NJ ASK

New Jersey Assessment of Skills and Knowledge

Mathematics

Grade 5

Extended Constructed Response

Samples

PTM # 1507.52

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September 2010

NJ ASSESSMENT OF SKILLS AND KNOWLEDGE (NJASK)
Grade 5

A MATHEMATICS MANUAL
EXTENDED-CONSTRUCTED RESPONSE QUESTIONS

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NJASK MATHEMATICS & CONSTRUCTED RESPONSE QUESTIONS

The mathematics section of the NJASK measures a student's ability to solve problems by applying mathematical concepts. The areas tested are: Number and Numerical Operations; Geometry and Measurement; Patterns and Algebra; and Data Analysis, Probability, and Discrete Mathematics.

The mathematics section of the test consists of multiple-choice, short-constructed response (SCR) and extended-constructed response (ECR) questions. Each ECR question must be responded to in the area provided in the answer document. For each of these questions, a student must provide enough explanation so that the scorer can understand the solution. The student's response will be scored on the correctness of the method as well as the accuracy of the answer. Responses must be in English in order to be scored.

The ECRs will be hand scored on a scale from 0 to 3. The general scoring guide on the next page was created to help readers score ECR questions consistently. The scoring guide is used by the trained readers who score the Mathematics ECR questions on the NJASK test. Each ECR question on the NJASK has its own scoring rubric which is based upon the general scoring guide.

The students are provided with a Mathematics Reference Sheet as shown on page 3 and a Mathematics Manipulatives Sheet as shown on page 4. The student is also provided with a calculator during the calculator section of the test.

Scoring Guide for Mathematics Extended-Constructed Response (ECR) Questions
(Generic Rubric)

3-Point Response

The response shows complete understanding of the problem's essential mathematical concepts. The student executes procedures completely and gives relevant responses to all parts of the task. The response contains few minor errors, if any. The response contains a clear, effective explanation detailing how the problem was solved so that the reader does not need to infer how and why decisions were made.

2-Point Response

The response shows nearly complete understanding of the problem's essential mathematical concepts. The student executes nearly all procedures and gives relevant responses to most parts of the task. The response may have minor errors. The explanation detailing how the problem was solved may not be clear, causing the reader to make some inferences.

1-Point Response

The response shows limited understanding of the problem's essential mathematical concepts. The response and procedures may be incomplete and/or may contain major errors. An incomplete explanation of how the problem was solved may contribute to questions as to how and why decisions were made.

0-Point Response

The response shows insufficient understanding of the problem's essential mathematical concepts. The procedures, if any, contain major errors. There may be no explanation of the solution, or the reader may not be able to understand the explanation. The reader may not be able to understand how and why decisions were made.

The above generic rubric is used as a guide to develop specific scoring guides or rubrics for each of the ECR questions that appear on the New Jersey statewide assessments in Mathematics. These scoring rubrics provide the criteria for evaluating and scoring student performance and are developed by a committee of mathematicians and teachers. Rubrics ensure consistency, fairness, and accuracy in scoring ECR questions.

Mathematics Reference Sheet

New Jersey Assessment of Skills and Knowledge

Grade 5
MATHEMATICS REFERENCE SHEET

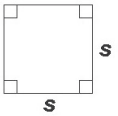
Use the information below to answer questions on the
Mathematics section of the Grade Five Assessment of Skills and Knowledge (NJ ASK 5).

The sum of the measures of the interior angles of a triangle = 180°

Distance = rate × time

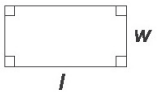
Square

Area = $s \times s$
Perimeter = $4s$



Rectangle

Area = lw
Perimeter = $2l + 2w$



USE THE FOLLOWING EQUIVALENTS FOR YOUR CALCULATIONS

60 seconds = 1 minute 60 minutes = 1 hour 24 hours = 1 day 7 days = 1 week 52 weeks = 1 year 12 months = 1 year 365 days = 1 year	12 inches = 1 foot 3 feet = 1 yard 36 inches = 1 yard 5,280 feet = 1 mile 1,760 yards = 1 mile	10 millimeters = 1 centimeter 100 centimeters = 1 meter 10 decimeters = 1 meter 1000 meters = 1 kilometer
8 fluid ounces = 1 cup 2 cups = 1 pint 2 pints = 1 quart 4 quarts = 1 gallon 1000 milliliters (mL) = 1 liter (L)	16 ounces = 1 pound 2,000 pounds = 1 ton 1000 milligrams = 1 gram 100 centigrams = 1 gram 10 grams = 1 dekagram 1000 grams = 1 kilogram	

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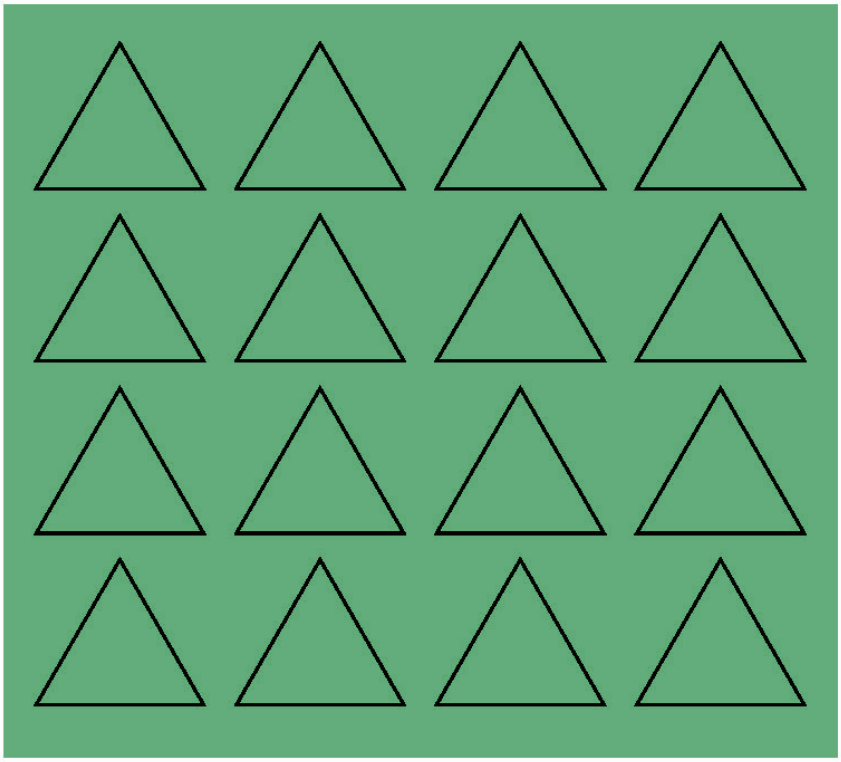
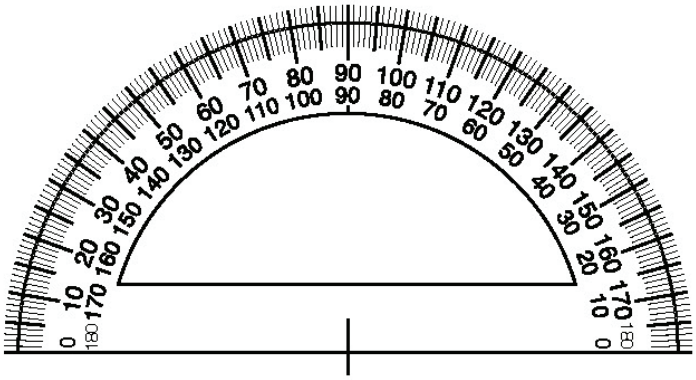
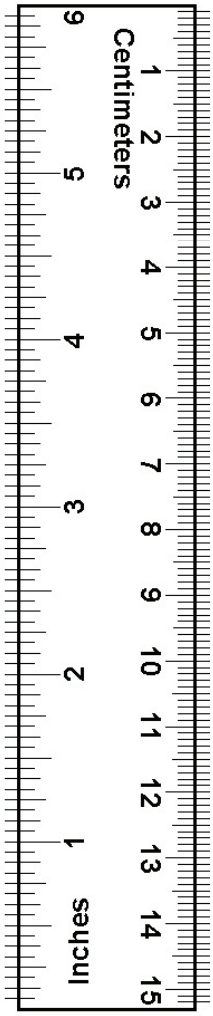
Mathematics Manipulatives Sheet
Shapes, Protractor, and Ruler
Grades 5, 6, and 7 Only



Regular Triangles



Protractor



Ruler

DESCRIPTION OF THIS MANUAL

This manual provides at least one ECR question from each of the Standards in Grade 5. The question, sample response (note that it is a "sample response," as there may be other acceptable responses as well), and item-specific scoring guide are provided for each item.

Samples are included for each score point of the General Scoring Guide for Mathematics (a 4-point scale, 0 to 3). These sample responses, which are grouped by score point, represent the range of approaches that fifth-grade students take with this ECR item in mathematics. Each response is annotated according to the score point criteria.

The responses selected to appear in this handbook were written by fifth-grade students. The responses appear as the students wrote them; no corrections have been made other than the deletion of specific names that may have appeared to identify the student or the student's school district.

STANDARD 1 – NUMBER AND NUMERICAL OPERATIONS

A teacher wanted to divide her 24 students into groups.

- Into how many different groups can the teacher evenly divide her 24 students? Show your work or explain your answer.

- If the teacher uses the three rules shown below, how many different groups are possible? Show your work or explain your answer.

Rules:
- The class must be divided into more than 2 groups.
- Each group must have a least 4 students.
- All 24 students must be included among the groups.

The teacher added a fourth rule: "The number of groups must be prime."

- After the teacher added this new rule, how many different groups of students are possible? Show your work or explain your answer.

Sample Response:

- 6 groups
  (2 groups of 12, 3 groups of 8, 4 groups of 6, 6 groups of 4, 8 groups of 3, 12 groups of 2)

- 3 groups
  (3 groups of 8, 4 groups of 6, 6 groups of 4)

- 1 group
  (3 groups of 8)

Scoring Rubric:

3-Point Response

- The response contains the correct number of 6 groups with work or explanation.
  AND
- The correct number of 3 groups with work or explanation.
  AND
- The correct answer that only one group follows all four rules with work or explanation.

2-Point Response

- The response contains the correct number of 6 groups with work or explanation.
  AND
- The correct number of 3 groups with work or explanation.

OR

- The response contains the correct number of 6 groups with work or explanation.
  AND
- The correct answer that only one group follows all four rules with work or explanation.

OR

- The correct number of 3 groups with work or explanation.
  AND
- The correct answer that only one group follows all four rules with work or explanation.

