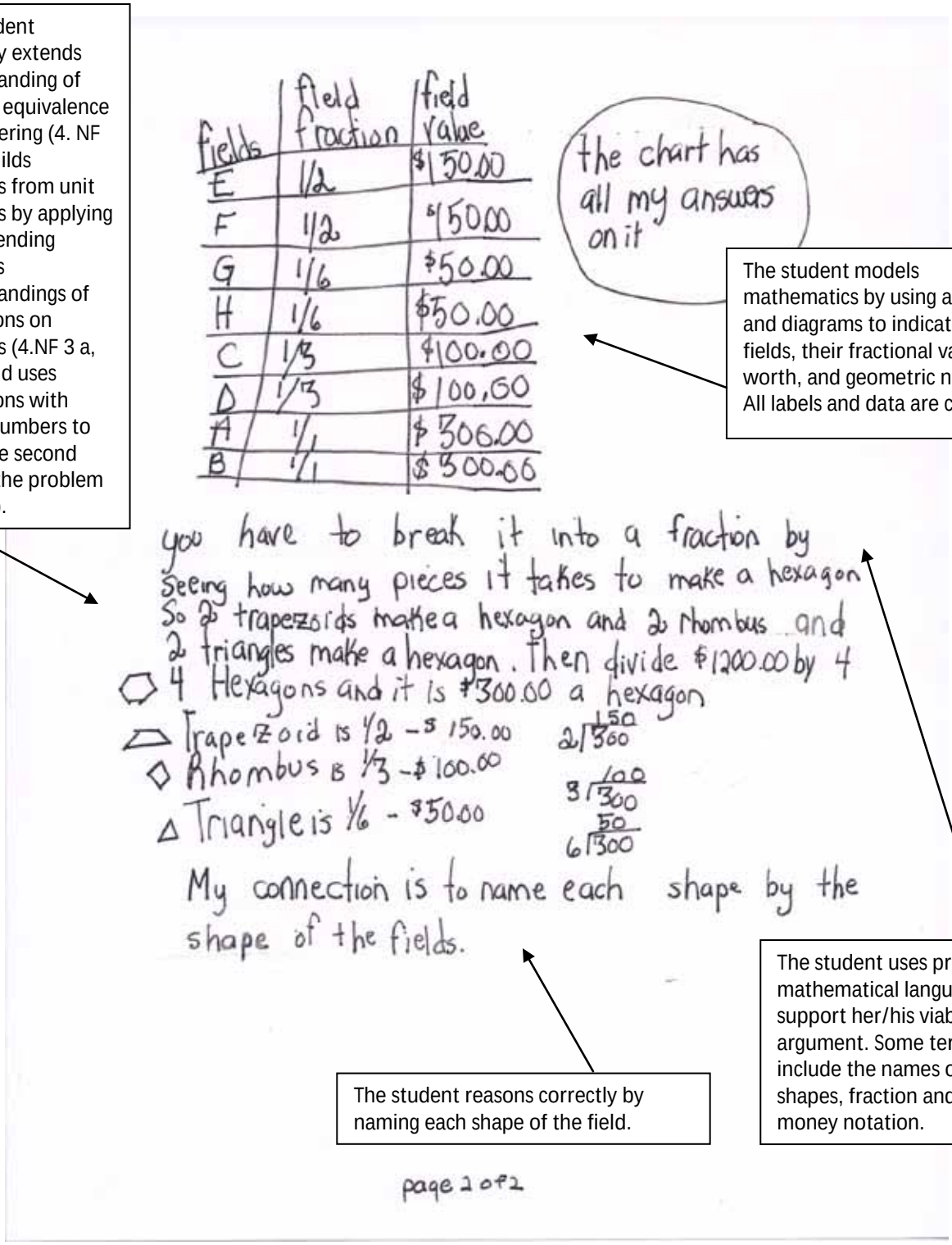
I am going to find out how much each field is worth and the fraction value. I will make a chart

page 1 of 2

The student is able to make sense and persevere in solving the problem. The student applies understanding of fractional parts of a whole in determining the correct fractional value of each field and applies correct number and operations thinking to find the correct worth of each field.

Grade 4 Math: Farmer Fred
Annotated Student Work: Practitioner

The student correctly extends understanding of fraction equivalence and ordering (4. NF 1, 2), builds fractions from unit fractions by applying and extending previous understandings of operations on fractions (4.NF 3 a, b, d), and uses operations with whole numbers to solve the second part of the problem (4.OA 2).



Fields	field fraction	field value
E	1/2	$150.00
F	1/2	$150.00
G	1/6	$50.00
H	1/6	$50.00
C	1/3	$100.00
D	1/3	$100.00
A	1/1	$300.00
B	1/1	$300.00

the chart has all my answers on it

you have to break it into a fraction by seeing how many pieces it takes to make a hexagon So 2 trapezoids make a hexagon and 2 rhombus and 2 triangles make a hexagon. Then divide $1200.00 by 4 4 Hexagons and it is $300.00 a hexagon

Trapezoid is 1/2 - $150.00

Rhombus is 1/3 - $100.00

Triangle is 1/6 - $50.00

2|300 150

3|300 100

6|300 50

My connection is to name each shape by the shape of the fields.

page 2 of 2

The student models mathematics by using a table and diagrams to indicate the fields, their fractional value, worth, and geometric names. All labels and data are correct.

The student uses precise mathematical language to support her/his viable argument. Some terms include the names of the shapes, fraction and money notation.

The student reasons correctly by naming each shape of the field.

Grade 4 Math: Farmer Fred
Annotated Student Work: Practitioner

Practitioner – Student 3 Summary

Achievement Level: Student 3 is a Practitioner according to both the Exemplars Process Rubric and the CCSS Content Standards Rubric, (both of which are included in the supporting materials). The table below provides a rationale for the student's performance level in each of the criteria identified in the Exemplars Process Rubric.

Criteria and Performance Level	Rationale
Problem Solving Practitioner	The student's strategy of creating a table to show each field, determining the fractional part of each field, and the fair worth of each field, works to solve the problem. The student writes, "the chart has all my answers on it." The student's answer, "Field E and F is 1/2 and $150.00, Field G and H is 1/6 and $50.00, Field C and D is 1/3 and $100.00, Field A and B is 1/1 and $300.00," is correct.
Reasoning and Proof Practitioner	The student demonstrates correct reasoning of the underlying mathematical concepts in the problem. The student applies understanding of fractional parts of a whole when considering that all the fields combined total four hexagons. The student divides $1200.00 by four for a quotient of $300.00 and then divides the $300.00 by the denominators two, three, and six to find the correct worth of each field.
Communication Practitioner	The student correctly uses the mathematical terms-fraction, worth, value, from the task. The student also correctly uses the terms-chart, hexagon, rhombus, triangles, trapezoid, shapes. The student correctly uses the mathematical notation-1/2, 1/6, 1/3, 1/1, $150.00, $50.00, $100.00, $300.00.
Connections Practitioner	The student makes the mathematically relevant connections, "My connection is to name each shape by the shape of the fields." The student diagrams a shape and labels it with its correct name.
Representation Practitioner	The student's table is appropriate and accurate with all columns correctly labeled and all entered data is correct. The student's diagram of the field shapes is also appropriate and accurate with each shape labeled correctly.

Instructional Implications: Farmer Fred, 4

Student Achievement Level: Practitioner

The following is a list of instructional implications that you may want to consider for students performing at the Practitioner level. In addition, you may want to consult the suggestions for the Novice and Apprentice levels:

- Include more writing of equations using fractions, 1/6 + 1/6 + 1/6 = 6/6 which is one whole
- Encourage student to independently make more than one mathematically relevant connection about her/his work (see Preliminary Planning Sheet)
- Introduce another strategy to solve the same problem-area model/circle graph/diagram, table, number line,
- Establish a different total value for the fields for practice

Grade 4 Math: Farmer Fred
Annotated Student Work: Apprentice

This student is an Apprentice according to both the Exemplars Rubric and the CCSS Content Standards Rubric (both included in the supporting materials).

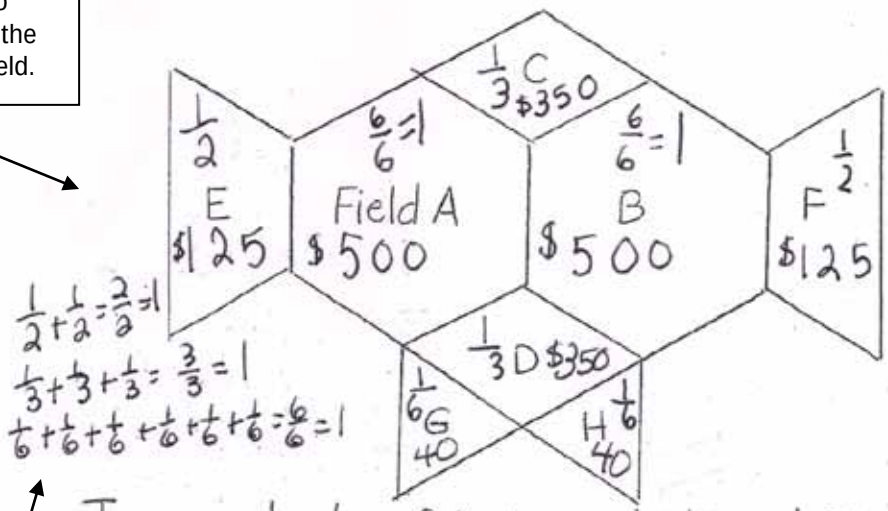
Apprentice, Student 1 Grade 4

Name_____

Farmer Fred

Farmer Fred's fields are worth twelve hundred dollars total. The fields are formed with the same properties as your pattern blocks. Each field's value is based on its size. What fraction of the total value is each field worth? How much is each field worth? Show and explain all of your mathematical thinking.

