ISTEP+: Grade 3

Mathematics

Released Part 1 Applied Skills (open-ended) Items
and Scoring Notes

Introduction

The *ISTEP+* Spring 2016 test was administered to Indiana students in Grades 3-8 and 10. The test included two parts: Part 1 was given in March, and Part 2 took place in late April and early May. Part 1 contained Applied Skills test questions (also referred to as open-ended items) that were hand scored by trained evaluators, and Part 2 was machine scored. Scores for Part 1 and Part 2 are combined to generate a student's total score.

Test results, as well as images of the Applied Skills student responses, are available online, and schools are expected to discuss results with parents and students. As a springboard for these conversations and to serve as a resource for teachers, the Indiana Department of Education has created this document, which consists of the following:

- a brief description of the types of questions on the test
- a short summary of scoring rules utilized by the trained evaluators
- a copy of the rubrics—or scoring guides—used by evaluators to score student responses
- a copy of the released Applied Skills questions *("released" means the items are posted on the web and are no longer secure; therefore, the released test items can be discussed and used with students as future practice items)*
- anchor papers—or sample student responses—used by evaluators to distinguish between score points

Notes:

➢ The Part 1 open-ended questions are released when test results are made available.

➢ It is important to keep in mind that the majority of a student's score is calculated from items in Part 2. Since Part 2 items are secure and are not released, they are not included in this document.

Question Types

This document addresses questions from *ISTEP+ Part 1. Students* demonstrate their knowledge and understanding by responding to items that are open-ended, providing written responses in a short-answer or essay-type format.

Part 1 consists of the following test question types: Constructed-Response (CR), Extended-Response (ER), and a Writing Prompt (WP).   Item types vary by subject area. Math, Science, and Social Studies include CR and ER items. English/Language Arts includes CR and WP test questions.

Scoring

The questions on *ISTEP+* Part 1 are scored by evaluators who must have a four-year college degree and pass a series of qualifying tests. Prior to scoring student responses, evaluators receive extensive training to ensure that student responses are scored accurately and consistently.

For Part 1 of *ISTEP+*, each question is scored according to a rubric, or scoring guide. Rubrics clearly define the requirements for each score point. A set of student responses representing all of the score points on a rubric are selected as anchor papers (exemplars) and are used as clear examples of specific score points. Samples of anchor papers are presented within this document.

ISTEP+ Part 1: Mathematics		
Question Type	**Score Reporting Categories**	**Scoring Method**
Constructed-Response (CR)	Algebraic Thinking Measurement Data Analysis Mathematical Process	2-pt. CR Rubric (Grades 3-8, 10)
Extended Response (ER)	Algebraic Thinking Measurement Data Analysis Mathematical Process	3-pt. ER Rubric (Grades 3-8, 10)

If a student's response is unable to be scored, it is assigned one of the following condition codes:

A Blank/No Response/Refusal
B Illegible
C Written predominantly in a language other than English
D Insufficient response/Copied from text
E Response not related to test questions or scoring rule (not applied to Mathematics questions)

More information is available regarding assessment topics on the Office of Student Assessment homepage at http://www.doe.in.gov/assessment.

Constructed-Response Rubric

	Content Rubric
2	A score of two indicates a **thorough understanding** of the mathematical concepts embodied in the task. The response • shows algorithms, computations, and other content related work executed correctly and completely.
1	A score of one indicates a **partial understanding** of the mathematical concepts embodied in the task. The response • contains errors in the execution of algorithms, computations, and/or other content related work.
0	A score of zero indicates **limited or no understanding** of the mathematical concepts embodied in the task.
	Process Rubric
2	A score of two indicates a **thorough understanding** of the problem-solving concepts embodied in the task. The response • shows an appropriate strategy to solve the problem, and the strategy is executed correctly and completely. • identifies all important elements of the problem and shows a complete understanding of the relationships among them. • provides clear and complete explanations and/or interpretations when required.
1	A score of one indicates a **partial understanding** of the problem-solving concepts embodied in the task. The response contains one or more of the following errors. The response • shows an appropriate strategy to solve the problem. However, the execution of the strategy contains errors and/or is incomplete. • identifies some of the important elements of the problem and shows a general understanding of the relationships among them. • provides incomplete, partial, or unclear explanations and/or interpretations when required.
0	A score of zero indicates **limited or no understanding** of the problem-solving concepts embodied in the task.

Clarification and Implementation Guidance

- Correct answers ONLY, on all parts of the problem with no work shown, will receive a maximum of 1 point in content and a maximum of 1 point in Problem Solving.
- A student can receive the top score point in Problem Solving if the strategy used would result in a correct answer even though the response contains computation errors.
- A student can receive the top score point in Problem Solving if an error made in the "content" portion is used with an appropriate strategy to solve the problem.