1-Point Response

- The response contains the correct number of 6 groups with work or explanation.

OR

- The correct number of 3 groups with work or explanation.

OR

- The correct answer that only one group follows all four rules with work or explanation.

OR

- The response shows a limited understanding of the problem's mathematical concepts.

0-Point Response

- The response shows insufficient understanding of the problem's mathematical concepts. The response is incomplete or inaccurate and contains major errors, or no response is given.

MATHEMATICS
EXTENDED RESPONSE

30. Show your work here.

2, 3, 4, 6, 8, 12,

6 groups of 4
4 groups of 6
3 groups of 8

3 groups of 8

The class can be put into '6' different kinds of groups.

There are 3 ways.

There is 1 way.

STOP. Do not write beyond this page.

Score Point: 3

The response shows complete understanding of the problem's essential mathematical concepts. The student writes "*6 different kinds of groups*" and shows the group numbers 2, 3, 4, 6, 8, 12. The student writes 3 ways and shows the three groupings. The student writes "*There is 1 way*." and shows the 3 groups of 8.

MATHEMATICS
EXTENDED RESPONSE

30. Show your work here.

1. 3x8 8x3 4x6 6x4 12x2 2x12

2. 3x8 4x6 4x6

3. 3x8

• If there were no rules for the groups/pairs, there would be 6 different ways to arrange the desks, I found all the ways to multiply 2 numbers that get 24.

• Now only three groups are possible because the other ones did not follow the rules in number of people and groups

• 3 groups of 8 people is now the only possibility because 3 groups, and 3 is a prime number.

STOP. Do not write beyond this page.

Score Point: 3

The response shows complete understanding of the problem's essential mathematical concepts. The student writes 6 and shows the groupings. The student writes "*Now only three groups*." and shows the groupings (even though the student writes 4 × 6 twice, it is clear that the student meant one to be 6 × 4.) The student writes that "*3 groups of 8 people is now the only possibility…*"

MATHEMATICS
EXTENDED RESPONSE

30. Show your work here.

1. 6x4, 4x6, ~~8x3~~, 3x8, ~~12x2~~, ~~2x12~~

2. ~~6x4~~, ~~4x6~~, ~~3x8~~

3. Not possible

The teacher can make 6 different groups. I know this because I had to do two multiply and find the numbers that equled 24. With the three rules only 3 different groups or possible. I found my answer by reading the rules then looking at the features of the numbers. With this new rule it is not possible to have any groups that equal 24. I found my answer by reading the rule and seeing if any of the numbers were prime.

STOP. Do not write beyond this page.

Score Point: 2
The response shows nearly complete understanding of the problem's essential mathematical concepts. The student correctly answers part 1 and part 2 with supporting work. Part 3 is incorrect.

MATHEMATICS
EXTENDED RESPONSE

30. Show your work here.

(A) She can divide four different groups. First she can put three groups of 8, 8 groups of 3 4 groups of 6, or 6 groups of 4. (B) If she uses the rule's she can have 3 groups of 8, 6 groups of 4, or 4 groups of 6. (C) The "New" rule would only have 1 group which would be 3 groups of 8 because 3 is prime.

STOP. Do not write beyond this page.

Score Point: 2
The response shows nearly complete understanding of the problem's essential mathematical concepts. The student writes there are only 4 groups for part 1 and shows work. The student correctly answers part 2 and part 3 with supporting work.

MATHEMATICS
EXTENDED RESPONSE

30. Show your work here.

① If she has 24 students she may split them into two groups of 12, 4 groups of 6, 6 groups of 4, 12, groups of 2 8 groups of 3. That equals 5 different ways to divide her class of 24 students.

② If they must be in more than 2 groups you may do 3 groups of 8. They must be in more than groups of 4 so you can do 4 groups of 6. They all need to be included so you can do 6 groups of 4. In all you can divide them all into 3 total groups.

③ If you add they all must be prime you can do 3 groups of eight. That allows you to have 1 total amount of groups to be divided by.

STOP. Do not write beyond this page.

Score Point: 2
The response shows nearly complete understanding of the problem's essential mathematical concepts. The student misses one of the groups in part 1 but successfully answers part 2 and part 3 with supporting work.

MATHEMATICS
EXTENDED RESPONSE

30. Show your work here.

1. 6 of 4
1. 4 of 6
1. 3 of 8
1. 8 of 3
1. 9 of 12
1. 12 of 2
1. 24

2. 6 of 4

3. 3 of 8 becaus 3 has 1 as it's only factor.

7 possible combinations

STOP. Do not write beyond this page.

Score Point: 1
The response shows limited understanding of the problem's essential mathematical concepts. The student writes "*7 possible combinations*" for part 1. Part 2 is incomplete. Part 3 is correct.

MATHEMATICS
EXTENDED RESPONSE

30. Show your work here.

$8\overline{)24}$ = 3 $\quad 2\overline{)24}$ = 12

$4\overline{)24}$ = 6 $\quad 12\overline{)24}$ = 2

$6\overline{)24}$ = 4 $\quad 3\overline{)24}$ = 8

$6\overline{)24}$ = 4

3

2 $6\overline{)24}$ = 4

• 6 different groups the teacher can evenly divide her 24 students. Step one I put a Large amount of division problems on the space above. Step 2 I counted how many groups. Lastly I got 6 different groups.

• If she uses the three rules there would be only 1 group. I got my answer because I was crosing out the ones that didn't match the rules. There will only be one possible outcome. I got my answer by following the rules and xing out the ones that could not go.

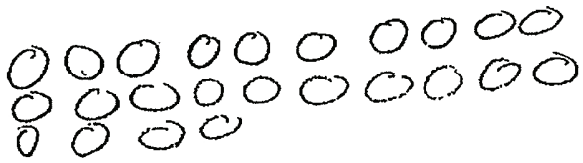
STOP. Do not write beyond this page.

Score Point: 1

The response shows limited understanding of the problem's essential mathematical concepts. The student correctly answers part 1 and shows work. Part 2 is incorrect. The student writes "*there will be one possible outcome*" but does not show what that outcome is.

MATHEMATICS
EXTENDED RESPONSE

30. Show your work here.



The teacher can divide the class into 6 groups of 4. 4 groups of 6, 2 groups of 12, 12 groups of 2, 8 groups of 3, or 3 groups of 8. She could do this because, when you multiply the number of groups by the number of people, you will get 24. If she used the 3 rules she could have 4 groups of 8, or 8 groups of 4. If she added the new rule, she would have 8 groups of 4 because 8 is a prime number.

STOP. Do not write beyond this page.

Score Point: 1
The response shows limited understanding of the problem's essential mathematical concepts. The student correctly shows the 6 groups for part 1. Part 2 and part 3 are incorrect.

MATHEMATICS
EXTENDED RESPONSE

30. Show your work here.

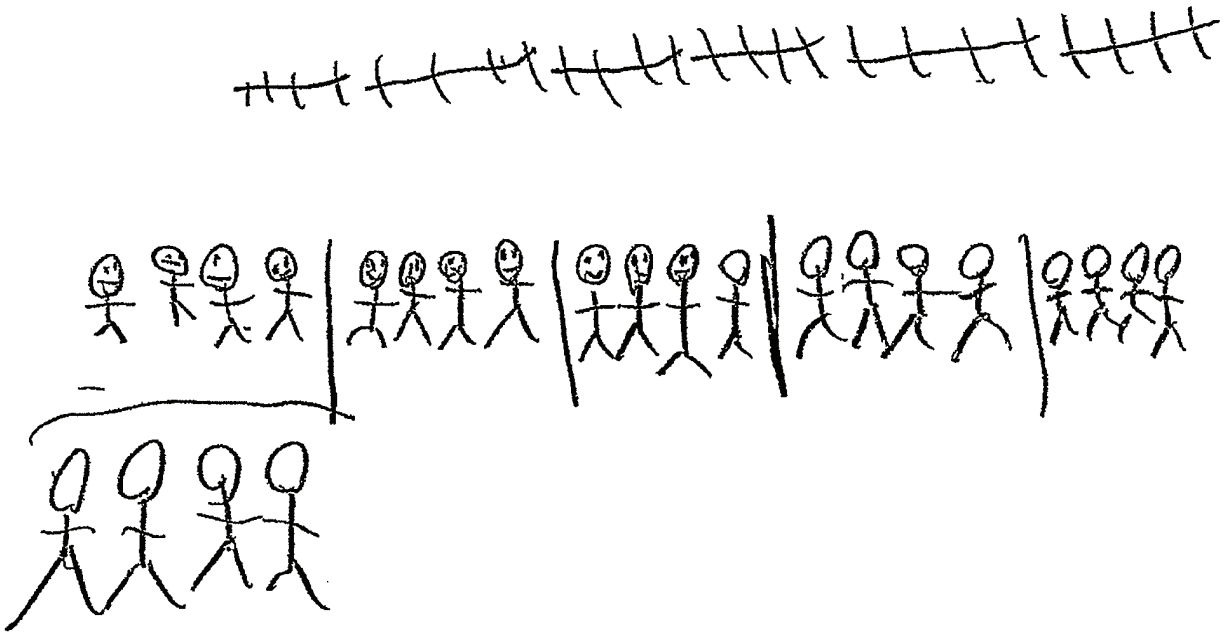
She can divide them in two 4 groups.
The different groups can be 6.

STOP. Do not write beyond this page.

Score Point: 0
The response shows insufficient understanding of the problem's essential mathematical concepts. The student response is incomplete.

MATHEMATICS
EXTENDED RESPONSE

30. Show your work here.



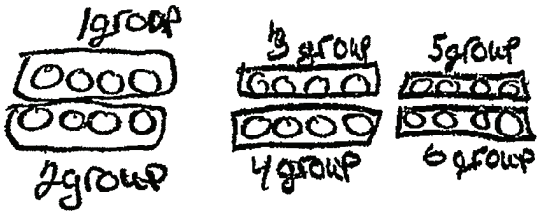
She can divide them in to 6 groups. red, blue, yellow green, purple, orange.

STOP. Do not write beyond this page.

Score Point: 0
The response shows insufficient understanding of the problem's essential mathematical concepts. The student writes "*she can divide them in to 6 groups*" but only shows 6 groups of 4.

MATHEMATICS
EXTENDED RESPONSE

30. Show your work here.



6 groups are possible. The groups would still stay the same.

STOP. Do not write beyond this page.

Score Point: 0
The response shows insufficient understanding of the problem's essential mathematical concepts. The student writes "*6 groups are possible*" but only shows 6 groups of 4.