The student is able to make sense of part of the problem. The student correctly defines the fractional value of each field but is not able to correctly define the worth of each field.



$\frac{1}{2}+\frac{1}{2}=\frac{2}{2}=1$

$\frac{1}{3}+\frac{1}{3}+\frac{1}{3}=\frac{3}{3}=1$

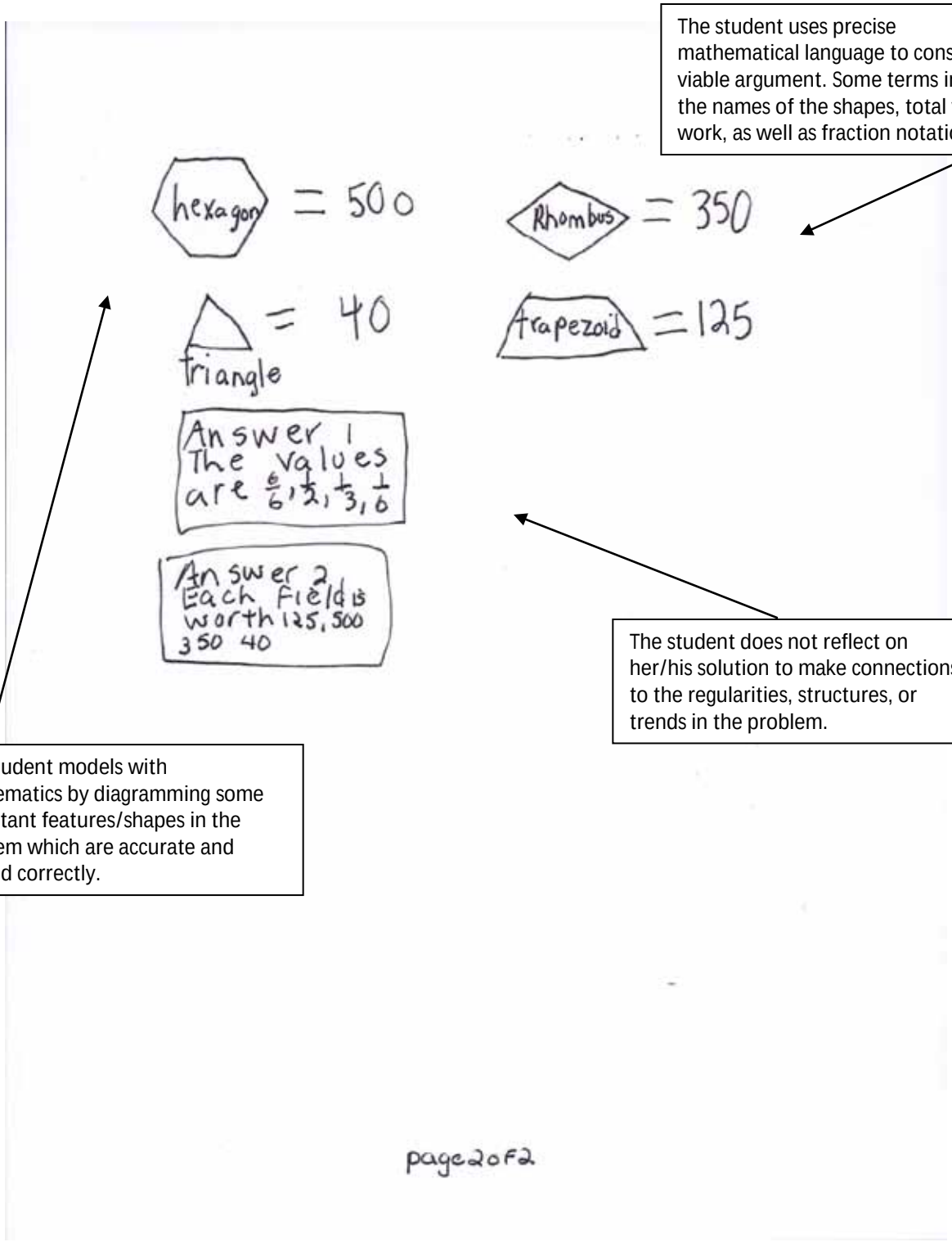
$\frac{1}{6}+\frac{1}{6}+\frac{1}{6}+\frac{1}{6}+\frac{1}{6}+\frac{1}{6}=\frac{6}{6}=1$

I need to find out the total value for each field and how much is each field worth. I will make a diagram and use my pattern blocks.

page 1 of 2

The student correctly extends understanding of fraction equivalence and ordering (4.NF 1, 2), and builds fractions from unit fractions by applying and extending previous understandings of operations on fractions (4.NF 3, a, b, d). The student does not use operations with whole numbers to solve the problem (4.OA 2).

Grade 4 Math: Farmer Fred
Annotated Student Work: Apprentice



The student uses precise mathematical language to construct a viable argument. Some terms include the names of the shapes, total value, work, as well as fraction notation.

The student does not reflect on her/his solution to make connections to the regularities, structures, or trends in the problem.

The student models with mathematics by diagramming some important features/shapes in the problem which are accurate and labeled correctly.

Grade 4 Math: Farmer Fred
Annotated Student Work: Apprentice

Apprentice – Student 1 Summary

Achievement Level: Student 1 is an Apprentice according to both the Exemplars Process Rubric and the CCSS Content Standards Rubric, (both of which are included in the supporting materials). The table below provides a rationale for the student's performance level in each of the criteria identified in the Exemplars Process Rubric.

Criteria and Performance Level	Rationale
Problem Solving Apprentice	The student's strategy of labeling each lot on the diagram of the eight fields with the correct fraction of the total value, works to solve the first part of the problem. The student's answer, "6/6, 1/2, 1/3, 1/6," is correct. The student's strategy of diagramming the four field shapes and stating their worth would work to solve the second part of the problem but the student does not determine any correct values. The student's answer, "Each Field is worth 125, 500, 350, 40," is incorrect.
Reasoning and Proof Apprentice	The student demonstrates correct reasoning of some of underlying mathematical concepts in the problem. The student applies understanding of fractional parts of a whole when considering hexagon, trapezoid, rhombus, and triangle shapes and determines what fraction of the total value each field is worth. The student is not able to determine any correct worth of a field. The student does not supply any computation to support her/his thinking so one does not know why the student uses 500, 350, 40, 125. The money the student lists does not connect with the student's understanding of fractional parts of a whole.
Communication Practitioner	The student correctly uses the mathematical terms-total value, worth, from the task. The student also correctly uses the terms-diagram, hexagon, rhombus, triangle, trapezoid. The student correctly uses the mathematical notation-1/2, 6/6, 1/3, 1/6.
Connections Novice	The student solves the problem and stops without making a a mathematically relevant connection.
Representation Apprentice	The student's diagram of the shapes from the problem is appropriate but not accurate. The student correctly diagrams and labels each shape but the worth of each field is incorrect. No money notation was used to support that the numbers were actually what each field was worth.

Grade 4 Math: Farmer Fred
Annotated Student Work: Apprentice

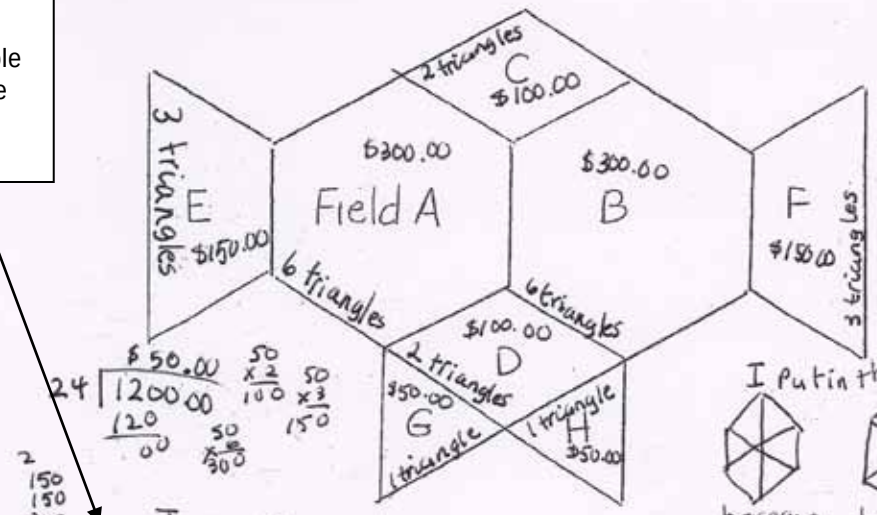
This student is an Apprentice according to both the Exemplars Rubric and the CCSS Content Standards Rubric (both included in the supporting materials).