Extended-Response Rubric

	Content Rubric
3	A score of three indicates a **thorough understanding** of the mathematical concepts embodied in the task. The response • shows algorithms, computations, and other content related work executed correctly and completely.
2	A score of two indicates a **partial understanding** of the mathematical concepts embodied in the task. The response • shows an attempt to execute algorithms, computations, and other content related work correctly and completely; computation errors or other minor errors in the content related work may be present.
1	A score of one indicates a **limited understanding** of the mathematical concepts embodied in the task. The response • contains major errors, or only a partial process. • contains algorithms, computations, and other content related work which may only be partially correct.
0	A score of zero indicates **no understanding** of the mathematical concepts embodied in the task.
	Problem-Solving Rubric
3	A score of three indicates a **thorough understanding** of the problem-solving concepts embodied in the task. The response • shows an appropriate strategy to solve the problem, and the strategy is executed correctly and completely. • identifies all important elements of the problem and shows a complete understanding of the relationships among them. • provides clear and complete explanations and/or interpretations when required.
2	A score of two indicates a **partial understanding** of the problem-solving concepts embodied in the task. The response contains one or more of the following errors. The response • shows an appropriate strategy to solve the problem. However, the execution of the strategy lacks an essential element. • identifies some of the important elements of the problem and shows a general understanding of the relationships among them. • provides incomplete or unclear explanations and/or interpretations when required.
1	A score of one indicates a **limited understanding** of the problem-solving concepts embodied in the task. The response contains one or more of the following errors. The response • shows an appropriate strategy to solve the problem. However, the execution of the strategy is applied incorrectly and/or is incomplete. • shows a limited understanding of the relationships among the elements of the problem. • provides incomplete, unclear, or omitted explanations and/or interpretations when required.
0	A score of zero indicates **no understanding** of the problem-solving concepts embodied in the task.

Clarification and Implementation Guidance

- Correct answers ONLY, on all parts of the problem with no work shown, will receive a maximum of 2 points in content and a maximum of 2 points in Problem Solving.
- A student can receive the top score point in Problem Solving if the strategy used would result in a correct answer even though the response contains computation errors.
- A student can receive the top score point in Problem Solving if an error made in the "content" portion is used with an appropriate strategy to solve the problem.

Item #1
Constructed-Response

Question 1

1. Jack is making a rectangular play area for his puppy.

Part A

Jack looks at three sizes of play areas. Fill in the missing length, width, and area of the play areas in the table.

Area of rectangle $= l \times w$

Play Area Sizes

	Length (feet)	Width (feet)	Area (square feet)
Play Area A	12		72
Play Area B		8	72
Play Area C	11	5	

Part B

Jack makes a play area that has

- a length equal to 1 foot less than the length of Play Area B and
- an area equal to 56 square feet.

What is the width, in feet, of the play area Jack makes?

Show All Work

Answer _____ feet

Exemplary Response:

Play Area Sizes

	Length (feet)	Width (feet)	Area (square feet)
Play Area A	12	**6**	72
Play Area B	**9**	8	72
Play Area C	11	5	**55**

AND

- 7 feet

- Sample Process:

  72 / 12 = 6
  72 / 8 = 9
  11 x 5 = 55
  9*1 = 8
  58 / 8 = 7

OR

- Other valid process

Question 1, Sample A – Measurement Score Point 2; Process Score Point 2

Part A

Jack looks at three sizes of play areas. Fill in the missing length, width, and area of the play areas in the table.

Area of rectangle $= l \times w$

Play Area Sizes

	Length (feet)	Width (feet)	Area (square feet)
Play Area A	12	6	72
Play Area B	9	8	72
Play Area C	11	5	55

Part B

Jack makes a play area that has

• a length equal to 1 foot less than the length of Play Area B and
• an area equal to 56 square feet.

What is the width, in feet, of the play area Jack makes?

Show All Work

$$\begin{array}{r} 9 \\ -1 \\ \hline 8 \end{array}$$

$$56 \div 8$$

Answer _____ 7 _____ feet

Scoring Notes: The response demonstrates a thorough understanding of finding the area of rectangles by correctly completing the table. The response demonstrates a thorough understanding of reasoning quantitatively by finding the correct width of the play area with a valid process. This response receives two points for content and two points for process.

Question 1, Sample B – Measurement Score Point 2; Process Score Point 1

Part A

Jack looks at three sizes of play areas. Fill in the missing length, width, and area of the play areas in the table.