STANDARD 1 – NUMBER AND NUMERICAL OPERATIONS

Jamisha has exactly $1.25 in her pocket. She has only quarters, dimes, and nickels for a total of 12 coins.

- What is a possible number of each kind of coin that Jamisha has in her pocket?

- Show that the sum of the 12 coins in Jamisha's pocket equals $1.25.

Jamisha purchased a $0.45 snack using some of the 12 coins in her pocket. She received no coins back as change.

- What is the fewest number of coins that Jamisha could have used to buy the snack? Show your work or explain your answer.

Sample Response:

- Answers may vary. Possible answers include but are not limited to:
  5 dimes, 5 nickels, and 2 quarters
  OR
  9 dimes, 2 nickels, and 1 quarter
  OR
  1 dime, 8 nickels, and 3 quarters

- Answers may vary. Possible answers include but are not limited to:
  0.50 + 0.25 + 0.50 = 1.25
  OR
  0.90 + 0.10 + 0.25 = 1.25
  OR
  0.10 + 0.40 + 0.75 = 1.25

- Answers may vary. Possible answers include but are not limited to:
  3 coins – 1 quarter and 2 dimes, 0.25 + 0.20 = 0.45
  OR
  4 coins – 1 quarter, 1 dime and 2 nickels, 0.25 + 0.10 + 0.10 = 0.45

Scoring Rubric:

3-Point Response

- The response contains the correct number of each coin for part one,
  AND
- shows that the sum of the 12 coins equal $1.25 for part two,
  AND
- shows the correct number of coins used for the snack with work/explanation for part three.

2-Point Response

- The response contains the correct number of each coin for part one
  AND
- shows that the sum of the 12 coins equal $1.25 for part two.

OR

- The response contains the correct number of each coin for part one
  AND
- contains the correct number of coins used for the snack with work/explanation for part three.

OR

- The response shows that the sum of the 12 coins equal $1.25 for part two
  AND
- shows the correct number of coins used for the snack with work/explanation for part three.

1-Point Response

- The response contains the correct number of each coin for part one.

OR

- The response shows that the sum of the 12 coins equal $1.25 for part two.

OR

- The response contains the correct number of coins used for the snack with work/explanation for part three.

OR

- The response shows limited understanding of the problem's essential mathematical concepts.

0-Point Response

The response shows insufficient understanding of the problem's essential mathematical concepts. The procedures, if any, contain major errors. There may be no explanation of the required solutions, or the explanation may not be understandable. How decisions were made may not be readily understandable.

MATHEMATICS
EXTENDED RESPONSE

30. Show your work here.

$\begin{array}{r} 25¢ \\ \times\ 2 \\ \hline 50 \end{array}$ $\begin{array}{r} 10¢ \\ \times\ 5 \\ \hline 50 \end{array}$

$\begin{array}{r} 50¢ \\ +\ 50¢ \\ \hline 1.00\ \$ \end{array}$ $\begin{array}{r} 5¢ \\ \times\ 5 \\ \hline 25 \\ +\ 1.00\$ \\ \hline 1.25\$ \end{array}$

• Jamisha could have 2 quarters, 5 dimes and 5 nickels

• Jamisha could use 1 quarter and 2 dimes that is three coins which is the fewest number of coins she could've used to buy the snack.

STOP. Do not write beyond this page.

Score Point: 3
The response shows complete understanding of the problem's essential mathematical concepts. The response shows the correct number of coins and shows work that the sum is $1.25. The response correctly answers part three with explanation.

MATHEMATICS
EXTENDED RESPONSE

30. Show your work here.

1 5
2 5
3 5
4 10
5 10
6 10
7 10
8 10
9 5
10 25
11 25
125

She has 5 nickels 2 quarters and 5 dimes. All those coins add up to $1.25. If she buys something for $0.45. She uses 3 coins a quarter and two dimes. 25+10=35. 35+10=45 wich is the amount of cents she use to buy a snack.

STOP. Do not write beyond this page.

Score Point: 3
The response shows complete understanding of the problem's essential mathematical concepts. The response shows the correct number of coins and shows work that the sum is $1.25. The response correctly answers part three with explanation.

MATHEMATICS
EXTENDED RESPONSE

30. Show your work here.

(25) Quarter (5) nickel (10) dime

(25) (25) (10) (10) (10) (10) (5) (5) (10) (5) (5) (5)

$$\begin{array}{r} 25 \\ +25 \\ +10 \\ +10 \\ +10 \\ +10 \\ +10 \\ +5 \\ +5 \\ +5 \\ +5 \\ +5 \\ \hline \$125 \end{array}$$

$$\begin{array}{r} 25 \\ +10 \\ +10 \\ \hline 45¢ \end{array}$$

A possible number of each coins is 2 Quarters 5 dimes and 5 nickels. The fewest number of coins that Jamisha could have spent is 3 coins 1 quarter and 2 dimes.

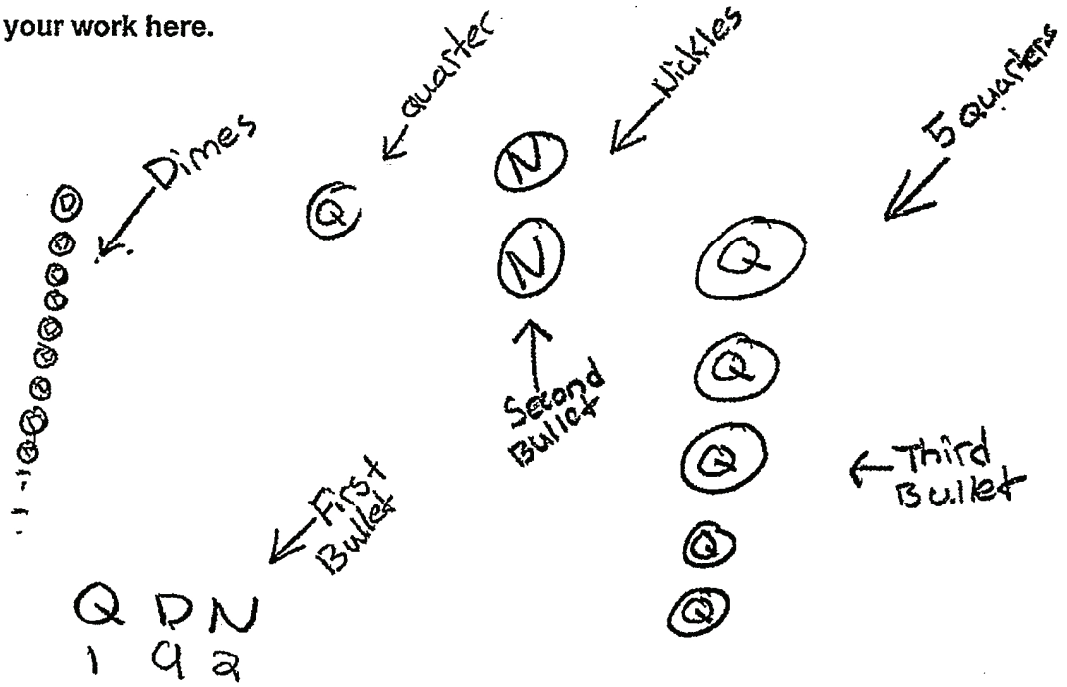
STOP. Do not write beyond this page.

Score Point: 3

The response shows complete understanding of the problem's essential mathematical concepts. The response shows the correct number of coins and shows work that the sum is $1.25. The response correctly answers part three with explanation.

MATHEMATICS
EXTENDED RESPONSE

30. Show your work here.



She could have a possible of 1 quarter
2 Nickles and 9 Dimes,

9 Dimes equall 90 cents + 2 nickles 1.00
+ a quarter equals a dollar 25

The least money she could have is
5 quarters

STOP. Do not write beyond this page.

Score Point: 2
The response shows nearly complete understanding of the problem's essential mathematical concepts. The response shows the correct number of coins and shows work that the sum is $1.25. The response incorrectly answers part three.

MATHEMATICS
EXTENDED RESPONSE

30. Show your work here.

• 25¢ 25¢ 10¢ 5¢ 5¢ 5¢ 5¢ 10¢ 10¢ 10¢ 10¢ 5¢

50 60 70 80 90 100 110 120 $1.25

•

25¢
25¢
10¢
10¢
10¢
10¢
10¢
5¢
5¢
5¢
5¢
+ 5¢
$1.25

1
75
+45
120

• A possible number that Jamisha might have can have is 2 Quarters 5 dimes and 5 nickels that equals $1.25.

• The fewest would've been 2 dimes 2 nickle and 3 quarters.

STOP. Do not write beyond this page.

Score Point: 2
The response shows nearly complete understanding of the problem's essential mathematical concepts. The response shows the correct number of coins and shows work that the sum is $1.25. The response incorrectly answers part three.

MATHEMATICS
EXTENDED RESPONSE

30. Show your work here.

Q = quarter
D = dimes
N = nickels

• It is my belief that the possible number of each kind of coin Jamisha has in her pocket is 2 quarters, 5 dimes, and 5 nickels.
• QQ = 50¢ + DDDDD = $1.00 + NNNNN = $1.25

STOP. Do not write beyond this page.

Score Point: 2
The response shows nearly complete understanding of the problem's essential mathematical concepts. The response shows the correct number of coins and shows work that the sum is $1.25. The response does not attempt to answer part three.

MATHEMATICS
EXTENDED RESPONSE

30. Show your work here.

125¢
100¢
100¢
100¢
100¢
100¢
100¢ + 10
100¢ + 10
100¢ + 10
100¢ + 10
5¢ + 5
5¢ 45¢

I found my awnser by using coins (Step 1) I tried to find some posibilitys but they failed. (Step 2) I had 11 coins so I took out a 10 and put 2 nickels. (Step 3) Jamisha buys chips and get 5¢ chang and I had the right amount of coins she needed.

STOP. Do not write beyond this page.

Score Point: 1
The response shows limited understanding of the problem's essential mathematical concepts. The response shows a correct combination of 12 coins; however, it does not show that they add to $1.25. The response to the third bullet is incorrect.

MATHEMATICS
EXTENDED RESPONSE

30. Show your work here.

•B

25 10 5
25 10 5
10 5
10 5
10 5

Zy Ed EN

•A

A possible number of each kind of coin is 2 quarters, 5 dimes, and 5 nickles.

STOP. Do not write beyond this page.

Score Point: 1
The response shows limited understanding of the problem's essential mathematical concepts. The response shows a correct response for part 1.

MATHEMATICS
EXTENDED RESPONSE

30. Show your work here.

bullet 1.

25 5 10

25 5

25 5

25

bullet 2.