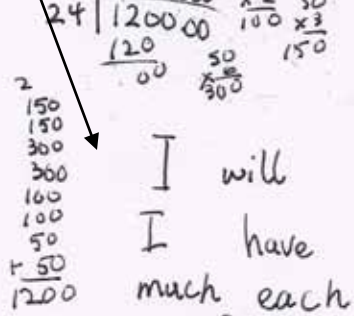
Apprentice, Student 2 Grade 4

Name_____

Farmer Fred

Farmer Fred's fields are worth twelve hundred dollars total. The fields are formed with the same properties as your pattern blocks. Each field's value is based on its size. What fraction of the total value is each field worth? How much is each field worth? Show and explain all of your mathematical thinking.





I will draw a diagram I have to find out how much each field is worth. So find how many triangles and divide into $1200.00 to get the answer.

Answer
Field E $150.00
Field A & B $300.00
Field C & D $100.00
Field G & H $50.00

page 1 of 1

The student correctly extends understanding of fraction equivalence and ordering (4. NF 1, 2), but does not build fractions from unit fractions by applying and extending previous understandings of operations on fractions (4.NF 3 a, b, d). The student uses operations with whole numbers to solve the second part of the problem (4.OA 2).

The student models with mathematics by accurately diagramming the shapes of the fields and providing all necessary labels.

The student uses precise mathematical language to support her/his viable argument. Some terms include the names of shapes, fraction and money notation.

The student does not reflect on her/his solution to make a connection about the structures, regularities, or trends in the problem.

The student is able to make sense of most of the problem. The student applies fractional understanding by determining the correct number of triangles for each shape but does not label the fractional value of each field the triangles represent. The student finds the correct worth of each field.

Grade 4 Math: Farmer Fred
Annotated Student Work: Apprentice

Apprentice – Student 2 Summary

Achievement Level: Student 2 is an Apprentice according to both the Exemplars Process Rubric and the CCSS Content Standards Rubric, (both of which are included in the supporting materials). The table below provides a rationale for the student's performance level in each of the criteria identified in the Exemplars Process Rubric.

Criteria and Performance Level	Rationale
Problem Solving Apprentice	The student's strategy of diagramming the fractional parts of each shape by indicating how many triangles make up each shape would work to solve the first part of the problem but the student does not state any fractions as an answer. The student shows computation to support how each field's worth was determined. The student's answer, "Field E, F $150.00. Field A, B $300.00, Field C, D $100.00, Field G, H $50.00," is correct.
Reasoning and Proof Apprentice	The student demonstrates correct reasoning of most of the underlying mathematical concepts in the problem. The student applies understanding of fractional parts of a whole when considering how many triangles are needed to create a hexagon, trapezoid, and rhombus. The student writes how many triangles are needed in each shape but does not represent that thinking with a fraction for each field which is why the student earns a performance level of Apprentice. The student correctly reasons and labels the worth of each field and includes computation to support her/his thinking.
Communication Practitioner	The student correctly uses the mathematical term—worth—from the task. The student also correctly uses the terms-diagram, hexagon, trapezoid, rhombus, triangle. The student correctly uses the mathematical notation-$150.00, $300.00, $100.00, $50.00.
Connections Novice	The student solves the problem and stops without making a mathematically relevant connection.
Representation Apprentice	The student's diagram of the shapes from the problem with the triangles in each shape is appropriate and accurate. The shapes are correctly labeled and the student states, "I put in the triangles."

Grade 4 Math: Farmer Fred
Annotated Student Work: Apprentice

This student is an Apprentice according to the Exemplars Rubric and a Practitioner according to the CCLS Content Standards Rubric (both included in the supporting materials).

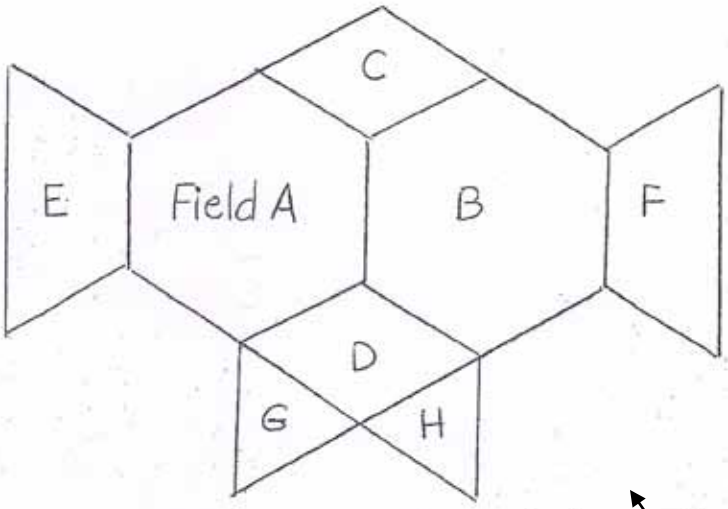
Exemplars Rubric: Apprentice
CCLS Content Rubric: Practitioner

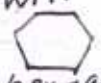
Grade 4

Name_____

Farmer Fred

Farmer Fred's fields are worth twelve hundred dollars total. The fields are formed with the same properties as your pattern blocks. Each field's value is based on its size. What fraction of the total value is each field worth? How much is each field worth? Show and explain all of your mathematical thinking.



I have to find out how the fraction and the total value is of each field is. I will use a diagram to see how many  there are.

hexagons

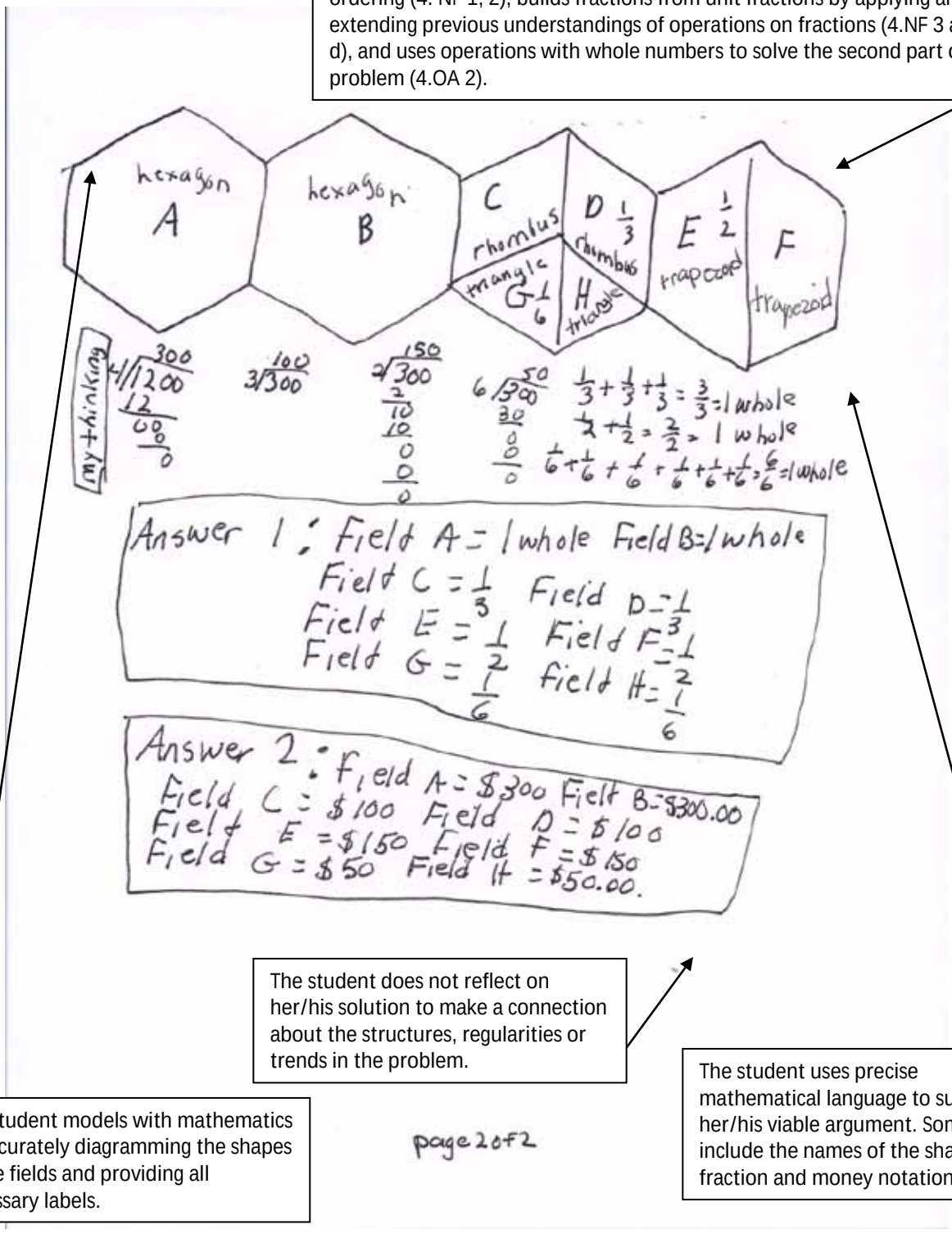
page 1 of 2

The student is able to make sense and persevere in solving the problem. The student applies understanding of fractional parts of a whole in determining the correct fractional value of each field and applies correct number and operations thinking to find the correct worth of each field.