Area of rectangle $= l \times w$

Play Area Sizes

	Length (feet)	Width (feet)	Area (square feet)
Play Area A	12	6	72
Play Area B	9	8	72
Play Area C	11	5	55

2
2
2
2
2
2
2

72

Part B

Jack makes a play area that has

• a length equal to 1 foot less than the length of Play Area B and

• an area equal to 56 square feet.

What is the width, in feet, of the play area Jack makes?

Show All Work

Answer _____ 7 _____ feet

Scoring Notes: The response demonstrates a thorough understanding of finding the area of rectangles by correctly completing the table. The response demonstrates a partial understanding of reasoning quantitatively by finding the width of the play area; however, the response does not provide a valid process. This response receives two points for content and one point for process.

Part A

Jack looks at three sizes of play areas. Fill in the missing length, width, and area of the play areas in the table.

Area of rectangle $= l \times w$

Play Area Sizes

	Length (feet)	Width (feet)	Area (square feet)
Play Area A	12	4	72
Play Area B	9	8	72
Play Area C	11	5	55

Part B

Jack makes a play area that has

• a length equal to 1 foot less than the length of Play Area B and
• an area equal to 56 square feet.

What is the width, in feet, of the play area Jack makes?

Show All Work

$$\frac{9 \, -1}{8} \times \frac{}{7} = 56$$

Answer _____7_____ feet

Scoring Notes: The response demonstrates a partial understanding of finding the area of rectangles by correctly finding two of the three values in the table. The response demonstrates a thorough understanding of reasoning quantitatively by finding the correct width of the play area with a valid process. This response receives one point for content and two points for process.

Question 1, Sample D – Measurement Score Point 1; Process Score Point 0

Part A

Jack looks at three sizes of play areas. Fill in the missing length, width, and area of the play areas in the table.

Area of rectangle $= l \times w$

Play Area Sizes

	Length (feet)	Width (feet)	Area (square feet)
Play Area A	12	6	72
Play Area B	12	8	72
Play Area C	11	5	55

Part B

Jack makes a play area that has

• a length equal to 1 foot less than the length of Play Area B and
• an area equal to 56 square feet.

What is the width, in feet, of the play area Jack makes?

Show All Work

$$\begin{array}{r} 8\ ft. \\ 5\ ft. \\ +\ 6\ ft. \\ \hline 19 \end{array}$$

Answer ___19___ feet

Scoring Notes: *The response demonstrates a partial understanding of finding the area of rectangles by correctly finding two of the three values in the table. The response demonstrates limited understanding of reasoning quantitatively by finding an incorrect width of the play area with an invalid process to find the width. This response receives one point for content and zero points for process.*

Question 1, Sample E – Measurement Score Point 0; Process Score Point 1

Part A

Jack looks at three sizes of play areas. Fill in the missing length, width, and area of the play areas in the table.

Area of rectangle = $l \times w$

Play Area Sizes

	Length (feet)	Width (feet)	Area (square feet)
Play Area A	12	9:64	72
Play Area B	4	8	72
Play Area C	11	5	27

```
 12
+12
___
 24

 72
+12
___
 84

 172
+ 72
____
  44
```

Part B

Jack makes a play area that has

- a length equal to 1 foot less than the length of Play Area B and
- an area equal to 56 square feet.

What is the width, in feet, of the play area Jack makes?

Show All Work

```
  11
 +11
 ___
 87

 +72
  16
 ___
 88

 72
+2.(1)
_____
 90
```

Answer _____ feet

Scoring Notes: The response demonstrates a limited understanding of finding the area of rectangles as all three values in the table are incorrect. The response demonstrates a partial understanding of reasoning quantitatively by finding the correct width of the play area but with an invalid process. This response receives zero points for content and one point for process.

Question 1, Sample F – Measurement Score Point 0; Process Score Point 0

Part A

Jack looks at three sizes of play areas. Fill in the missing length, width, and area of the play areas in the table.

Area of rectangle $= l \times w$
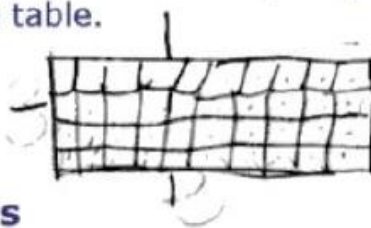
Play Area Sizes

	Length (feet)	Width (feet)	Area (square feet)
Play Area A	12	40	72
Play Area B	132	8	72
Play Area C	11	5	172

Part B

Jack makes a play area that has

• a length equal to 1 foot less than the length of Play Area B and
• an area equal to 56 square feet.

What is the width, in feet, of the play area Jack makes?