25x4+5+5+5+10)=

25x4+25

100+25= 25

bullet 3

25

10

10

1 4 quarters, 3 nickles and 1 dime.

2 (25¢x4+(5¢+5¢+5¢+10¢)=1.25¢

3 1 quarter and 2 dimes.

STOP. Do not write beyond this page.

Score Point: 0

The response shows insufficient understanding of the problem's essential mathematical concepts. The first bullet is incorrect. Even though the second bullet shows that the sum of the coins is $1.25, there aren't 12 coins. The third bullet has 1 quarter and 2 dimes; however, there is only 1 dime listed in part one.

MATHEMATICS
EXTENDED RESPONSE

30. Show your work here.

25¢, 25¢, 25¢, 25¢, and 25¢

fewest number of coins that equal .45¢

25¢, 10¢, and 10¢

The possible number of each kind of coin that Jamisha has in her pocket is 80¢

25¢, 25¢, 25¢, 25¢, and 25¢,

The fewest number that Jamisha could have spend was 1 quarter, and 2 dimes.

STOP. Do not write beyond this page.

Score Point: 0

The response shows insufficient understanding of the problem's essential mathematical concepts. The response shows an incorrect number of coins for part one and incorrectly states that 5 quarters have a sum of 80 cents. The third bullet states 1 quarter and 2 dimes; however, there are no dimes listed in the first bullet.

MATHEMATICS
EXTENDED RESPONSE

30. Show your work here.

5 5 5 5 5 5 5 5 5

25 100
25
1.25

To make $1.25 she can use dimes, quarters and nickels. She needs 10 dimes for 1 dollor, 5 nickels for 25¢ or one quarter for 25¢. The least amount for 0.45¢ is 9 nickels. Clearly Jamisha has a lot of coins.

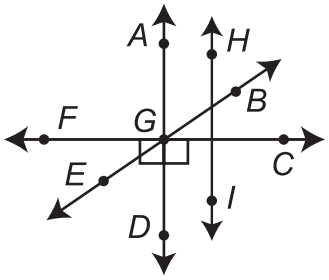
The total amount of money in her pocket is $1.25 exactly.

STOP. Do not write beyond this page.

Score Point: 0
The response shows insufficient understanding of the problem's essential mathematical concepts. All three bullets are incorrect.

STANDARD 2 – GEOMETRY AND MEASUREMENT

Look at the diagram shown below.



- Name two rays that from a right angle.
- Name two lines that intersect each other but are not perpendicular.
- Name two lines that appear to be parallel.

Sample Response:

- Possible rays are *GA* and *GF, GA* and *GC*, *GC* and *GD*, *GD* and *GF* or other combinations.
- Possible intersecting but non-perpendicular lines are *AD* and *BE*, *CF* and *BE*, *DA* and *EB*, *FC* and *EB*, *HI* and *EB* or other combinations.
- Possible parallel lines are *AD* and *HI* or *DA* and *IH.*

Scoring Rubric:

3-Point Response

- The response contains two correct rays
  AND
- Two correct lines that intersect but are not perpendicular
  AND
- Two correct lines that are parallel

2-Point Response

- The response contains two correct rays
  AND
- Two correct lines that intersect but are not perpendicular

OR

- The response contains two correct rays
  AND
- Two correct lines that are parallel

OR

- The response contains two correct lines that intersect but are not perpendicular
  AND
- Two correct lines that are parallel

1-Point Response

- The response contains two correct rays

OR

- Two correct lines that intersect but are not perpendicular

OR

- Two correct lines that are parallel

0-Point Response

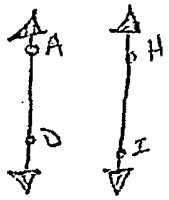
The response shows insufficient understanding of the problem's mathematical concepts. The response is incomplete or inaccurate and contains major errors, or no response is given.

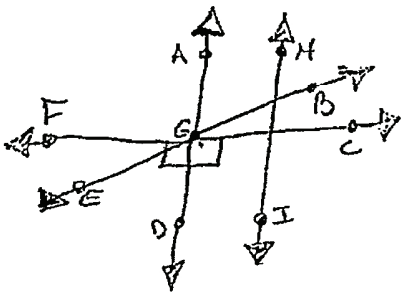
NOTE: It was not necessary for students to use the $\rightarrow$ or $\leftrightarrow$ to denote rays and lines. However, the correct 2 letters were necessary. There were a number of students who used commas in between letters, or also used 3 letters, which is incorrect notation.

MATHEMATICS
EXTENDED RESPONSE

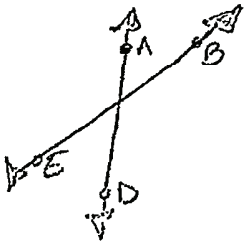
30. Show your work here.

parallel

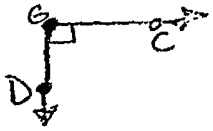




intersecting but not perpendicular



Two rays that form a right angle



Two rays that form a right angle are $\overrightarrow{GC}$ and $\overrightarrow{GD}$. The two lines in this picture that are intersecting but are not perpendicular are $\overleftrightarrow{EB}$ and $\overleftrightarrow{AD}$. The two lines that are parrallel are $\overleftrightarrow{HI}$ and $\overleftrightarrow{AD}$.

STOP. Do not write beyond this page.

Score Point: 3
The response shows complete understanding of the problem's essential mathematical concepts. The student correctly answers all 3 parts using correct notation.

MATHEMATICS
EXTENDED RESPONSE

30. Show your work here.

① F, G and E, G

② EB and HI

③ AD and HI

STOP. Do not write beyond this page.

Score Point: 2
The response shows nearly complete understanding of the problem's essential mathematical concepts. The student incorrectly answers part 1. The student correctly answers parts 2 and 3.

MATHEMATICS
EXTENDED RESPONSE

30. Show your work here.

- A.D and EGC
- HI and BE
- HI and AD

STOP. Do not write beyond this page.

Score Point: 2
The response shows nearly complete understanding of the problem's essential mathematical concepts. The student incorrectly answers part 1. The student provides correct answers to parts 2 and 3.

MATHEMATICS
EXTENDED RESPONSE

30. Show your work here.

① AC and AF, ② EB and FC, ③ AD and HI

AC and AF both form a right angle because they are both 90° degrees. EB and FC are intersecting lines because they both show two acute angles instead of right angles. AD and HI are parallel because they don't intersect each other.

STOP. Do not write beyond this page.

Score Point: 2
The response shows nearly complete understanding of the problem's essential mathematical concepts. The student incorrectly answers part 1. The student provides correct answers to parts 2 and 3.

MATHEMATICS
EXTENDED RESPONSE

30. Show your work here.

A, C.

A, B

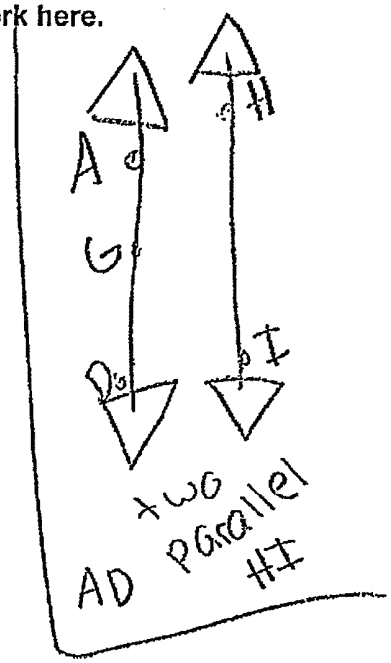
AI, AD

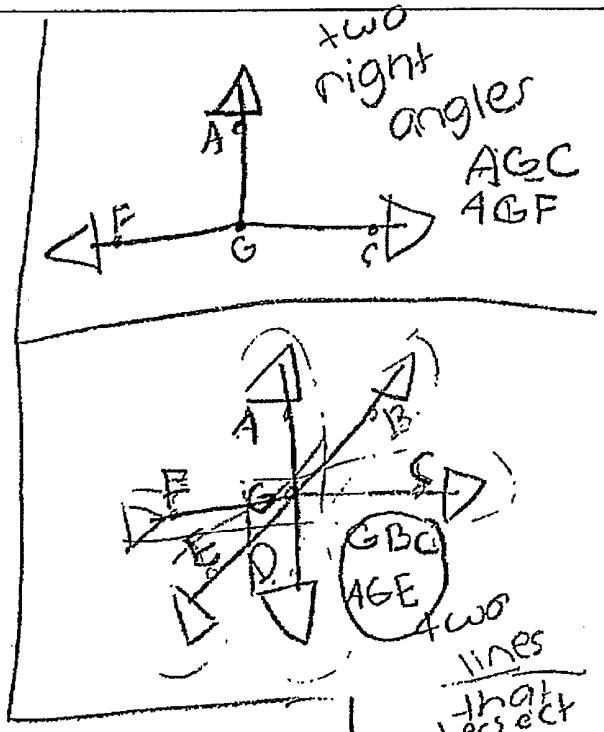
STOP. Do not write beyond this page.

Score Point: 1
The response shows limited understanding of the problem's essential mathematical concepts. The only correct part is part 3.

MATHEMATICS
EXTENDED RESPONSE

30. Show your work here.





STOP. Do not write beyond this page.

Score Point: 1
The response shows limited understanding of the problem's essential mathematical concepts. The only correct part is part 3.

MATHEMATICS
EXTENDED RESPONSE

30. Show your work here.

Two rays that form a right angle is A,C.
Two lines that intersect are F,C and A,D.
Two lines that are parallel are A,D and H,I.

STOP. Do not write beyond this page.

Score Point: 0
The response shows insufficient understanding of the problem's essential mathematical concepts. Commas are unacceptable notation within the letters denoting a ray or line.

MATHEMATICS
EXTENDED RESPONSE

30. Show your work here.

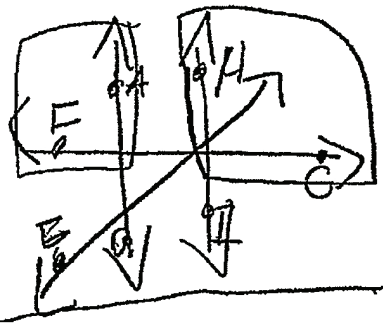
• Angle CGF and angle FGC.
• Angle H I and angle EGB.
• Angle AGD and angle FGC.

STOP. Do not write beyond this page.

Score Point: 0
The response shows insufficient understanding of the problem's essential mathematical concepts. The student writes about angles and uses incorrect notation for rays and lines (3 letters).