Grade 4 Math: Farmer Fred

Annot

The student correctly extends understanding of fraction equivalence and ordering (4. NF 1, 2), builds fractions from unit fractions by applying and extending previous understandings of operations on fractions (4.NF 3 a, b, d), and uses operations with whole numbers to solve the second part of the problem (4.OA 2).



The student does not reflect on her/his solution to make a connection about the structures, regularities or trends in the problem.

The student models with mathematics by accurately diagramming the shapes of the fields and providing all necessary labels.

The student uses precise mathematical language to support her/his viable argument. Some terms include the names of the shapes, fraction and money notation.

page 2 of 2

Grade 4 Math: Farmer Fred
Annotated Student Work: Apprentice

Apprentice/Practitioner – Student 3 Summary

Achievement Level: Student 3 is an Apprentice according to the Exemplars Process Rubric and a Practitioner according to the CCSS Content Standards Rubric (both of which are included in the supporting materials). The table below provides a rationale for the student's performance level in each of the criteria identified in the Exemplars Process Rubric.

Criteria and Performance Level	Rationale
Problem Solving Practitioner	The student's strategy of determining and diagramming four hexagons that can be formed using all the fields, dividing 1200 by 4, 300 by 3, 300 by 2, 300 by 6, stating the quotients as money, and finding the fraction of the total value each field is, works to solve the problem. The student's answer for part one of the problem, "Field A = 1 whole, Field B = 1 whole, Field C = 1/3, Field D = 1/3, Field E = 1/2, Field F = 1/2, Field G = 1/6, Field H = 1/6," is correct. The student's answer for part two of the problem, field A = $300 Field B = $300.00, Field C = $100, Field D = $100, Field E = $150, Field F = $150, Field G = $50, Field H = $50.00, is correct.
Reasoning and Proof Practitioner	The student demonstrates correct reasoning of the underlying mathematical concepts in the problem. The student applies understanding of fractional parts of a whole when considering hexagon, trapezoid, rhombus, and triangle shapes and determines what fraction of the total value each field is worth. The student also shows correct reasoning in determining the worth of each field by dividing 1200 by the 4 hexagons and then using the denominator of 1/2, 1/3, and 1/6 to find the correct worth of each field.
Communication Practitioner	The student correctly uses the mathematical terms-fraction, total value, from the task. The student also correctly uses the terms-diagram, hexagon, rhombus, triangle, trapezoid, whole. The student correctly uses the mathematical notation-1/6, 1/3, 1/2, 3/3, 2/2, 6/6, $300.00, $50.00. The student does not earn notation credit for $300, $100, $150, $50, because they lack a decimal point and the zeros to hold the cent places.
Connections Novice	The student solves the problem and stops without making a mathematically relevant connection.
Representation Practitioner	The student's diagram is appropriate and accurate with all necessary labels included.

Instructional Implications: Farmer Fred, 4

Student Achievement Levels: Novice and Apprentice

The following is a list of instructional implications that you may want to consider for students performing at the Novice and Apprentice levels:

Review how to read a mathematics problem-listen to the problem being read, read the problem to yourself, underline the important information, find the question sentence(s), determine the important nouns, look for mathematical language, etc.
Explore congruency and equivalent fractions using pattern blocks

- Use other manipulatives to investigate fractional part of a whole-fraction bars and circles, fraction wheels, paper plates, sticks
- Use games requiring the use of fractions with and without like denominators
- Work with a number line
- Order fractions with cards, sticks, etc.
- Provide activities where student adds and subtracts fractions with like and unlike denominators
- Review mathematical language-model, diagram/area model/circle graph key, table, number line, more/less than, fraction, 1/2, 1/3, 3/6 6/6..., numerator, denominator, whole, equivalent, shapes, hexagon, trapezoid triangle, rhombus, polygon, congruent
- Review how to make a diagram/area model with a key, table, chart
- Have centers available for investigation and practice with finding and applying fractions
- Provide leading questions to begin reflection on the solution in order to see regularities, structures, patterns, trends, etc. (See Preliminary Planning Sheet)
- Review division and multiplication

Grade 4 Math: Farmer Fred
Annotated Student Work: Novice

This student is a Novice according to both the Exemplars Rubric and the CCSS Content Standards Rubric (both included in the supporting materials).

The student is not able to discern that the problem requires an understanding of fractional parts to a whole and computation with money. The student does not indicate a fractional value for each field and the worth of each field is not correct.

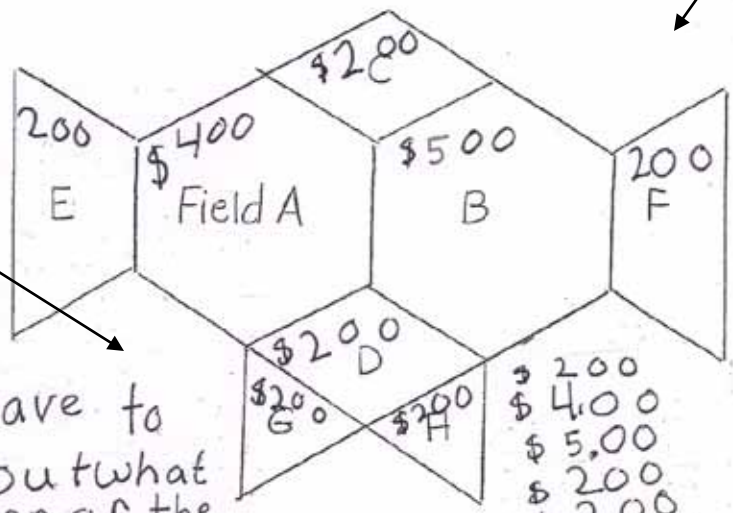
Novice, Student 1 Grade 4

Name_____

Farmer Fred

Farmer Fred's fields are worth twelve hundred dollars total. The fields are formed with the same properties as your pattern blocks. Each field's value is based on its size. What fraction of the total value is each field worth? How much is each field worth? Show and explain all of your mathematical thinking.

The student does not apply understanding of fraction equivalence and ordering (4NF 1, 2), and does not build fractions from unit fractions by applying and extending previous understanding of operations on whole numbers (4NF 3, b, d).



I have to find out what fraction of the total value is each field and how much is each field

$ 200
$ 4,00
$ 5,00
$ 200
$ 200
$1500

page 1 of 1

The student applies the math term, total value, in the solution but not the stated word-fraction.

The student does not model with mathematics. The student only labels the one provided with incorrect monetary amounts for each field and does not construct her/his own diagram or table to construct a viable argument.

The student is not able to search for the regularity and trends embedded in the problem.

Grade 4 Math: Farmer Fred
Annotated Student Work: Novice

Novice – Student 1 Summary

Achievement Level: Student 1 is a Novice according to both the Exemplars Process Rubric and the CCSS Content Standards Rubric, (both of which are included in the supporting materials). The table below provides a rationale for the student's performance level in each of the criteria identified in the Exemplars Process Rubric.

Criteria and Performance Level	Rationale
Problem Solving Novice	The student's strategy of filling in each lot on the diagram of the eight fields with either $200, $400, $500, or 200 would not work to solve the problem. The student does not state an answer.
Reasoning and Proof Novice	The student does not demonstrate correct reasoning of the underlying mathematical concepts in the problem. The student does not apply understanding of fractional parts of a whole when considering hexagon, trapezoid, rhombus, and triangle shapes, equivalent fractions, and correct money notation. The student is not able to determine any correct worth of a field and labels fields with the same properties and fractional parts to the whole differently or with the same worth given another field's shape. The student does not address the fraction of the total value each field is worth.
Communication Apprentice	The student does not use any mathematical language.
Connections Novice	The student solves the problem and stops without making a a mathematically relevant connection.
Representation Novice	The student does not attempt a mathematical representation. Filling in the fields on the diagram provided is not considered an attempt. The student has to make her/his own mathematical representation.

GRADE 4 MATH: FARMER FRED INSTRUCTIONAL SUPPORTS

The instructional supports on the following pages include a unit outline with formative assessments and suggested learning activities. Teachers may use this unit outline as it is described, integrate parts of it into a currently existing curriculum unit, or use it as a model or checklist for a currently existing unit on a different topic.

