

Increasing Rigor in Instruction & Assessments

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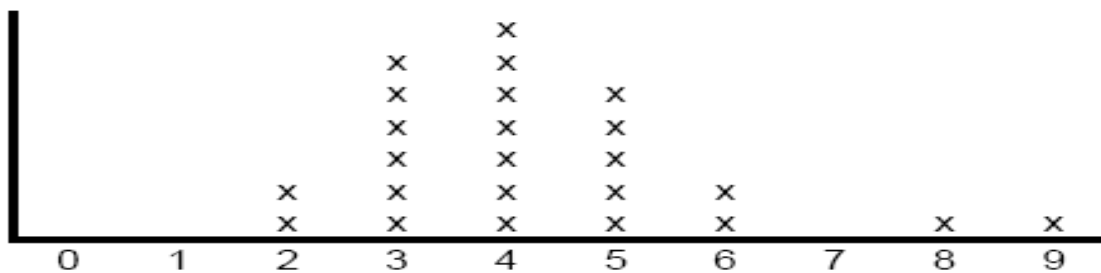
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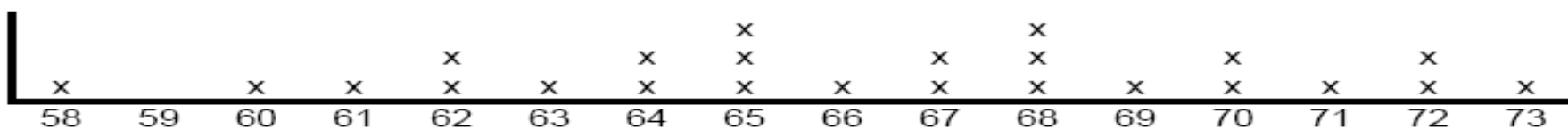
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Culpeper County Public Schools