MATHEMATICS
EXTENDED RESPONSE

30. Show your work here.



1
H, C
F, A

2. F, C
and
E, B

3.
A, D
and
H, I

STOP. Do not write beyond this page.

Score Point: 0
The response shows insufficient understanding of the problem's essential mathematical concepts. The student uses commas in between letters for the notation of a ray or line, which is unacceptable.

STANDARD 2 – GEOMETRY AND MEASUREMENT

Kathryn is using a piece of cloth that is 23 yards in length for two projects. She cuts off a piece from the cloth that is 2 yards in length to keep for her second project.

- What is the length, in feet, of the piece of cloth Kathryn is using for her first project? Show your work or explain your answer.

Kathryn's second project uses at least $\frac{1}{2}$ and no more than $\frac{3}{4}$ of the piece of cloth that she cut from the original piece.

- What is a possible length, in inches, for the cloth used in the second project? Show your work or explain your answer.

Sample Response:

- 63 feet used
  23 yards – 2 yards = 21 yards
  21 × 3 feet in a yard = 63

- Answers will vary. Possible answers are but not limited to:

  36 inches
  ½ of 2 yards = 1 yard
  1 yard = 36 inches

  OR

  54 inches
  2 yards = 72 inches
  ¾ of 72 = 54

  OR

  Accept any answer that is in the range of 36 inches to 54 inches with correct work or explanation.

Scoring Rubric:

3-Point Response

- The response contains the correct answer of 63 feet with work and/or explanation for part one
  AND
- A correct answer with work and/or explanation for part two.

2-Point Response

- The response contains the correct answer of 63 feet with work and/or explanation for part one
  AND
- A correct answer with missing work and/or explanation for part two.

OR

- The response contains a correct answer with work and/or explanation for part two.

1-Point Response

- The response contains the correct answer of 63 feet with work and/or explanation for part one.

OR

- The response contains the correct answer with missing work and/or explanation for part two.

0-Point Response

The response shows insufficient understanding of the problem's mathematical concepts. The response is incomplete or inaccurate and contains major errors, or no response is given.

MATHEMATICS
EXTENDED RESPONSE

58. Show your work here.

• 23 - 2 = 21 yards
21 x 3 = 63 feet

• 2 x 36 = ~~72~~ 72 inches
72 ÷ $\frac{1}{2}$ = 36 inches

• 23 - 2 = 21 yards first project
21 x 3 = 63 feet

• 2 x 36 = 72 inches second project
72 ÷ $\frac{1}{2}$ = 36 inches

STOP. Do not write beyond this page.

Score Point: 3
The response shows complete understanding of the problem's essential mathematical concepts. The response contains the correct answer of 63 feet with work and a correct answer of 36 inches with work.

MATHEMATICS
EXTENDED RESPONSE

58. Show your work here.

23 yards: 828 in. 828-72=756 in
2 yards: 72 in. ~~756~~ 756 ÷ 12=63 feet

72 in ÷ 2 = 36 in

The length of Kathryns cloth for her first project is 63ft, because 23 yards: 828 in, and 2 yards: 72 in, so I subtracted 828-72=756 in and then I divided 756÷12=63 feet.
The possible length of the cloth she used in her second project was 36 in, because 72 in
72 in ÷ 2 = 36 in

STOP. Do not write beyond this page.

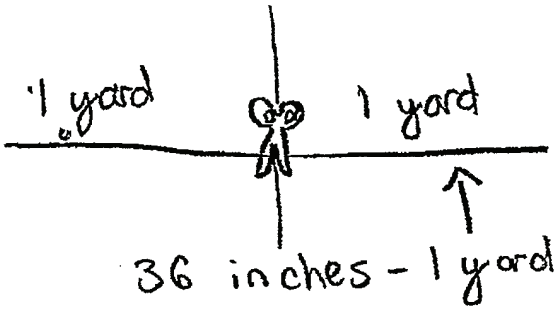
Score Point: 3
The response shows complete understanding of the problem's essential mathematical concepts. The response contains the correct answer of 63 feet with work and a correct answer of 36 inches with work.

MATHEMATICS
EXTENDED RESPONSE

58. Show your work here.

36 inches - 1 yard
36 inches - 3 feet

$$\begin{array}{r} 21 \\ \times\ 3 \\ \hline 63 \end{array}$$



• The length in feet is 63 feet for her first project.

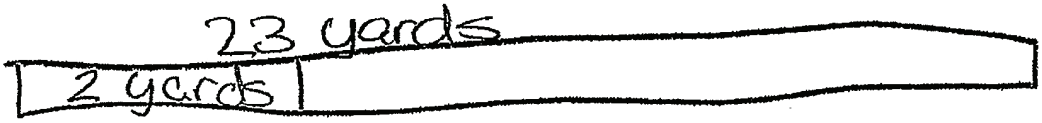
• For Kathryn's second project, the length in inches is 36 inches. I got my answer because half of 2 yards is 1 yard and 36 inches is a yard.

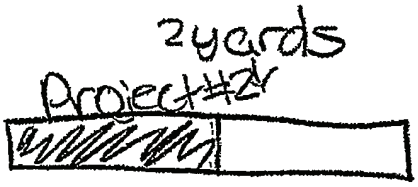
STOP. Do not write beyond this page.

Score Point: 3
The response shows complete understanding of the problem's essential mathematical concepts. The response contains the correct answer of 63 feet with work and a correct answer of 36 inches with work.

MATHEMATICS
EXTENDED RESPONSE

58. Show your work here.





$$\begin{array}{r} 23 \\ -\ 2 \\ \hline 21 \end{array} \qquad \begin{array}{r} 12 \\ \times\ 3 \\ \hline 36 \end{array}$$

Kathryn is using 21 yards for her project. I got my answer by subtracting 23 from 2. Kathryn's possible length in inches for her second project could be 36 inches. I got my answer by finding out how many inches are in a foot then finding out how many feet are in a yard and there are 12 inches in a foot so I multiplied 12 and 3 and got 36.

STOP. Do not write beyond this page.

Score Point: 2

The response shows nearly complete understanding of the problem's essential mathematical concepts. The response contains the incorrect answer of 21 yards for part one. The response has a correct answer of 36 inches with work for part two.

MATHEMATICS
EXTENDED RESPONSE

58. Show your work here.

1. 7
3 | 21

2) 2 yards

1 yard | 1 yard

3 feet

12x3=36in

The length in feet of kathryn's project is seven feet. There are three feet in one yard. She cut 2 yards off of 23. Twenty one divided by 3 is seven. Half of two yards is one yard. There are three feet in one yard and twelve inches in a foot and 12x3 is thirty six. There are 36 inches in her second project.

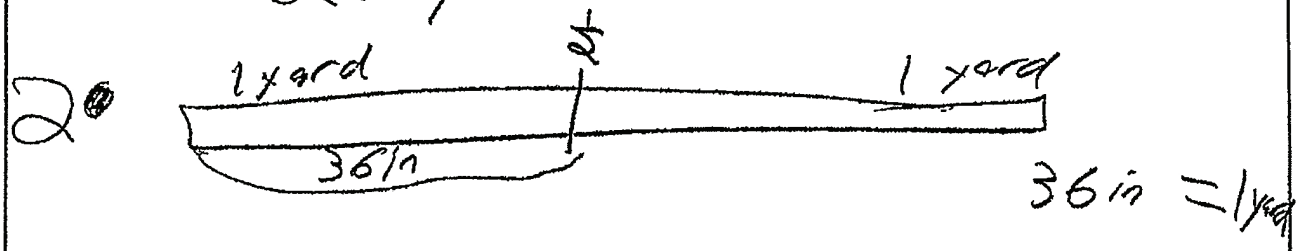
STOP. Do not write beyond this page.

Score Point: 2
The response shows nearly complete understanding of the problem's essential mathematical concepts. The response contains the incorrect answer of 7 feet for part one. The response has a correct answer of 36 inches with work for part two.

MATHEMATICS
EXTENDED RESPONSE

58. Show your work here.

1. $\begin{array}{r} 23 \\ -2 \\ \hline 21 \end{array}$ yard

2. 

1. 23 yards − 2 yards = 21 yard.
2. half of the yards is 1 yard and 1 yard = 36 in.

STOP. Do not write beyond this page.

Score Point: 2
The response shows nearly complete understanding of the problem's essential mathematical concepts. The response contains the incorrect answer of 21 yards for part one. The response has a correct answer of 36 inches with work for part two.

MATHEMATICS
EXTENDED RESPONSE

58. Show your work here.

23
x 3
69
- 6
63

3 feet = 1 yard
6 feet = 2 yards

The lenth of the first piece of cloth in feet is 63 feet.

36 inches = 1 yard

23
x 36
138
690
828

$\frac{3}{5} \times \frac{858}{1} = \frac{2574}{5} = 514\frac{8}{10} \div 2 = \frac{4}{5}$

The lenth of the second project in inches is $514\frac{4}{5}$ inches.

STOP. Do not write beyond this page.

Score Point: 1
The response shows limited understanding of the problem's essential mathematical concepts. The response contains the correct answer of 63 feet with work for part one. The response has an incorrect answer of 514 4/5 inches for part two.

MATHEMATICS
EXTENDED RESPONSE

58. Show your work here.

$$\begin{array}{r} 21 \\ \times\ 3 \\ \hline 63 \end{array} \qquad \begin{array}{r} {}^{1} \\ 36 \\ +36 \\ \hline 72 \end{array}$$

• 63 is the total amount in feet. I found my answer by multiplying 21 x 3 and got 63.

• 72 is the total amount of inches. I found my answer by adding 36 + 36 and got 72 inches.

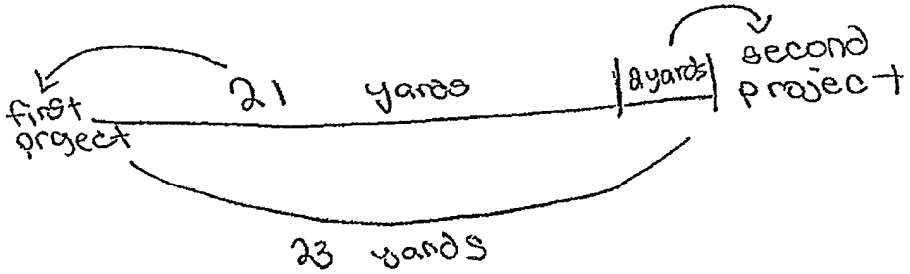
STOP. Do not write beyond this page.

Score Point: 1
The response shows limited understanding of the problem's essential mathematical concepts. The response contains the correct answer of 63 feet with work for part one. The response has an incorrect answer of 72 inches for part two.