Show All Work

$8 \times 5 = 40$

$12 \times 11 = 132$

$\begin{array}{r} 40 \\ +132 \\ \hline 172 \end{array}$

$\begin{array}{r} 12 \\ \times 11 \end{array}$

$10 \times 11 = 110$

$\begin{array}{r} 2 \times 11 \quad +22 \\ \hline 132 \end{array}$

Answer 172 feet

Scoring Notes: *The response demonstrates a limited understanding of finding the area of rectangles as all three values in the table are incorrect. The response demonstrates a limited understanding of reasoning quantitatively by finding the incorrect width of the play area with an invalid process. This response receives zero points for content and zero points for process.*

Item #2
Constructed-Response

Question 2

2. Nick and Sam each have a yard sale.

Part A

The table shows the number of books and toys Nick sells at his yard sale.

Complete the table by filling in the two missing numbers.

Nick's Yard Sale

Item	Sold	Not Sold	Total
Books		166	351
Toys	45	97	

Part B

Write a number sentence that can be used to find the number of BOOKS Nick sells.

_____

Part C

At Sam's yard sale, he sells 136 fewer books and toys than the number Nick sells.

What is the total number of books and toys that Sam sells?

Show All Work

Answer _____ books and toys

Exemplary Response:

Nick's Yard Sale

Item	Sold	Not Sold	Total
Books	185	166	351
Toys	45	97	142

AND

- $351 - 166 = ?$

OR

- Other valid response

AND

- 94 books and toys

- **Sample Process**:

  $351 - 166 = 185$
  $185 + 45 = 230$
  $230 - 136 = 94$

OR

  Other valid process

Question 2, Sample A – Algebraic Thinking Score Point 2; Process Score Point 2

Part A

The table shows the number of books and toys Nick sells at his yard sale.

Complete the table by filling in the two missing numbers.

Nick's Yard Sale

Item	Sold	Not Sold	Total
Books	185	166	351
Toys	45	97	142

Handwritten work:
2 14
3̶5̶1̶
−166
185

45
+97
142

Part B

Write a number sentence that can be used to find the number of BOOKS Nick sells.

$351 - 166 = 185$

Number Sentence _____

Part C

At Sam's yard sale, he sells 136 fewer books and toys than the number Nick sells.

What is the total number of books and toys that Sam sells?

Show All Work

185
+ 45
230

2̶3̶0̶
+136...
094

Answer ___94___ books and toys

Scoring Notes: The response demonstrates a thorough understanding of solving multi-step, real-world problems by providing a correct number sentence in Part B and a valid setup for Part C. The response demonstrates a thorough understanding of persevering in solving problems by correctly completing the table in Part A and correctly finding an answer of 94 for Part C. This response receives two points for content and two points for process.

Question 2, Sample B – Algebraic Thinking Score Point 2; Process Score Point 1

Part A

The table shows the number of books and toys Nick sells at his yard sale.

Complete the table by filling in the two missing numbers.

Nick's Yard Sale

Item	Sold	Not Sold	Total
Books	185	166	351
Toys	45	97	132

Part B

Write a number sentence that can be used to find the number of BOOKS Nick sells.

Number Sentence ___351-166=185___

Part C

At Sam's yard sale, he sells 136 fewer books and toys than the number Nick sells.

What is the total number of books and toys that Sam sells?

Show All Work

```
 12 9
 1 3 10
 230
-136
 04 4

  1 1
 185
+ 45
 230

 13 2
 230
-136
 4 8
```

Answer ___94___ books and toys

Scoring Notes: The response demonstrates a thorough understanding of solving multi-step, real-world problems by providing a correct number sentence in Part B and a valid setup for Part C. The response demonstrates a partial understanding of persevering in solving problems by correctly finding an answer of 94 for Part C. However, the response incorrectly completes the table in Part A. This response receives two points for content and one point for process.

Part A

The table shows the number of books and toys Nick sells at his yard sale.

Complete the table by filling in the two missing numbers.

Nick's Yard Sale

Item	Sold	Not Sold	Total
Books	185	166	351
Toys	45	97	142

Part B

Write a number sentence that can be used to find the number of BOOKS Nick sells.

Number Sentence ___185 + 45 = 230___

```
  1
 +166
  185
 ─────
  351
```

```
 2 14 11
  351
 -166
 ─────
  185
```

```
  1
  45
 +97
 ───
 142
```

```
 03 12
  142
 -045
 ─────
 097
```

```
  1 1
  185
 +45
 ───
 230
```

Part C

At Sam's yard sale, he sells 136 fewer books and toys than the number Nick sells.

What is the total number of books and toys that Sam sells?