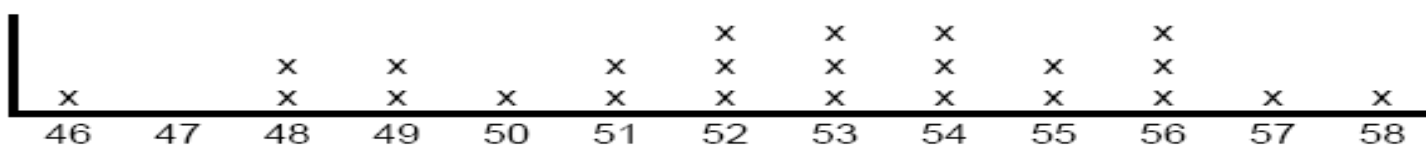
Graph 1



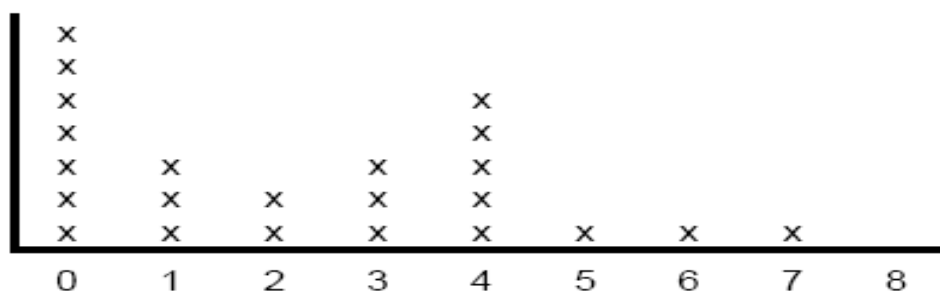
Graph 2



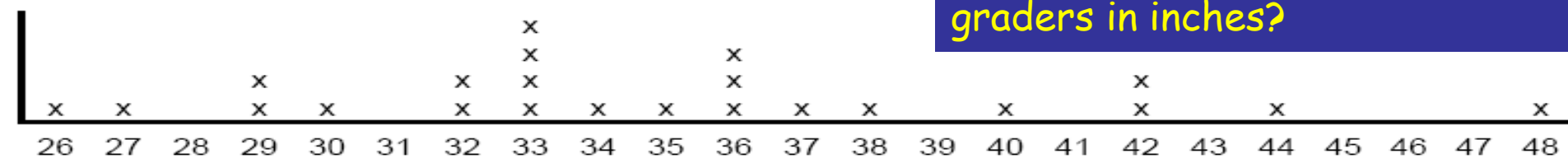
Graph 3



Graph 4



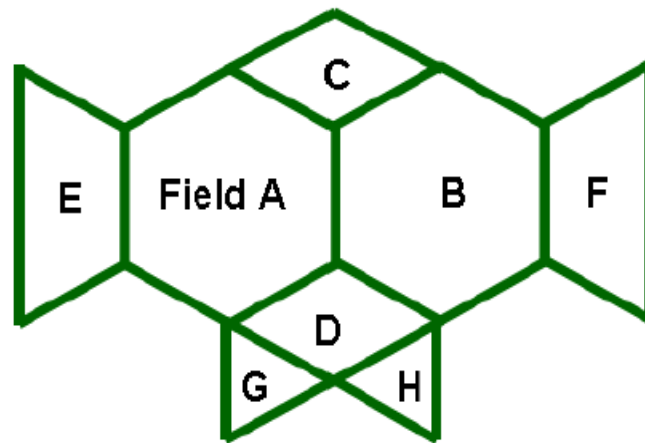
Graph 5



- The number of cavities the sixth graders have?
- The number of people in the sixth graders' families?
- The ages of the sixth graders' mothers?
- The heights of the sixth graders in inches?

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.



Note: The diagram above is not necessarily drawn to scale. It would be wise to build Farmer Fred's fields with your pattern blocks.

F
a
r
m
e
r
F
r
e
d
r

Level of Bloom's vs.
Depth of Knowledge

Cognitive Rigor Matrix for Comprehensive Mathematics Assessment

Depth of Thinking (Webb)+Type of Thinking (Bloom)	DOK Level 1 Recall & Reproduction	DOK Level 2 Basic Skills & Concepts	DOK Level 3 Strategic Thinking & Reasoning	DOK Level 4 Extended Thinking
REMEMBER A	<ul style="list-style-type: none"> Recall, conversions, terms, facts 			
UNDERSTAND B	<ul style="list-style-type: none"> Evaluate an expression Locate points on a grid or number on a number line Solve a one-step equation Represent math relationships in words, pictures, or symbols 	<ul style="list-style-type: none"> Specify, explain relationships Make basic inferences or logical predictions from data/observations Use models/diagrams to explain concepts Make and explain estimates 	<ul style="list-style-type: none"> Use concepts to solve non-routine problems Use supporting evidence to justify conjectures, generalize, or connect ideas Explain reasoning when more than one response is possible Explain phenomena in terms of concepts 	<ul style="list-style-type: none"> Relate mathematical concepts to other content areas, other domains Develop generalizations of the results obtained and the strategies used and apply them to new problem situations
APPLY C	<ul style="list-style-type: none"> Follow simple procedures Calculate, measure, apply a rule (e.g. rounding) Apply algorithm or formula Solve linear equations Make conversions 	<ul style="list-style-type: none"> Select a procedure and perform it Solve routine problems applying multiple concepts or decision points Retrieve information to solve a problem Translate between representations 	<ul style="list-style-type: none"> Design investigation for a specific purpose or research question Use reasoning, planning, and supporting evidence Translate between problem & symbolic notation when not a direct translation 	<ul style="list-style-type: none"> Initiate, design, and conduct a project that specifies a problem, identifies solution paths, solves the problem, and reports results
ANALYZE D	<ul style="list-style-type: none"> Retrieve information from a table or graph to answer a question Identify a pattern/trend 	<ul style="list-style-type: none"> Categorize data, figures Organize, order data Select appropriate graph and organize & display data Interpret data from a simple graph Extend a pattern 	<ul style="list-style-type: none"> Compare information with or across data sets or texts Analyze and draw conclusions from data, citing evidence Generalize a pattern Interpret data from complex graph 	<ul style="list-style-type: none"> Analyze multiple sources of evidence or data sets
EVALUATE E			<ul style="list-style-type: none"> Cite evidence and develop a logical argument Compare/contrast solution methods Verify reasonableness 	<ul style="list-style-type: none"> Apply understanding in a novel way, provide argument or justification for the new application
CREATE F	<ul style="list-style-type: none"> Brainstorm ideas, concepts, problems, or perspectives related to a topic or concept 	<ul style="list-style-type: none"> Generalize conjectures or hypotheses based on observations or prior knowledge and experience 	<ul style="list-style-type: none"> Develop an alternative solution Synthesize information within one data set 	<ul style="list-style-type: none"> Synthesize information across multiple sources or data sets Design a model to inform and solve a practical or abstract solution