Unit Outline – Grade 4 Math

INTRODUCTION: This unit outline provides an example of how to integrate performance tasks into a unit of instruction. *Teachers may (a) use this unit as it is described below; (b) integrate parts of it into a currently existing curriculum unit; or (c) use it as a model or checklist for a currently existing unit on a different topic*

Grade Subject: Title

UNIT TOPIC AND LENGTH:

- Understanding how shapes and sizes fit together. Can be segmented into parts to help learners make sense of problems and persevere in solving them by using their knowledge of not only lines and angles, but also the four operations with whole numbers. Further knowledge of fractions and how they can be applied to geometry is fundamental to recognizing equalities in shape and area.
- Unit Length: 4-6 weeks

COMMON CORE CONTENT STANDARDS:

- **3.G.2** Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole.
- **4.G.2** Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize right triangles as a category, and identify right triangles
- **4.NF3c** Add and subtract mixed numbers with like denominators, e.g., by replacing each mixed number with an equivalent fraction, and/or by using properties of operations and the relationship between addition and subtraction.
- **4.NF3d** Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators, e.g., by using visual fraction models and equations to represent the problem.
- **4.NF.4c** Solve word problems involving multiplication of a fraction by a whole number, e.g., by using visual fraction models and equations to represent the problem.
- **4.OA.3** Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.
- **MP.1** Make sense of problems and persevere in solving them.
- **MP.3** Construct viable arguments and critique the reasoning of others.
- **MP.6** Attend to precision.
- **MP.7** Look for and make use of structure.

BIG IDEAS/ENDURING UNDERSTANDINGS:	ESSENTIAL QUESTIONS:

➢ Mathematicians recognize equalities in shape and area, connect geometry to number, operations, and measurement via the notion of partitioning. ➢ Mathematicians classify shapes by properties of their lines and angles and make mathematical sense of shapes based on their geometric properties. ➢ Mathematicians make sense of problems by persevering, applying, and modeling, to expand the concept of number sense beyond whole numbers, to include fractions and irrational numbers.	➢ How can I combine shapes to find the area of the new shapes? ➢ How can I group shapes to identify their similarities? ➢ What steps do I need to take to make sense of problems?
CONTENT: **Connections** ➢ Geometry to numbers ➢ Operations ➢ Equalities of shape and area ➢ Measurements ➢ Parts to whole ---------- **Classification** ➢ Properties of lines and angles ➢ Geometric properties ➢ Characteristics of polygons ➢ Proportional relationships ---------- **Number Sense** ➢ Fractions ➢ Whole numbers ➢ Decimals ➢ Money notation ➢ Irrational numbers	**SKILLS:** ➢ **Partition** shapes into parts with equal areas. ➢ **Combine** polygons to determine the area of irregular shapes ➢ **Construct** models with multiple representations of the same value ➢ **Identify** appropriate operations within the problem solving process ---------- ➢ **Describe** the characteristics of polygons. ➢ **Compare** the characteristics of polygons. ➢ **Identify** the similarities in polygons. ---------- ➢ **Add** fractions, decimals, and whole numbers. ➢ **Solve** multi-step word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. ➢ **Formulate** explanations of processes taken to problem solve. ➢ **Apply** concepts to **solve** word problems involving multiplication of a fraction by a whole number ➢ **Write** decimal numbers in money notation.

ASSESSMENT EVIDENCE AND ACTIVITIES:

INITIAL ASSESSMENT: 75 POINTS

The **initial assessment** also allows for what is sometimes called a touchstone task. The task should be rich enough that it can be solved from a variety of approaches, so that students can make sense of it in natural ways. Then as the unit progresses, students should be able to move to more efficient or grade-level appropriate strategies. As the students learn new ideas or procedures, students and the teacher can reflect upon how these new ideas and procedures might apply to the initial task.

The task 75 Points asks students to partition shapes into parts with equal areas, find the fair value of each shape by multiplying fractions by whole numbers and find the total value of all shapes through addition of mixed numbers. Students must justify their mathematical thinking as they solve the problem. *See 75 Points for full details.*

FORMATIVE ASSESSMENTS:

The purpose of formative assessment is to surface misconceptions and, through the course of the lessons, to provide ways for students to resolve these misconceptions and deepen their understanding. By surfacing misconceptions, the teacher is then able to make mid-unit corrections to instruction. Thus, students' experiences help to improve learning, rather than waiting until the final assessment to uncover problems or gaps in learning. Throughout this unit, periodic collection and analysis of work from the tasks included in the learning plan should yield a wealth of information teachers can use formatively.

FINAL PERFORMANCE TASK: FARMER FRED

This task gives students the total monetary value of a set of fields and asks them to find the fractional and actual value of each field. Students use fractional parts of a whole, properties of shapes, congruency, and computation using fractions and money to determine the fair value and total worth of eight fields. Students must justify their mathematical thinking as they solve the problem. *See Farmer Fred for full details.*

LEARNING PLAN & ACTIVITIES:

PATTERN BLOCKS, FRACTIONS AND TANGRAMS:

- In addition to the supports below, teachers may use some of the tasks included in this packet as part of the learning plan throughout the unit. A suggested sequence for use of the tasks is below:
  - Little Bear
  - Kickball Money
  - Golden Pin
  - Selling Fudge
  - Build it with Pattern Blocks
  - A Pattern Block Design

- A Challenge #2
- Feverish Freddy

- Build a Shape Workshop: Students will work to replicate a shape (i.e.: the yellow hexagon or the blue trapezoid) using a different assortment of pattern blocks. Next, ask students to find multiple ways to do this. As they develop combinations, students should record them using fractions with the original shape (the yellow hexagon or blue trapezoid) having a value of 1. For example, if they build the hexagon with one red trapezoid and three green triangles, they'll write: 1/2 + 1/6 + 1/6 + 1/6 = 1 .

- Ask students to investigate which of the pattern blocks they can use to build shapes that are larger but similar--such as four or nine squares to make a larger square. To get children started, ask: Can you use green triangles to build a larger green triangle that is still the same shape? How many do you need?

- Edible Fraction Activities
  Begin by reading the book Eating Fractions or another appropriate book to introduce the concept of fractions as being a part of a whole or a set. Use the graham crackers to illustrate wholes, halves and quarters, the Hershey Bars to explore sixths and eights, and the colored marshmallows to determines the sets of colors. To introduce denominators and numerators ask students to eat 1/2, 2/6, etc. of the food.

- The Tangram puzzle was invented by the ancient Chinese hundreds of years ago. It is a square broken into seven pieces. When rearranged, these pieces form a great variety of shapes and pictures. This puzzle provides an excellent background for determining fractional parts and wholes.

  Ask students to create a square unit from all seven pieces.
  - Choosing each piece of the Tangram set, ask students which part of the whole square it is.
    - Large right triangles: 1/4
      Square: 1/8
      Small right triangles: 1/16 each
      Medium Right Triangle: 1/8
      Parallelogram: 1/8
  - Changing the unit whole is an interesting activity. For example, if a large right triangle is chosen and announced to be 1 unit in area, ask how the other pieces correspond.
    - Square: 1/2
      Small Right Triangle: 1/4 (each)
      Parallelogram: 1/2
      Medium Right Triangle: 1/2

RESOURCES:

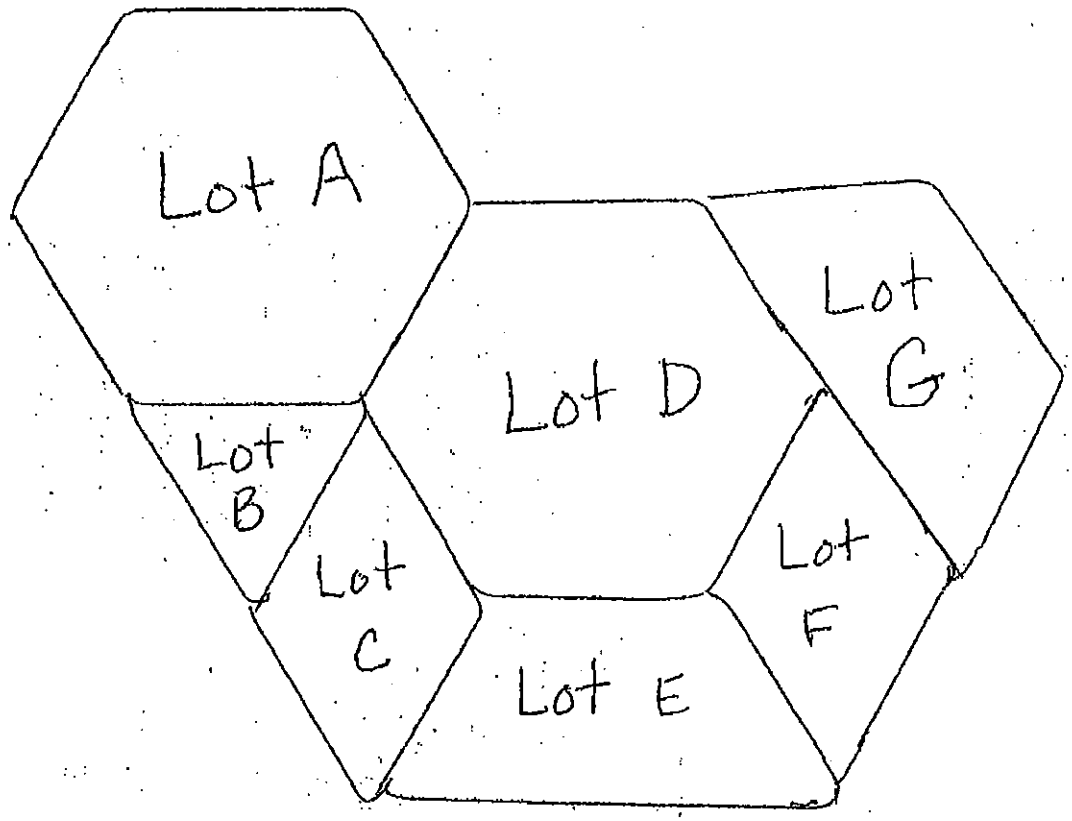
- http://www.mathplayground.com/patternblocks.html
- http://www2.scholastic.com/browse/article.jsp?id=4353
- http://math.rice.edu/~lanius/Patterns/

- Eating Fractions, Bruce Mcmillan
- http://mathman.biz/html/prob2.html
- Plastic Pattern Blocks (set of 250)
- Pattern cards for pattern blocks set activity cards
- 5X5 Pin Geo-boards
- Greedy Triangle, Marilyn Burns
- Mummy Math: An Adventure in Geometry, Cindy Nueschwander

Name_____

75 points

Mike and Juan are walking to the lots in the diagram below. The lots are formed with the same properties as your pattern blocks. They are going to clean each lot by removing papers, bottles, and cans. Each lot they clean will earn Mike and Juan points. If they earn a total of at least 75 points they will earn a reward. If Lot D is worth 20 points to clean up, what is the fair value of the other lots? If Mike and Juan clean up all the lots will they have earned enough points to earn a reward? Show all your mathematical thinking.