Show All Work

```
 1 2 10
  230
 -136
 ─────
  094
```

```
  1
  94
 +136
 ────
 230
```

Answer ___94___ books and toys

Scoring Notes: The response demonstrates a partial understanding of solving multi-step, real-world problems by providing a valid setup for Part C but an incorrect number sentence in Part B. The response demonstrates a thorough understanding of persevering in solving problems by correctly completing the table in Part A and correctly finding an answer of 94 for Part C. This response receives one point for content and two points for process.

Part A

The table shows the number of books and toys Nick sells at his yard sale.

Complete the table by filling in the two missing numbers.

Nick's Yard Sale

Item	Sold	Not Sold	Total
Books	185	166	351
Toys	45	97	142

Part B

Write a number sentence that can be used to find the number of BOOKS Nick sells.

Books 185 + 166 = 351
toys 45 + 97 = 142

Number Sentence _____

$$
\begin{array}{r}
2\ \overset{14}{\cancel{\cancel{3}}}\overset{11}{\cancel{5}}\cancel{1} \\
-\ 166 \\
\hline
185
\end{array}
$$

$$
\begin{array}{r}
\overset{1}{9}7 \\
+\ 45 \\
\hline
142
\end{array}
$$

Part C

At Sam's yard sale, he sells 136 fewer books and toys than the number Nick sells.

What is the total number of books and toys that Sam sells?

Show All Work

Answer _____3/1_____ books and toys

$$
\begin{array}{r}
3\cancel{5}\cancel{1}1 \\
-\ 136 \\
\hline
215 \\
+\quad\ 6 \\
\hline
311
\end{array}
$$

$$
\begin{array}{r}
14\cancel{2}\ 12 \\
-\ 136 \\
\hline
006
\end{array}
$$

Scoring Notes: The response demonstrates a partial understanding of solving multi-step, real-world problems by providing a correct number sentence in Part B but an invalid setup for Part C. The response demonstrates a partial understanding of persevering in solving problems by correctly completing the table in Part A. However, the response has a calculation error in Part C (215+6=311). This response receives one point for content and one point for process.

Part A

The table shows the number of books and toys Nick sells at his yard sale.

Complete the table by filling in the two missing numbers.

Nick's Yard Sale

Item	Sold	Not Sold	Total
Books	185	166	351
Toys	45	97	142

Part B

Write a number sentence that can be used to find the number of BOOKS Nick sells.

Number Sentence $185 + 45 = 230$

$$\begin{array}{r} 2\overset{14}{\cancel{4}} \\ 3\cancel{5}\,\overset{11}{\cancel{1}} \\ -166 \\ \hline 185 \end{array}$$

$$185 + 97$$

$$+ 45$$

$$\overline{142}$$

$$\begin{array}{r} 185 \\ + 45 \\ \hline 230 \end{array}$$

Part C

At Sam's yard sale, he sells 136 fewer books and toys than the number Nick sells.

What is the total number of books and toys that Sam sells?

Show All Work

$$\begin{array}{r} 9\,7 \\ -\,4\,5 \\ \hline \end{array}$$

$$\begin{array}{r} 9\,5\,2 \\ \hline \end{array}$$

90 toys

Answer _____90_____ books and toys

248

235 + 11
- 1 85
-----
1 66
-1 66

O O O

Part A

The table shows the number of books and toys Nick sells at his yard sale.

Complete the table by filling in the two missing numbers.

Nick's Yard Sale

Item	Sold	Not Sold	Total
Books		166	351
Toys	45	97	

Part B

Write a number sentence that can be used to find the number of BOOKS Nick sells.

Number Sentence _____ 5 __22__ _____

$$\begin{array}{r} {}^{14}{}^{+514}\\ 4\,5\\ -9\,7\\ \hline 5\,7 \end{array}$$

$$\begin{array}{r} {}^{0}{}^{5}\\ 1\,6\,6\\ -3\,5\,1\\ \hline 3\,0\,5 \end{array}$$

$$\begin{array}{r} 5\,7\\ -3\,5\\ \hline 2\,2 \end{array}$$

Part C

At Sam's yard sale, he sells 136 fewer books and toys than the number Nick sells.

What is the total number of books and toys that Sam sells?

Show All Work

Answer _____5_____ books and toys

$$136$$
$$-351$$
$$\overline{005}$$

Scoring Notes: The response demonstrates a limited understanding of solving multi-step, real-world problems by providing an incorrect number sentence in Part B and an invalid process for Part C. The response demonstrates a limited understanding of persevering in solving problems by incorrectly completing the table in Part A and providing an answer with a calculation error (136-351=005) in Part C. This response receives zero points for content and zero points for process.

Item #3
Constructed-Response

Question 3

3. Mike builds a doghouse. He uses

   - 10 boards,
   - 2 nails for every board used,
   - and 6 shingles for every 2 boards used.

Part A

How many shingles does Mike use?