Name: _____

Jerome used the following steps to simplify each problem. Review the steps he used and explain whether you agree with him.

B3

$$\frac{1}{4} \times 1200$$

1. Jerome made 1200 into a fraction by putting 1 over 1200. $\frac{1}{1200}$
2. He then multiplied 1 times 1 and 4 times 1200 $\frac{1}{4} \times \frac{1}{1200} = \frac{1 \times 1}{4 \times 1200}$.
3. Jerome wrote his answer as $\frac{1}{4800}$

Provide Jerome detailed feedback on his steps.

Fraction Friction

Name: _____

Simplify each mathematical expression: (Remember to show your work)

$$\frac{1}{24} \times 1200$$

$$\frac{1}{8} \times 64$$

B1

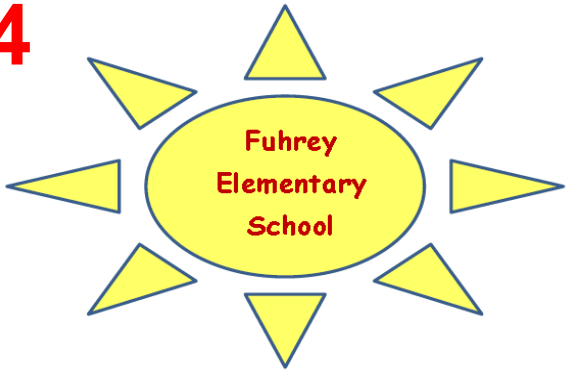
$$\frac{1}{6} \times 120$$

$$\frac{1}{5} \times 400$$

What is the best design to the new elementary school in Newton County?

Superintendent Matthews has requested you and your team to serve as the design committee for the new Fuhrey Elementary School. Using your patterns blocks design the layout for the new school. Transfer your design to paper and label each section of the school (e.g., library, gym, classroom pods, etc.). The cost of materials of each hexagon section used in construction is \$120,000.

F4



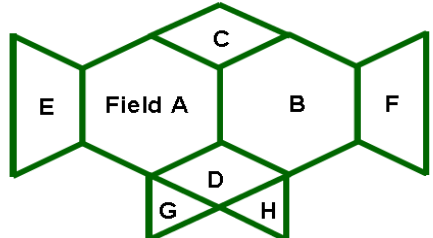
- Dr. Matthews has tasked your committee to submit to him:
- a. A sketch of the building (with each section of the building labeled)
 - b. The fractional part of the entire building that is represented by each section.
 - c. The cost of construction each section.
 - d. The total cost of materials for Fuhrey Elementary School.
 - e. Write a persuasive letter or a presentation to justifying your design of the new school to Dr. Matthews.

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C3



How did we use this with our teams to improve instruction and assessment?

- Met with the grade level team before the beginning of each new unit
- Examined and completed a matrix for the prior year's unit test
- Unpacked the standards (to make sure we were assessing everything we needed to)
- Made adjustments (small ones at first) and added TEI
- For levels that we felt could not be measured by typical test questions, we discussed activities/ performance tasks that could be utilized to increase the rigor in our instruction

Old vs. New Assessment Example

Results

- Overall improvement in instruction
- Unit tests are more on level with benchmark tests
- Math SOL pass rate increased

Work with your group to:

- Select an SOL
- Write questions to assess each Essential Knowledge skill for that SOL
- Make sure that you have at least one question for each DOK level