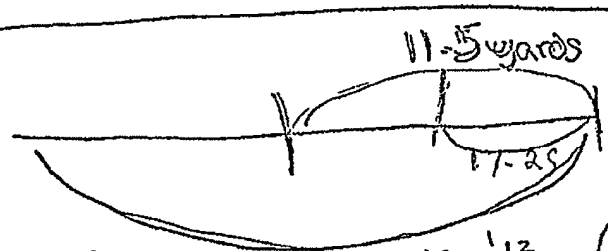
MATHEMATICS
EXTENDED RESPONSE

58. Show your work here.

1yard = 3 feet



$$\begin{array}{r} 21 \\ \times\ 3 \\ \hline \boxed{63} \end{array}$$



no more than $17\frac{1}{4}$
at least $11\frac{1}{2}$
= possible length 13 y
= possible length 468 in.

1yard=36 in.

$$\begin{array}{r} 13 \\ \times\ 36 \\ \hline 78 \\ 390 \\ \hline 468 \end{array}$$

First, you must take off 2 yards from 23 because she is using that for her second project. So 23-2=21. Since you know 1 yard = 3 feet, you must multiply 21×3= 63 ft. Kathryn is using 63 ft. for her first project. Half of 23 yards is $11\frac{1}{2}$ yards - However, it can not be more than 17-25. So it must be between $11\frac{1}{2}$ - $17\frac{1}{4}$. So for example 13 yards. But it tells you to convert it to inchs. But you know that 1 yard = 36 inchs. So 13×36 = 168 inchs. A possible length can be 168 inchs.

STOP. Do not write beyond this page.

Score Point: 1
The response shows limited understanding of the problem's essential mathematical concepts. The response contains the correct answer of 63 feet with work for part one. The response has an incorrect answer of 168 inches for part two.

MATHEMATICS
EXTENDED RESPONSE

58. Show your work here.

$3\overline{)21}$ = 7, 21, 0

36 in = 1 yd
72 in = 2 yd

3 ft = 1 yd
6 ft = 2 yd
9 ft = 3 yd
12 ft = 4 yd
15 ft = 5 yd
18 ft = 6 yd
21 ft = 7 yd

The length of the cloth in ft is 21 ft. I divided 3 into 21 and got 7.

The cloth used in the seconded project lenght in inches is 72 inches. I got my answer by adding 36 plus 36 and got 72 inches.

STOP. Do not write beyond this page.

Score Point: 0
The response shows insufficient understanding of the problem's essential mathematical concepts. The response contains incorrect answers to both parts of the question.

MATHEMATICS
EXTENDED RESPONSE

58. Show your work here.

Kathryn is using 21 yards of cloth for her first project

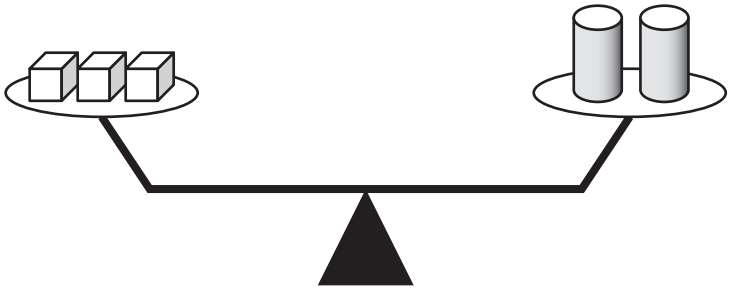
for the second project Kathryn uses about 24in of cloth.

STOP. Do not write beyond this page.

Score Point: 0
The response shows insufficient understanding of the problem's essential mathematical concepts. The response contains incorrect answers to both parts of the question.

STANDARD 3 – PATTERNS AND ALGEBRA

The balance scale below shows cubes and cylinders that are balanced.



- If each cube weighs 1 unit, what is the weight of 1 cylinder? Show your work or explain your answer.

- Choose another number to represent the weight of 1 cube. Based on that weight, what is the weight of 1 cylinder? Show your work or explain your answer.

- Choose a different number that could represent the weight of 1 cube. Based on the new weight, what is the weight of 1 cylinder? Show your work or explain your answer.

Sample Response:

- 1.5 units
  1 unit × 3 cubes = 3 units
  3 units / 2 cylinders = 1.5 units for each cylinder

- 1 cylinder = 3 units
  If each cube weighs 2 units then 2 units × 3 cubes = 6 units.
  6 units / 2 cylinders = 3 units for each cylinder

- 1 cylinder = 45 units
  If each cube weighs 30 units then 30 units × 3 cubes = 90 units.
  90 units / 2 cylinders = 45 units for each cylinder

Scoring Rubric:

Each of the following correct answers receives 1 value point:

- The correct weight of 1.5 units for each cylinder.
- Work or explanation supporting 1.5 units for each cylinder.
- A possible weight for one cube and the corresponding weight for one cylinder, which is 1.5 times the weight for each cube.
- Work or explanation supporting the answer for the second bullet.
- A second possible weight for one cube and the corresponding weight for a cylinder which is 1.5 times the weight for each cube.
- Work or explanation supporting the answer for the third bullet.

3-Point Response

The response contains 6 value points.

2-Point Response

The response contains 4–5 value points.

1-Point Response

The response contains 2–3 value points.

0-Point Response

The response shows insufficient understanding of the problem's mathematical concepts. The response is incomplete or inaccurate and contains major errors, or no response is given.

MATHEMATICS
EXTENDED RESPONSE

57. Show your work here.

1. 1 cube = 1 unit
3 cubes = 3 units
1 cylinder = $1\frac{1}{2}$ units
2 cylinders = $1\frac{1}{2} + 1\frac{1}{2}$
2 cylinders = 3 units

2. 1 cube = 5 units
3 cubes = 15 units
1 cylinder = $7\frac{1}{2}$ units
2 cylinders = $7\frac{1}{2} + 7\frac{1}{2}$
2 cylinders = 15 units

3. 1 cube = 3 units
3 cubes = 9 units
1 cylinder = $4\frac{1}{2}$ units
2 cylinders = $4\frac{1}{2} + 4\frac{1}{2}$
2 cylinders = 9 units

1. One cylinder weighs $1\frac{1}{2}$ units.

2. One cube can be $5\frac{1}{2}$ units and one cylinder can be $7\frac{1}{2}$ units

3. One cube can be 3 units and one cylinder can be $4\frac{1}{2}$ units.

STOP. Do not write beyond this page.

Score Point: 3
The response shows complete understanding of the problem's essential mathematical concepts. The student received a total of 6 value points. All parts are correct with supporting work.

MATHEMATICS
EXTENDED RESPONSE

57. Show your work here.

weight of cylinder:

1.5 unit

3 cu = 2cy | 1 cu = 1
3 = 2cy | 3 ÷ 2 = 1.5
1.5 = 1cy | 2cy ÷ 2 = 1cy

• if 1 cu = 3

4.5 units

3 cu = 2cy | 1cu = 3
9 = 2cy | 3cu = 9
4.5 = 1cy | 9 ÷ 2 = 4.5
| 2cy ÷ 2 = 1cy

• if 1 cu = 100

150 units

3 cu = 2cy | 1cu = 100
300 = 2cy | 3cu = 300
150 = 1cy | 300 ÷ 2 = 150
| 2cy ÷ 2 = 1cy

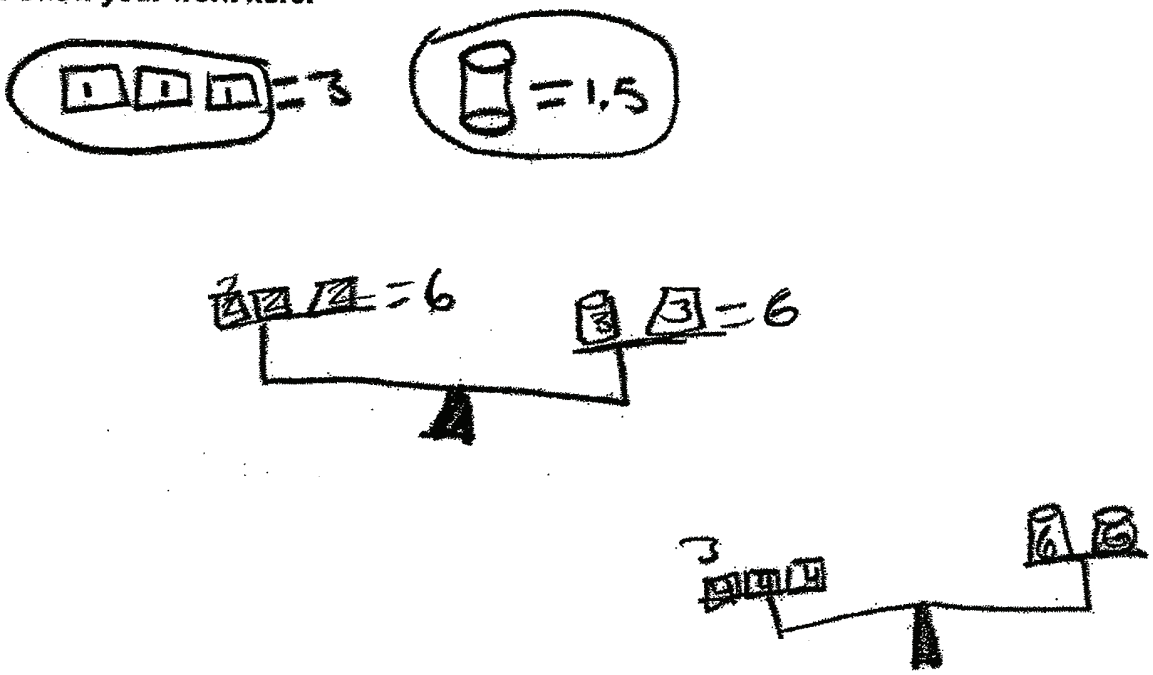
cu = cube
cy = cylinder
no label = unit

STOP. Do not write beyond this page.

Score Point: 3
The response shows complete understanding of the problem's essential mathematical concepts. The student received a total of 6 value points. All parts are correct with supporting work.

MATHEMATICS
EXTENDED RESPONSE

57. Show your work here.



One cylinder weights 1.5 units because 3÷2=1.5.

2 I change the weight of the cube to 2 units 2&3cubes=6. The cylinder each weight 3 3x2=6 so they balance now.

3 Now the cube weights 4 units each 4x3=12 units, the cylinder weights 6 units each so 6x2=12 units.

STOP. Do not write beyond this page.