Preliminary Planning Sheet for a Mathematics Portfolio Piece/Task

(4)

Title of Task ~~115~~ 75 Points

Content Strand(s) Addressed Number + Operations - Fractions Geometry

State Standard(s) Addressed

Program Link

Common Core Standard(s) 4NF 2.3a-d 4.G.3

Underlying Mathematical Concepts

fractional parts of a whole
number sense to 115
properties of hexagon, trapezoid, rhombus, triangle
congruency | fair value
comparison
multiplication | division

Problem Solving Strategies/Representation

model (manipulatives)
diagram | key
table | chart

Mathematical Language

model	percents 50%...
diagram	decimals .50...
key	equal
chart	total
hexagon	flip
trapezoid	rotate
rhombus	area
triangle	fair value
polygon	similar
symmetry	shape
congruent	numerator
fractions	denominator
$\frac{1}{2}, \frac{1}{4}$...	

48

Answer
Yes, they will have enough points

Possible Solution(s)

115 Points

connection

Lot	Points	running total of points	fractional value
A	30	30	1 whole
B	5	35	$\frac{1}{6}$
C	10	45	$\frac{1}{3}$
D	30	75	1 whole
E	15	90	$\frac{1}{2}$
F	10	100	$\frac{1}{3}$
G	15	115	$\frac{1}{2}$

Connections

- Recreate problem by assigning different point value to Lot A using divisibility rules
- Give fractional | decimal | percent value for each shape
- name each shape
- Relate to a similar problem and state math
- Lot G is $\frac{1}{2}$ of Lot A
- Introduce line of symmetry

Related Tasks

See Resource Binder

P/S	R/P	Com	Con	Rep	AC/LV

Name: _____

Little Bear

Little Bear wants to make a symmetrical design using yellow, red, green, and blue pattern blocks to put on his vest. The value of each green block is ten cents. Each colored block's cost is proportional to the triangle's cost. Design a pattern for Little Bear's vest that is worth four dollars. Use at least two of each of the shapes you choose when you make your design. Show all your mathematical thinking.

Preliminary Planning Sheet for a Mathematics Portfolio Piece/Task (4)

Title of Task Little Bear

Content Strand(s) Addressed Number + Operations - Fractions, Geometry

State Standard(s) Addressed

Program Link

Common Core Standard(s) 4NF 2, 3a, d 4.G 3

Underlying Mathematical Concepts

- symmetry
- properties of hexagon, trapezoid, triangle, rhombus
- money notation
- fair value
- multiplication/division
- number sense to $4.00

Problem Solving Strategies/Representation

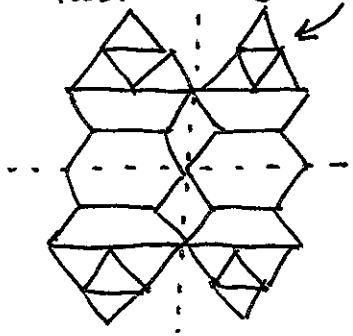
- model (manipulatives)
- diagram/key
- chart
- guess and check

Mathematical Language

model	polygon
diagram	total
key	per
chart	double
symmetry	congruent
triangle	flip
hexagon	rotate
trapezoid	similar
rhombus	area
money notation	square
$	fractions $\frac{1}{2}$ $\frac{1}{3}$
value	decimals .50
shape	percents %

Possible Solution(s)

Possible Design Answer A Design



Shape	total money
hexagon	$1.20
trapezoid	$1.20
rhombus	.40
triangle	$1.20

$60. $30 $20 $10

× 2 × 4 × 2 × 12

$1.20 $1.20 $.40 $1.20

$1.20 + $1.20 + $.40 + $1.20 = $4.00

1 whole 100%

.50 $\frac{1}{2}$ 50%

.33 $\frac{1}{3}$, $\frac{1}{3}$...

$\frac{1}{6}$ ...

Connections

- name the shapes
- create a new design
- recreate design with triangle having a new value using divisibility rules
- relate to a similar problem and state math
- Discuss why square pattern block can not be used
- Design a shape with more than 2 lines of symmetry
- rhombus value is double Δ
- find fractional value or percent/decimal of each shape

Related Tasks

See Resource Binder

P/S	R/P	Com	Con	Rep	AC/LV

Name_____

Kickball Money

Mr. Barton's class decided to sell cookies to earn enough money to buy a kickball for $8.00. The class baked cookies in the shape of the pattern blocks like the ones in the classroom (except for the rhombus and the square). The class decided to sell each hexagon shaped cookie for twenty-four cents. What would be a fair price to charge for the other two shaped cookies? The class sold all the different shaped cookies and earned exactly $8.00. How many of each cookie could the class have baked? Show all your mathematical thinking.

Preliminary Planning Sheet for a Mathematics Portfolio Piece/Task

(4)

Title of Task Kickball Money

Content Strand(s) Addressed Geometry

Number + Operations - Fractions

State Standard(s) Addressed

Program Link

Common Core Standard(s) 4NF 3.3a-d 4.G3

Underlying Mathematical Concepts

- Fractional part of a whole
- properties of hexagon, triangle, trapezoid, rhombus, square
- congruency
- fair value
- multiplication/addition/division
- money notation

Problem Solving Strategies/Representation

- diagram/key
- model (manipulatives)
- chart
- guess and check

Mathematical Language

diagram	hexagon
key	congruent
model	fair value
chart	money notation
properties	$.
shape	area
combinations	most/least
equivalent	fraction
triangle	$\frac{1}{2}$, $\frac{1}{6}$ $\frac{N}{D}$
rhombus	percent 50%...
square	line of symmetry

Possible Solution(s)

Answer

fair price

shape	name of shape	value	fractional part
⬡	hexagon	$.24	1 whole
⏢	trapezoid	$.12	$\frac{1}{2}$
△	triangle	$.04	$\frac{1}{6}$

$.24
$.12
+ $.04
$.40

40 | 800 — 20
400 — 10
400 — 10
400
0

$4.80
$2.40
$ .80
$8.00

many combinations for $8.00

Answer one possible

number of cookies	shape	money earned
20	hexagon	$4.80
20	trapezoid	$2.40
20	triangle	$.80

Connections

- Can't use a square as it is not congruent
- names trapezoid and triangle
- show other totals for $8.00
- show fractional/decimal equivalent names
- show percents $\frac{1}{2}$ is 50%...
- $.12 is one-half of $.24 so can have 10 hexagon and 40 trapezoid cookies
- Relate to a similar problem and state math

Related Tasks

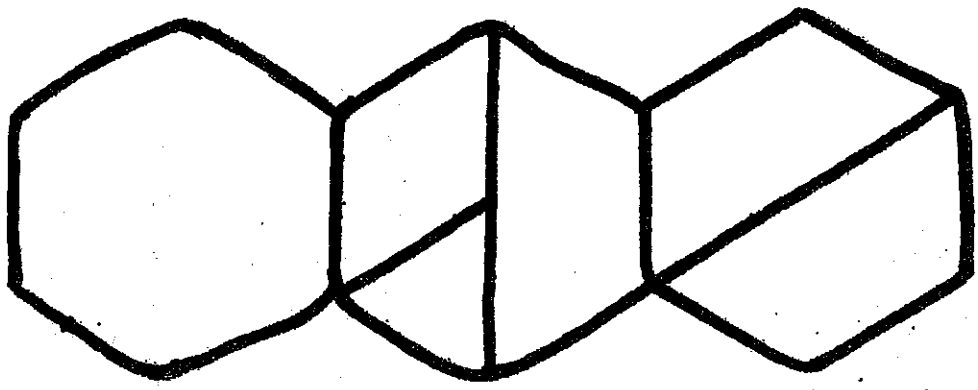
See Resource Binder

Name_____

P/S	R/P	Com	Con	Rep	AC/LV

The Golden Pin

The pin below has been passed down through many generations. The pin is divided into three large parts that look like the yellow pattern block. The first part is worth sixty dollars. Based on this information, what is the fair value of each section of the second part and each second of the third part of the golden pin? Show all your mathematical thinking.