Show All Work

Answer _____ shingles

Part B

Complete the picture graph to show the number of boards, nails, and shingles Mike uses to build the doghouse.

Doghouse

Item	Number of Items
Boards	
Nails	
Shingles	

KEY
x = 5 items

Exemplary Response:

- 30 shingles

AND

- **Sample Process**:

    6 / 2 = 3
    3 x 10 = 30

OR

   Other valid process

AND

Doghouse

Item	Number of Items
Boards	X X
Nails	X X X X
Shingles	X X X X X X

3 Mike builds a doghouse. He uses

- 10 boards,
- 2 nails for every board used,
- and 6 shingles for every 2 boards used.

Part A

How many shingles does Mike use?

Show All Work

$S = shingles$
$b = boards$

2 boards
6 shingles

$\frac{8}{2}\frac{6}{45}$

$\frac{6}{18}\frac{6}{5}$

$\frac{4}{12}\frac{6}{5}$

$\frac{10}{30}\frac{6}{5}$

Answer __30__ shingles

Part B

Complete the picture graph to show the number of boards, nails, and shingles Mike uses to build the doghouse.

Doghouse

Item	Number of Items
Boards	✗ ✗
Nails	✗ ✗ ✗ ✗
Shingles	✗ ✗ ✗ ✗ ✗ ✗

KEY
✗ = 5 items

2 nails for every bord used

10 boards

10
× 2
___
20

Scoring Notes: The response demonstrates a thorough understanding of data analysis by creating a valid picture graph. The response demonstrates a thorough understanding of reasoning quantitatively by finding a correct number of shingles with a valid process. This response receives two points for content and two points for process.

3 Mike builds a doghouse. He uses

- 10 boards,
- 2 nails for every board used,
- and 6 shingles for every 2 boards used.

Part A

How many shingles does Mike use?

Show All Work

$$\begin{array}{r} 8 \\ \times\,6 \\ \hline 44 \end{array}$$

$$\begin{array}{r} 60 \\ -16 \\ \hline 44 \end{array}$$

Answer _____44_____ shingles

Part B

Complete the picture graph to show the number of boards, nails, and shingles Mike uses to build the doghouse.

Doghouse

Item	Number of Items
Boards	✗ ✗
Nails	✗ ✗ ✗ ✗
Shingles	✗ ✗ ✗ ✗ ✗ ✗ ✗

KEY
✗ = 5 items

Scoring Notes: The response demonstrates a thorough understanding of data analysis by creating a valid picture graph based on the incorrect number of shingles that the student found in Part A. The response demonstrates a limited understanding of reasoning quantitatively by finding an incorrect number of shingles with an invalid process. This response receives two points for content and zero points for process.

Question 3, Sample C – Data Analysis Score Point 1; Process Score Point 2

Part A

How many shingles does Mike use?

Show All Work

Answer _____30_____ shingles
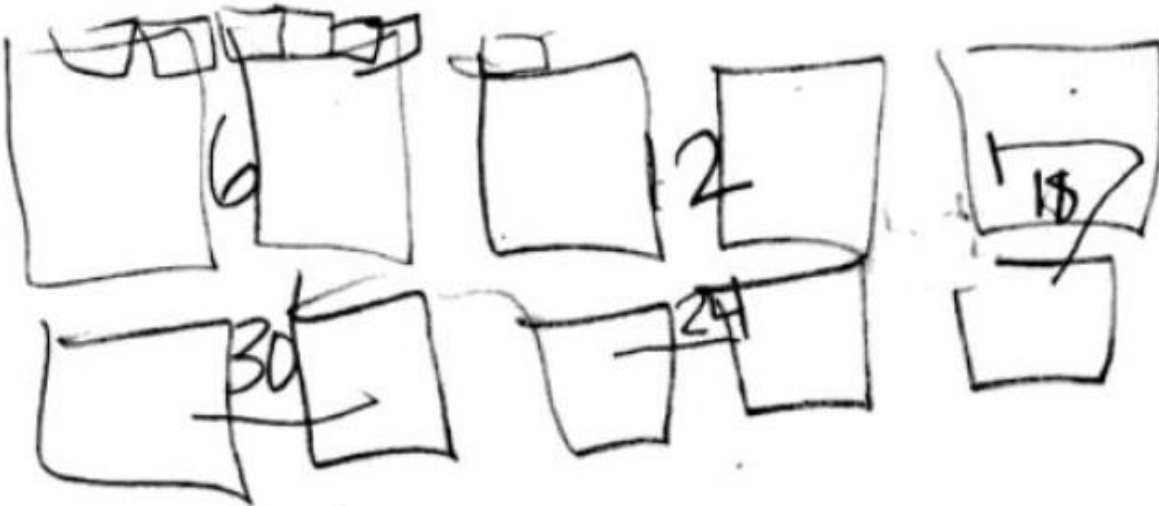
Part B

Complete the picture graph to show the number of boards, nails, and shingles Mike uses to build the doghouse.