Score Point: 3
The response shows complete understanding of the problem's essential mathematical concepts. The student received a total of 6 value points. All parts are correct with supporting work.

MATHEMATICS
EXTENDED RESPONSE

57. Show your work here.

Each cylinder weighs 1.5 units.
because 1×3= 3 and 1.5·2=3
Each cube is 2 units so a cylinder
is 3 units.
Each cube is 3 units so a cylinder
is 4.5 units.

STOP. Do not write beyond this page.

Score Point: 2
The response shows nearly complete understanding of the problem's essential mathematical concepts. The student received a total of 4 value points. There is no supporting work for parts 2 and 3.

MATHEMATICS
EXTENDED RESPONSE

57. Show your work here.

$$\begin{array}{r} 1 \\ +1 \\ 1 \\ \hline 3 \end{array} \qquad \begin{array}{r} 1\frac{1}{2} \\ +1\frac{1}{2} \\ \hline 3 \end{array} \qquad \begin{array}{r} 12 \\ +12 \\ 12 \\ \hline 36 \end{array} \qquad 2\overline{)36} = 18 \quad \begin{array}{r} -2 \\ 16 \\ -16 \\ \hline 0 \end{array}$$

The cylinders wieght is 1 $\frac{1}{2}$ units. 12 is another wieght for the cubes. The wieght of the cylinders would be 18 each. 12×3=36. 36÷2=18, so 18 units is the wieght of the cylinders.

STOP. Do not write beyond this page.

Score Point: 2
The response shows nearly complete understanding of the problem's essential mathematical concepts. The student received a total of 4 value points. The student correctly answers parts 1 and 2 with supporting work. Part 3 is not attempted.

MATHEMATICS
EXTENDED RESPONSE

57. Show your work here.

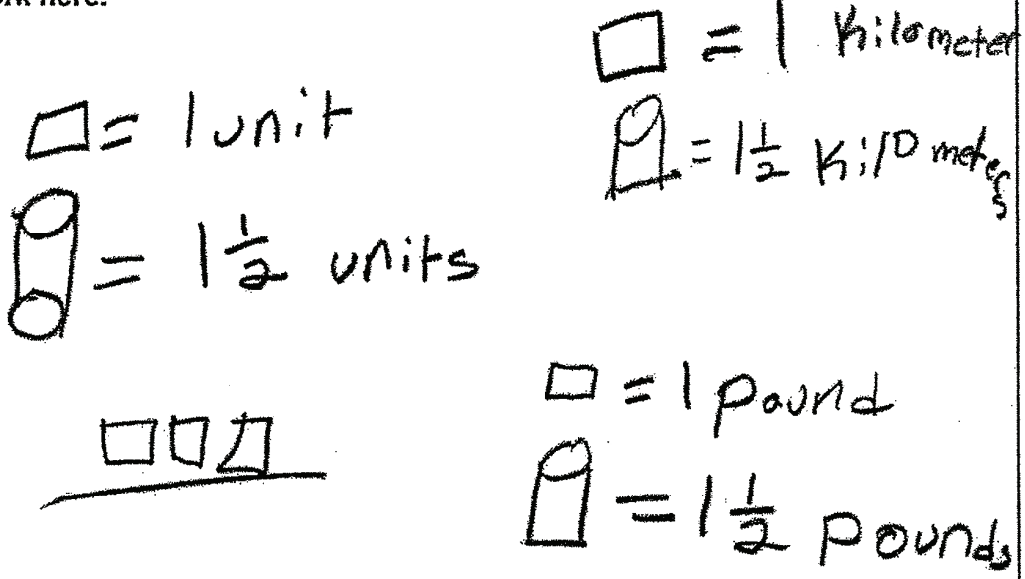
• One cylinder weighs 1.5 because 1.5 + 1.5 = 3 units and since there are 3 cubes they balance
• 3. Then the cylinder is 4.5
• 11. The weigh of the cylinder is 16.5

STOP. Do not write beyond this page.

Score Point: 2
The response shows nearly complete understanding of the problem's essential mathematical concepts. The student received a total of 4 value points. There is no supporting work for parts 2 and 3.

MATHEMATICS
EXTENDED RESPONSE

57. Show your work here.



A cylendor equals 1 1/2 because 3 cubes is equal to 2 cylendors, 1 1/2 + 1 1/2 = 3 just the same amount as the blocks. The cube can also be 1 pound and the cylendor would be 1 1/2 pounds. The cube is now 1 kilometer but the cylendor also changes to 1 1/2 kilometers.

STOP. Do not write beyond this page.

Score Point: 1
The response shows limited understanding of the problem's essential mathematical concepts. The student received a total of 2 value points for correctly answering part 1 with supporting work.

MATHEMATICS
EXTENDED RESPONSE

57. Show your work here.

cube = 1 units	cylinder = 1.5 units
cube = 5 units	Cylinde = 7.5 units
cube = 40 units	cylinder = 60 units

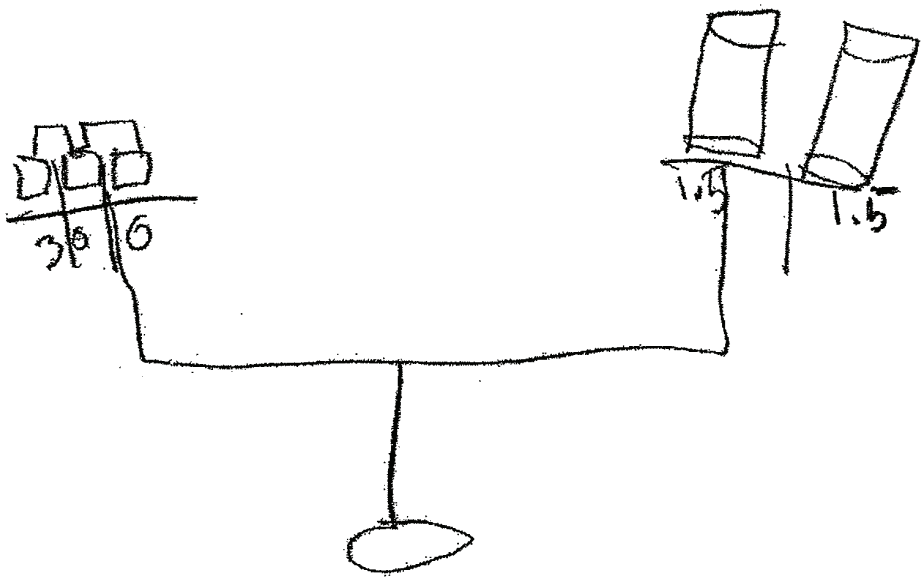
If a cube is 1 unit the cylinder is 1.5 units.
If a cube is 5 units a cylinder is 7.5 units.
If a cube is 40 units a cylinder is 60 units.

STOP. Do not write beyond this page.

Score Point: 1
The response shows limited understanding of the problem's essential mathematical concepts. The student received a total of 3 value points for 3 correct answers with no supporting work.

MATHEMATICS
EXTENDED RESPONSE

57. Show your work here.



The weight of clinder is 1.5 units because 1 cube has the weight of 1 unit, and there are 3 cubes and only 2 clinders. So for they to be even it is 1.5 units. One cubit can way 3 units and there's nothing. The re is no differens.

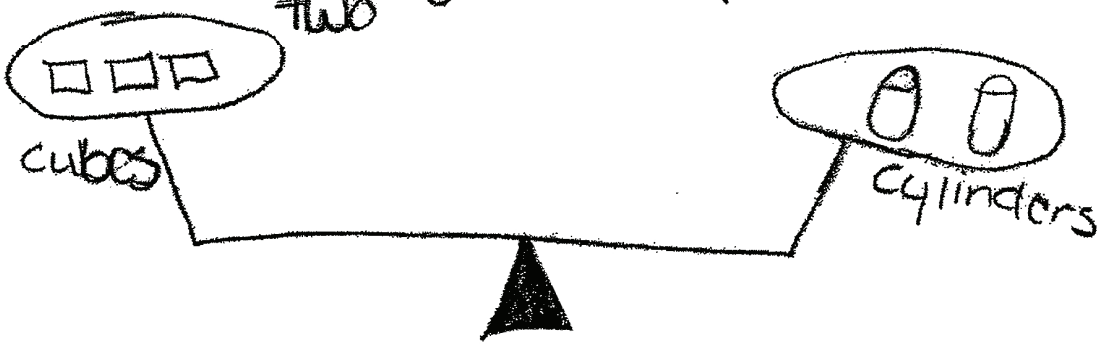
STOP. Do not write beyond this page.

Score Point: 1
The response shows limited understanding of the problem's essential mathematical concepts. The student received a total of 2 value points for correctly answering part 1 with supporting work.

MATHEMATICS
EXTENDED RESPONSE

57. Show your work here.

weight of the cube is one unit then the weight of a cylinder has to be two



The weight of the one cylinder is 2 becaus if the weight of a cube is one the wieght for a cylinder must be 2.

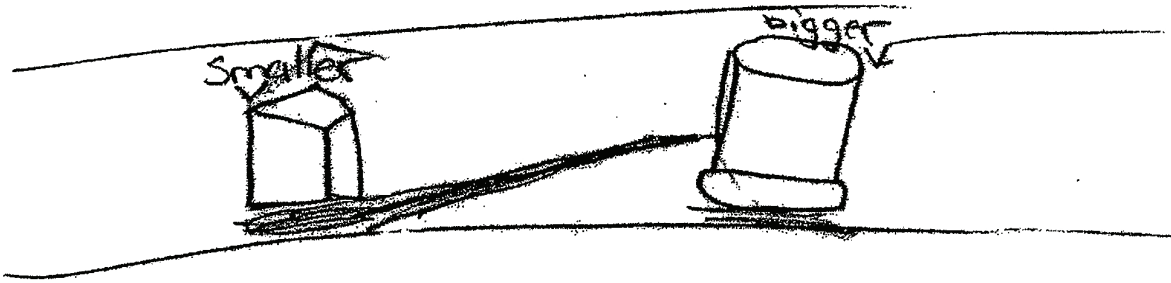
STOP. Do not write beyond this page.

Score Point: 0
The response shows insufficient understanding of the problem's essential mathematical concepts. The student received a total of 0 value points.

MATHEMATICS
EXTENDED RESPONSE

57. Show your work here.

1



3

① A cylinder is about 3 units. It is taller so it has an advantage. But a cube is smaller and lighter.
② A cube is about 2 pound and a cylinder is about 4 pounds because it is heavier and taller
③ A cube could also be 1 and cylinder could be 3 pounds The cube is smaller and fater, but it is not heavier.