Preliminary Planning Sheet for a Mathematics Portfolio Piece/Task

(4)

Title of Task The Golden Pin

Content Strand(s) Addressed Number + operations - fractions Geometry

State Standard(s) Addressed

Program Link

Common Core Standard(s) 4NF 2,3a,d 4.G3

Underlying Mathematical Concepts

Congruency
fractional part of a whole
properties of hexagon, rhombus, triangle,
multiplication / addition / division
money notation
number sense to $60.00

Problem Solving Strategies/Representation

model (manipulatives)
diagram / key
chart

Mathematical Language

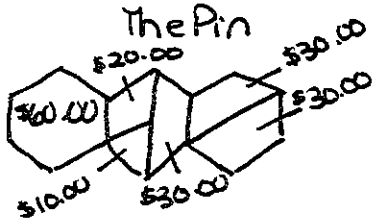
model	per
diagram	total
key	product
chart	sum
shape	congruent
hexagon	money notation
rhombus	$, . line of symmetry
triangle	$\frac{1}{2}, \frac{1}{6}, \frac{1}{3}$ $\frac{N}{D}$
trapezoid	whole
square	area
fractions	fair value
	decimals

54

Possible Solution(s)

Answer see diagram

The Pin



$36.00 × 2 = $60.00

$10.00 × 6 = $60.00

$20.00 × 3 = $60.00

Shape	name	fair value	fractional part
⬡	hexagon	$60.00	1 whole
◇	rhombus	$20.00	$\frac{1}{3}$
△	triangle	$10.00	$\frac{1}{6}$
⏢	trapezoid	$30.00	$\frac{1}{2}$

Connections

- names each shape correctly
- finds fractional and decimal equivalent value
- hexagon has most area
- triangle has least area
- can not use square pattern block - not congruent
- Total value of pin is $180.00
- Redesign pin - could have 3 hexagons or 6 trapezoids or 9 rhombi or 18 triangles or combinations of each
- Relate to a similar problem and state math

Related Tasks

See Resource Binder

- There are lines of symmetry in the 2nd + 3rd hexagons

combinations

P/S	R/P	Com	Con	Rep	AC/LV

Name_____

Selling Fudge

Some students make fudge for a bake sale. The students cut the fudge in the same sizes as the yellow, green, red, and blue pattern block shapes they use in math class. The students sell the fudge cut like a green pattern block for five cents. What is the fair price the students charge for the other shapes of fudge?

Ben wants to spend fifty cents to buy fudge. What pieces of fudge can Ben buy?

Preliminary Planning Sheet for a Mathematics Portfolio Piece/Task

(4)

Title of Task Selling Fudge

Content Strand(s) Addressed Number + Operations - Fractions Geometry

State Standard(s) Addressed

Program Link

Common Core Standard(s) 4 NF 2, 3a-d 4 G 3

Underlying Mathematical Concepts

fractional part of a whole
congruency
money notation $.
properties of hexagon, trapezoid, triangle, rhombus
multiplication / division

Problem Solving Strategies/Representation

model (manipulatives)
diagram / key
chart

Mathematical Language

model	money notation
diagram	$.
key	most
chart	least
hexagon	congruent
trapezoid	per
rhombus	equivalent
triangle	vertex / vertices
square	angle
area	side
cost/profit	fractions $\frac{1}{2}$...
total	decimals .50...
	percents 50%...
	combinations
	numerator
	denominator

Possible Solution(s)

Fudge

Answer

shape	shape name	value	fractional value
△	triangle	$.05	$\frac{1}{6}$
◇	rhombus	$.10	$\frac{1}{3}$
▱	trapezoid	$.15	$\frac{1}{2}$
⬡	hexagon	$.30	1 whole

Answer 2 - various combinations for $.50

example ⬡ $.30 + ▱ $.15 + △ $.05 = $.50

Connections

- State names of each shape
- Add fractional, percent, or decimal amount
- hexagon is most expensive
- triangle is least expensive
- Assign a new value - use the divisibility rules
- Show more than one way to spend $.50
- Compare area and congruency
- Relate to a similar problem and state math
- Explain why the square pattern block can't be used

Related Tasks

See Resource Binder

P/S	R/P	Com	Con	Rep	AC/LV

Name_____

Build it With Pattern Blocks

Jon is building a design with pattern blocks. The yellow hexagon is worth eighteen cents. Jon will create a design that is worth one dollar and fifty-six cents. Jon will use fifteen or more pattern blocks. Jon will not use any square pattern blocks. What could Jon's design look like? How does Jon know that the design is worth one dollar and fifty-six cents? What is the greatest number of blocks that can be used to create a design worth one dollar and fifty-six cents? Show all your mathematical thinking.

Preliminary Planning Sheet for a Mathematics Portfolio Piece/Task

(4)

Title of Task Build it With Pattern Blocks

Content Strand(s) Addressed Number + operations - Fractions Geometry

State Standard(s) Addressed

Program Link

Common Core Standard(s) 4.NF 2, 3a,d 4.G 3

Underlying Mathematical Concepts

fractional part of a whole
properties of shapes
number sense to $1.56
money notation
multiplication/addition
comparison

Problem Solving Strategies/Representation

model (manipulatives)
diagram key
table

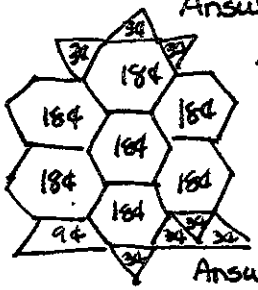
Mathematical Language

model
diagram
key
table
triangle
hexagon
trapezoid
square
rhombus
money notation
$.
double
value
per
fractions
$\frac{1}{2}, \frac{1}{3}$...
decimals
.50...
percents
50%...
shape
most/least
symmetrical

Answer
number of solutions for 1,2
see example

Possible Solution(s)

Answer 1



7 hexagons
7 triangles
1 trapezoid

percent of each shape
hexagon $\frac{6}{6}$ 1 whole
trapezoid $\frac{1}{2}$
rhombus $\frac{1}{3}$
triangle $\frac{1}{6}$

Answer 2

$.18 x 7 = $1.26
$.09 x 1 = $.09
$.03 x 7 = $.21
$1.56

Answer 3

52 triangles
52 x $0.03 = $1.56

Connections

- A rhombus would value double a triangle
- The design is symmetrical
- give the percent value of each shape
- give the decimal value of each shape
- give fraction for value of each shape
- Relate to a similar problem and state math
- Make additional designs that could total $1.56