Doghouse

Item	Number of Items
Boards	✗✗
Nails	✗✗
Shingles	✗✗ ✗ ✗✗ ✗

KEY
✗ = 5 items

Scoring Notes: This response demonstrates a partial understanding of data analysis by correctly creating the picture graph for only the Boards and Shingles. The response demonstrates a thorough understanding of reasoning quantitatively by finding the correct number of shingles with a valid process. This response receives one point for content and two points for process.

Question 3, Sample D – Data Analysis Score Point 1; Process Score Point 0

Part A

How many shingles does Mike use?

Show All Work

6 12 18 24 30
36 42 48 54
59 6 71

Answer ___51___ shingles

Part B

Complete the picture graph to show the number of boards, nails, and shingles Mike uses to build the doghouse.

Doghouse

Item	Number of Items
Boards	10
Nails	20
Shingles	59

KEY
x = 5 items

Scoring Notes: The response demonstrates a partial understanding of data analysis by placing the correct number of items in the picture graph, but the response did not follow the key when creating the picture graph. The response demonstrates a limited understanding of reasoning quantitatively by finding an incorrect number of shingles with an invalid process. This response receives one point for content and zero points for process.
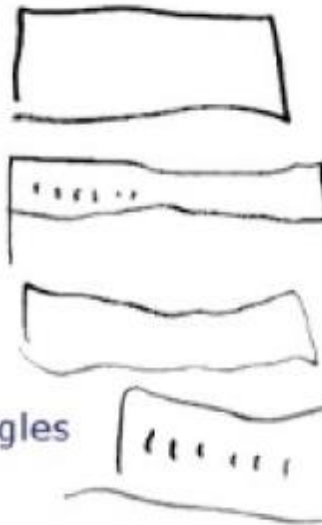
3 Mike builds a doghouse. He uses
- 10 boards,
- 2 nails for every board used,
- and 6 shingles for every 2 boards used.

Part A

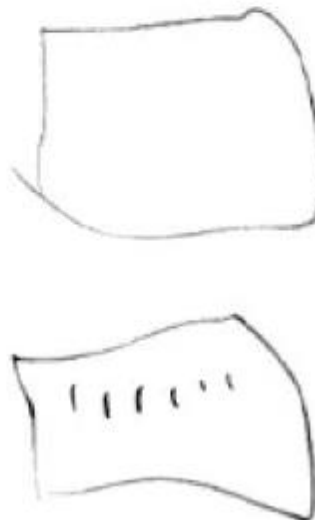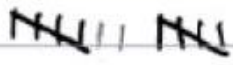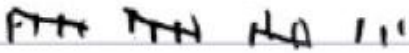How many shingles does Mike use?

Show All Work

$$\begin{array}{r} 6 \\ +\ 6 \\ \hline 12 \\ +\ 6 \\ \hline 18 \\ +\ 6 \\ \hline 24 \\ +\ 6 \\ \hline 30 \end{array}$$

Answer ___3 0___ shingles

$$\begin{array}{r} 30 \\ \times\ 2 \\ \hline 60 \end{array}$$

Part B

Complete the picture graph to show the number of boards, nails, and shingles Mike uses to build the doghouse.

Doghouse

Item	Number of Items
Boards	1 0
Nails	6 0
Shingles	3 0

KEY
× = 5 items

Scoring Notes: The response demonstrates a limited understanding of data analysis by creating an incorrect picture graph. The response demonstrates a thorough understanding of reasoning quantitatively by finding a correct number of shingles with a valid process. This response receives zero points for content and two points for process.

3 Mike builds a doghouse. He uses
- 10 boards,
- 2 nails for every board used,
- and 6 shingles for every 2 boards used.

Part A

How many shingles does Mike use?

Show All Work

10
×2
‾
20

Answer _____ 18 _____ shingles

Part B

Complete the picture graph to show the number of boards, nails, and shingles Mike uses to build the doghouse.

Doghouse

Item	Number of Items
Boards	ꝃꞀꞀꞀ ꝃꞀ
Nails	ꝃꞀꞀ ꝃꞀꞀ ꝃꞀ ꞁꞁ
Shingles	ꝃꞀ ꝃꞀ ꝃꞀꞀ ꞁꞁ

KEY
x = 5 items

Scoring Notes: The response demonstrates a limited understanding of data analysis by creating an incorrect picture graph. The response demonstrates a limited understanding of reasoning quantitatively by incorrectly finding the number of shingles with an invalid process. This response receives zero points for content and zero points for process.