STOP. Do not write beyond this page.

Score Point: 0
The response shows insufficient understanding of the problem's essential mathematical concepts. The student received a total of 0 value points.

MATHEMATICS
EXTENDED RESPONSE

57. Show your work here.

1. = = 2 units.

2. = 3 units

 = 6 units

3. = 88 units

 = 176 units

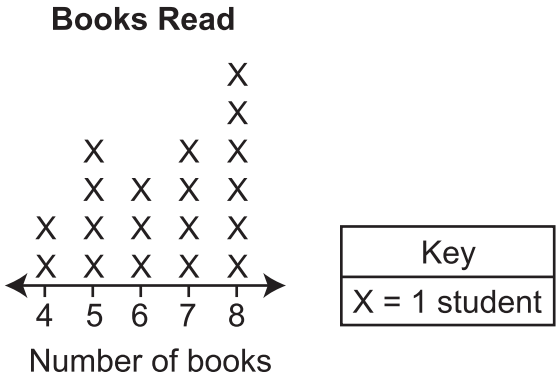
The weight of a cylinder is two times the weight of a cube.

STOP. Do not write beyond this page.

Score Point: 0
The response shows insufficient understanding of the problem's essential mathematical concepts. The student received a total of 0 value points.

STANDARD 4 - DATA ANALYSIS, PROBABILITY AND DISCRETE MATHEMATICS

The line plot shows the number of books read by students in Adam's class.



- What is the median and the range of the number of books read by students in Adam's class? Show your work or explain your answer.

- Adam's teacher read 10 books. If this number is added to the list of number of books read, which measure changes the most: the median or the range? Show your work or explain your answer.

Sample Response:

- The median number of books is 7.
  4 4 5 5 5 5 6 6 6 **7** 7 7 7 8 8 8 8 8 8 **OR** Since there are 19 numbers given, the median number of books read is the 10th number, which is 7.

  The range is 4. 8 – 4 = 4

- The range changes the most.
  Since there are now 20 numbers, the median is the average of the 10th and 11th number, which is still 7.
  The range is now 10 – 4 = 6.

Scoring Rubric:

3-Point Response

- The response contains the correct median and range with work or explanation for both answers.
  AND
- The correct answer that the range changed the most with work or explanation for the answer.

2-Point Response

- The response contains the correct answer for the median **or** for the range with work or explanation for the answer.
  AND
- The correct answer to the second part with work or explanation for the answer.

OR

- The response contains the correct answer for the median **and** for the range with work for **both**.

1-Point Response

- The response contains three correct answers without work.

OR

- The response contains the correct answer for the second part with work or explanation.

OR

- The response contains the correct answer for the median **or** for the range with work or explanation for the answer.

0-Point Response

The response shows insufficient understanding of the problem's mathematical concepts. The response is incomplete or inaccurate and contains major errors, or no response is given.

MATHEMATICS
EXTENDED RESPONSE

55. Show your work here.

• Range: 8 − 4 = 4

Median − 4, 4, 5, 5, 5, 5, 6, 6, 6, 7, 7, 7, 7, 8, 8, 8, 8, 8, 8

• 4 is the range because 8 is the highest number of books read and 4 is the least number of books read so if you subtract it you get 4. 7 is the median because if you order the numbers least to greatest you get 7 in the middle.
• The range changes the most because then 10 becomes the largest number and 4 remains the same so if you minus 4 from 10 you get 6 which is different but the median remains the same because now there is 20 people so you have to average 7 and 7 which gives you 7.

Score Point: 3
The response shows complete understanding of the problem's essential mathematical concepts. The student gives correct answers to both parts with supporting work.

MATHEMATICS
EXTENDED RESPONSE

55. Show your work here.

4,4,5,5,5,5,6,6,6,7,7,7,8,8,8,8,8,8,10

7

−

= 6

The range means the lowest number subtracted by the highest number (8-4). The range equals 4. The median is the middle number (numbers must be in least to greatest order). The median is seven. If you add the number ten the median stays the same but the range would then be 6. So the range changes more.

Score Point: 3
The response shows complete understanding of the problem's essential mathematical concepts. The student gives correct answers to both parts with supporting work.

MATHEMATICS
EXTENDED RESPONSE

55. Show your work here.

8-4=4

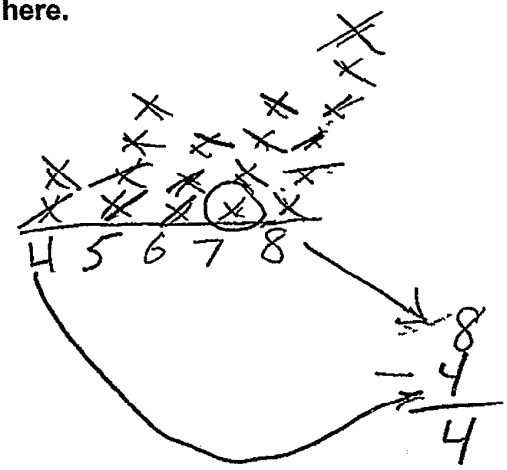
mde=7 R=4

If Adam's teacher redd 10 books, the Range would be 6 because 10-4=6 and the median would still be 7 because 7+7÷2=7

Score Point: 3
The response shows complete understanding of the problem's essential mathematical concepts. The student gives correct answers to both parts with supporting work.

MATHEMATICS
EXTENDED RESPONSE

55. Show your work here.



The median is 7 books. The range is 4. The range would change the most because it would be 6 and the median would be 8.

Score Point: 2
The response shows nearly complete understanding of the problem's essential mathematical concepts. The student correctly answers part 1 with supporting work. The student writes that the median would be 8 in part 2.

MATHEMATICS
EXTENDED RESPONSE

55. Show your work here.

~~[illegible]~~

Median 7 range 4

The range is 4 because if you subtract the highest lower number which is 8-4 you get four. The median is 7 because if you order them from least to greatest and slash off left and right until only 7 is left.

Score Point: 2

The response shows nearly complete understanding of the problem's essential mathematical concepts. The student correctly answers part 1 with supporting work. The student does not answer part 2.

MATHEMATICS
EXTENDED RESPONSE

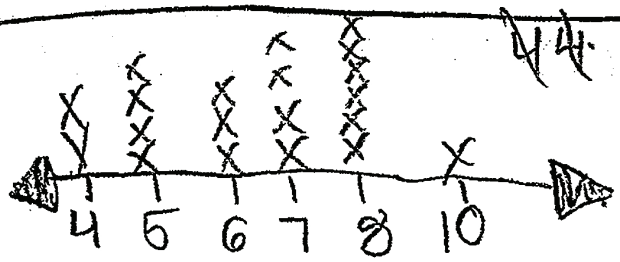
55. Show your work here.

4 4 5 5 5 6 6 6 7 7 7 8 8 8 8 8

meadian

8
−4
4 = range

4 4 5 5 5 6 6 6 7 7 7 8 8 8 8 8



• Themeadian is 7 and the range is 4 because if you cross out the #'s, you get 7 as the meadian, and if you subtract 8−4 you get the range of 4.

• It would effect the meadian the most because you have to do another step because before it was an odd number but if you add a 10, it becomes an even #.

Score Point: 2

The response shows nearly complete understanding of the problem's essential mathematical concepts. The student correctly answers part 1 with supporting work. The student writes that the median would change the most in part 2.

MATHEMATICS
EXTENDED RESPONSE

55. Show your work here.

median

4 5 6 7 8 → biggest

median

smallest

second small

2nd bigget

range

8
−4
4

and one of those are the median

4 5 6 7 8 10

small

second small

big

biggest

The median is 6. And the range is 4. Median is 6 because its the middle number. Range is 4 because you subtract the biggest number and the smallest. The median because it would not be six because now the 10 is the highest one.

Score Point: 1
The response shows limited understanding of the problem's essential mathematical concepts. The student correctly finds the range in part 1 with supporting work.

MATHEMATICS
EXTENDED RESPONSE

55. Show your work here.

4455556667777888888 10

The median is 7 and the range is 4. 12 The changes is the range.

Score Point: 1

The response shows limited understanding of the problem's essential mathematical concepts. The student has 3 correct answers but not supporting work.

MATHEMATICS
EXTENDED RESPONSE

55. Show your work here.

~~4 4 5 5 5 5 6 6 6 7 7 7 8 8 8 8 8 8~~

~~4 4 5 5 5 5 6 6 6 7 7 7 7 8 8 8 8 8 8 10~~

7

6

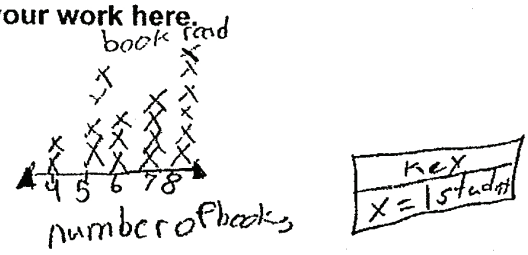
The median of these sets of numbers is 7 because I listed the numbers in order from least to greatest then crossed off the numbers on the two ends until I got to the middle. I found the range by looking for the highest and lowest number and – them. They both dont really change that much cause the median gose up 1 and the range goes down 1.

Score Point: 1

The response shows limited understanding of the problem's essential mathematical concepts. The student correctly finds the median in part 1 with supporting work. The student writes how to find the range but never writes what it is. The student states that "*the median gose up 1 and the range goes down 1*" in part 2.

MATHEMATICS
EXTENDED RESPONSE

55. Show your work here.



① 19 is the range
② 6 is the median.

① 19 is the range and 6 is the median.

② the range will change because with the range you will have to add so it will be much much higher.

Score Point: 0
The response shows insufficient understanding of the problem's essential mathematical concepts. There are no correct answers to either part.

MATHEMATICS
EXTENDED RESPONSE

5. Show your work here.

8, 18, 20, 28, 48

median

40 is the range

48
− 8
40

median 21

19

8, 20, 18, 28, 48, 10

8, 10, 18, 20, 28, 48

range

20
+18
38

48
− 8
− 40

This is my range and median because I did how many kids are in one and then added to find the median then subtracted to find the range. the median will change the most because it is a higher number than 8 so the median wit change.

Score Point: 0

The response shows insufficient understanding of the problem's essential mathematical concepts. There are no correct answers to either part.

MATHEMATICS
EXTENDED RESPONSE

55. Show your work here.

The median would be 6 because it's in the Middle The range is eight because it's at the end.

The median would range the most because it's in the Middle.

Score Point: 0
The response shows insufficient understanding of the problem's essential mathematical concepts. There are no correct answers to either part.