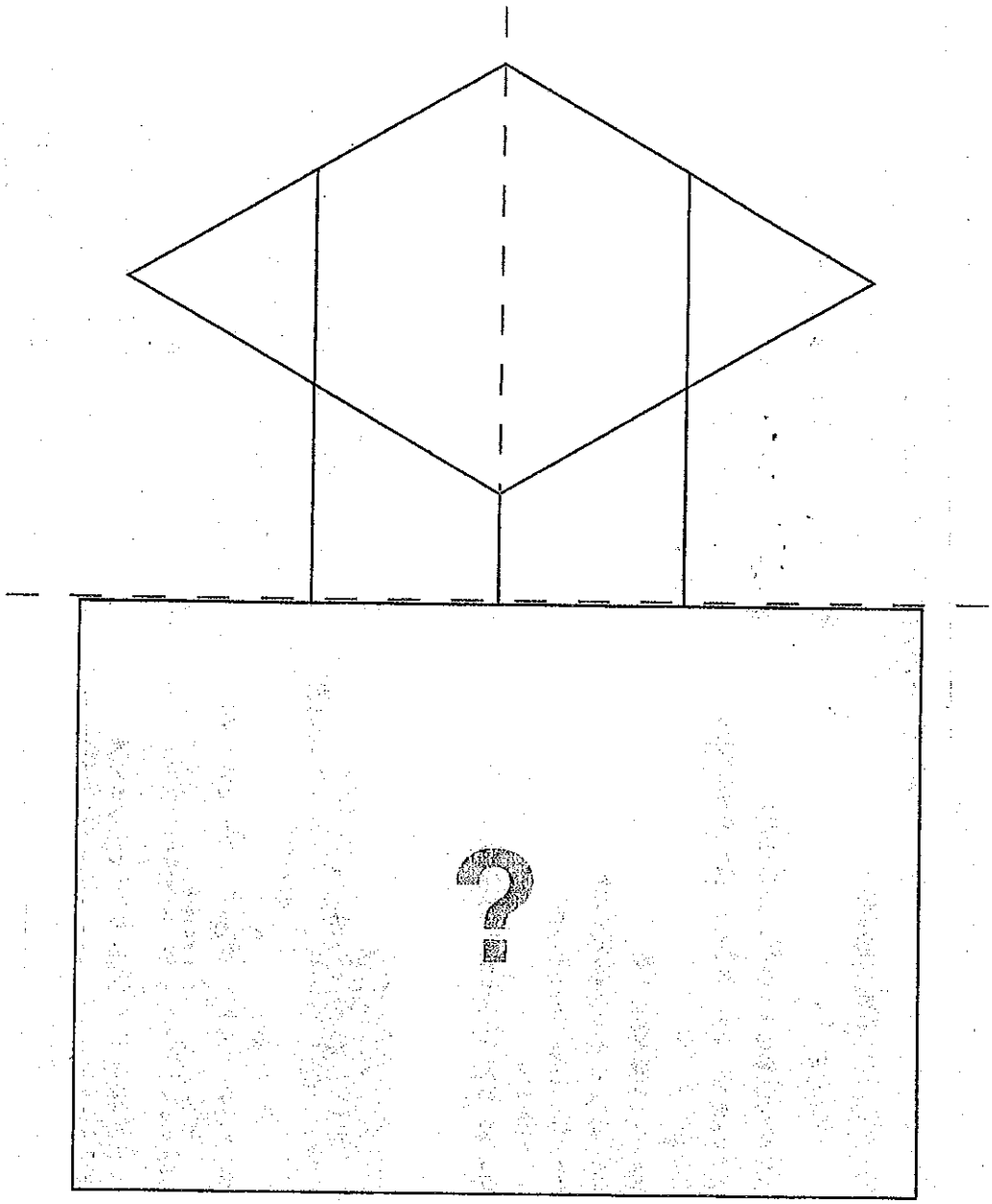
Related Tasks

P/S	R/P	Com	Con	Rep	AC/LV

Name_____

A Pattern Block Design

Tom made a design with pattern blocks. Then Tom drew in two lines of symmetry. Tom covered part of the design with a piece of paper. Tom asked Jen to discover what was under the paper. Tom also told Jen that the hexagon was worth twelve dollars and asked her to determine the fair value of the other shapes in the design. How did Jen complete Tom's design and what values did Jen give the pattern block shapes? Show all your mathematical thinking.



Preliminary Planning Sheet for a Mathematics Portfolio Piece/Task (4)

Title of Task A Pattern Block Design

Content Strand(s) Addressed Number + Operations - Fractions, Geometry

State Standard(s) Addressed

Program Link

Common Core Standard(s) 4.NF 3.3 a-d 4.G 3

Underlying Mathematical Concepts

- fractional part of a whole
- properties of triangle, hexagon, trapezoid
- money notation $.
- multiplication / addition
- division / subtraction
- fair value
- number sense to $12.00

Problem Solving Strategies/Representation

- model (manipulatives)
- diagram / key
- chart

Mathematical Language

model	fractions
diagram	½, ⅓ ... whole
key	decimals .50 ...
chart	percents 100% ...
money	total
money notation	fair value
$.	shapes
line of symmetry	congruent
per	area
triangle	flip
hexagon	rotate
trapezoid	numerator
rhombus	denominator

Possible Solution(s)

Answer - finish pattern by adding 2 trapezoids, 1 hexagon, 2 triangles

shape	Design name of shape	Answer ✓ fair value	fractional value
⬡	hexagon	$12.00	1 whole
⏢	trapezoid	$6.00	½
△	triangle	$2.00	⅙

$2\overline{)12}^{6}$

$6\overline{)12}^{2}$

Connections

- total for all shapes is $20.00
- total value of design is $44.00
- compare area
- show fractional / decimal / percent value of each shape
- prove why a square can not be used as it is not congruent
- create a new design
- assign a different value for the hexagon.
- Discuss how some hexagon value would not work "cents" issue

Related Tasks

See Resource Binder

- Relate to a similar problem and state math

P/S	R/P	Com	Con	Rep	AC/LV

Name_____

A Challenge #2

Emma thinks of a mathematical challenge for the students in the class to solve. Emma gives the students the following directions:

1. Draw a square on the paper.
2. Draw in the lines of symmetry.

Emma asks the following question: If the square is worth seventy-four dollars, what are the fair values of at least three shapes in your square? Show all your mathematical thinking.

Preliminary Planning Sheet for a Mathematics Portfolio Piece/Task (4)

Title of Task A Challenge #2 Content Strand(s) Addressed Number + operations - Fractions Geometry

State Standard(s) Addressed _____ Program Link _____

Common Core Standard(s) 4NF 2, 3a-d 4G3

Underlying Mathematical Concepts

Number sense to $74.00
fractional part of a whole
properties of square, rectangle, triangle
congruency / fair value
symmetry
division / multiplication

Problem Solving Strategies/Representation

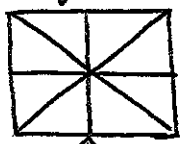
model (manipulatives)
diagram/key
chart

Mathematical Language

model	percents 50%...
diagram	decimals .50...
key	money notation
chart	$. N/D
square	equal
rectangle	total
triangle	flip, rotate
trapezoid	area
polygon	Fair value
symmetry	similar
fractions ½, ¼...	congruent

Possible Solution(s)

Answer 1
Square



line of symmetry

Answer 2
3 of following

small Δ $9.25
med. Δ $18.50
large Δ $37.00
small □ $18.50
rectangle $37.00
rt. trapezoid $27.75

shape	name of shape	value in money	value in %	value in decimal

A possible chart to show various values

$9.25
8 | 74.00
72
20
16
40

$9.25 × 4 = $37.00

$9.25 × 2 = $18.50

$9.25 × 3 = 27.75

Connections

- finds more than 3 shape values
- compare to a rectangle, trapezoid, etc.
- Disuss how areas compare
- Show fraction, decimal, percent value of shapes
- name the shapes
- Relate to a similar problem and state math
- Change value of square
- Discuss how some values for the square would not work ("cents" remainders)

Related Tasks

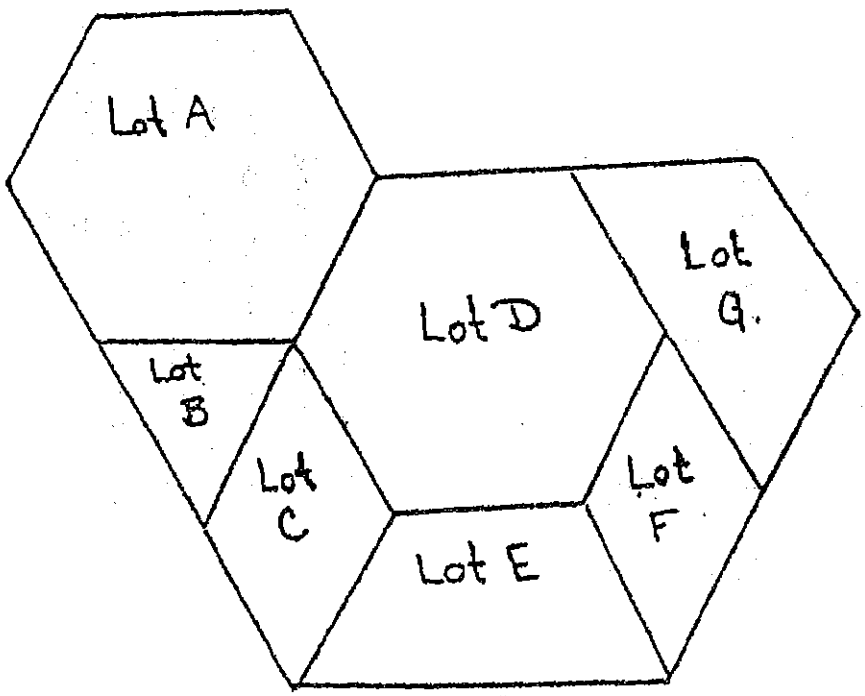
See Resource Binder

P/S	R/P	Com	Con	Rep	AC/LV

Name_____

Feverish Freddy

Freddy, a very precise real estate appraiser, was sent to appraise some lots on a local property. Freddy appraised Lot A for $88,000 but had to go home because he was not feeling well. Freddy is not able to appraise the fair market value for the rest of the lots. Help Freddy finish his appraising work. What are the fair values of all the lots? Show your mathematical thinking.



Preliminary Planning Sheet for a Mathematics Portfolio Piece/Task (4)

Title of Task Feverish Freddy

Content Strand(s) Addressed Number and Operations-Fractions Geometry

State Standard(s) Addressed

Program Link

Common Core Standards 4NF 2,3 a,d 4.G 3

Underlying Mathematical Concepts

fractional part of a whole
congruency
addition/division
money notation
number sense to $88,000.00

Problem Solving Strategies/Representation

model (manipulatives)
diagram/key
table
chart

Mathematical Language

model	value
diagram	fractions $\frac{1}{2}$...
key	decimals .50...
table	percents 50%...
chart	area
hexagon	total
trapezoid	congruent
rhombus	numerator
triangle	denominator
money notation	cost
$.	profit
	><

Answer See value column

64

Possible Solution(s)

The Properties

Lot	name of shape	value of each lot
A	hexagon	$88,000.00
B	triangle	$14,666.60
C	rhombus	$29,333.30
D	hexagon	$88,000.00
E	trapezoid	$44,000.00
F	rhombus	$29,333.30
G	trapezoid	$44,000.00

Connections

- name each shape
- Show fractional/decimal/percent for each shape's value
- The total of all lots is $337,333.20
- Relate to a similar problem and state math
- Shapes are the pattern blocks Explain why square can't be used
- compare area and congruency

Related Tasks

See Resource Binder