Item #4
Extended-Response

Question 4

4. Mark places toothpicks end to end to make the sides of three shapes.

   Part A

   Shape A has 3 sides. Each side is 8 toothpicks long.

   What is the PERIMETER, in toothpicks, of Shape A?

   Show All Work

   Answer _____ toothpicks

   Part B

   Mark makes Shape B using the same number of toothpicks used in Shape A. Shape B has 4 sides of equal length.

   What is the LENGTH, in toothpicks, of each side of Shape B?

   Show All Work
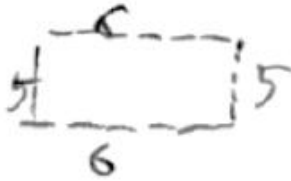
   Answer _____ toothpicks

Part C

Mark uses 22 toothpicks to make Shape C. It is a rectangle that has a length of 6 toothpicks.

What is the WIDTH, in toothpicks, of Shape C?

$$\text{Perimeter of rectangle} = 2 \times l + 2 \times w$$

Show All Work

Answer _____ toothpicks

Exemplary Response:

- 24 toothpicks

AND

- 6 toothpicks

AND

- 5 toothpicks

AND

- Sample Process:

8 + 8 + 8 = 24

24 / 4 = 6

22 – 6 – 6 = 10

10 / 2 = 5

OR

- Other valid process

Mark places toothpicks end to end to make the sides of three shapes.

Part A

Shape A has 3 sides. Each side is 8 toothpicks long.

What is the PERIMETER, in toothpicks, of Shape A?

Show All Work

$$\begin{array}{r} 8 \\ +8 \\ \hline 16 \end{array} \qquad \begin{array}{r} 16 \\ +8 \\ \hline 24 \end{array}$$
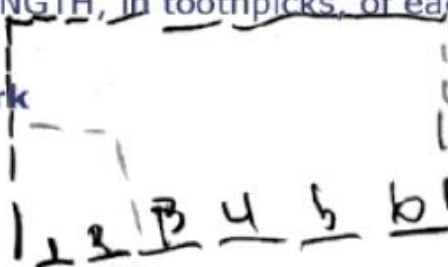
Answer ___**24**___ toothpicks

Part B

Mark makes Shape B using the same number of toothpicks used in Shape A. Shape B has 4 sides of equal length.

What is the LENGTH, in toothpicks, of each side of Shape B?

Show All Work

$$\begin{array}{r} 6 \\ \times 4 \\ \hline 24 \end{array}$$

Answer ___**6**___ toothpicks

Part C

Mark uses 22 toothpicks to make Shape C. It is a rectangle that has a length of 6 toothpicks.

What is the WIDTH, in toothpicks, of Shape C?

> Perimeter of rectangle $= 2 \times l + 2 \times w$

Show All Work

[handwritten diagram: rectangle labeled with c on top, 5 on left, 5 on right, 6 on bottom]

Answer _____ *5* _____ toothpicks

Scoring Notes: The response demonstrates a thorough understanding of how to determine the perimeter of polygons with a valid setup in Parts A, B, and C. The response demonstrates a thorough understanding of making sense of problems and persevering in solving those problems with a correct number of toothpicks in Parts A, B, and C. This response receives three points for content and three points for process.

Part A

Shape A has 3 sides. Each side is 8 toothpicks long.

What is the PERIMETER, in toothpicks, of Shape A?

Show All Work

3 8

$$\begin{array}{r} 8 \\ 8 \\ + 8 \\ \hline 24 \end{array}$$

Answer ___8 24___ toothpicks

Part B

Mark makes Shape B using the same number of toothpicks used in Shape A. Shape B has 4 sides of equal length.

What is the LENGTH, in toothpicks, of each side of Shape B?

Show All Work

1 2 3 4 5 6

Answer ___6___ toothpicks

Part C

Mark uses 22 toothpicks to make Shape C. It is a rectangle that has a length of 6 toothpicks.

What is the WIDTH, in toothpicks, of Shape C?

$$\boxed{\text{Perimeter of rectangle} = 2 \times l + 2 \times w}$$

Show All Work

$2 \times 11 + 2 \times 1 = 4$

$1 \quad 2 \quad 3 \quad 4 \quad 5$

$\begin{array}{r} 6 \\ +6 \\ \hline 12 \\ +10 \\ \hline 22 \end{array}$

Answer __10 4__ toothpicks

Scoring Notes: The response demonstrates a thorough understanding of how to determine the perimeter of polygons with a valid setup in Parts A, B, and C. The response demonstrates a partial understanding of making sense of problems and persevering in solving those problems with a correct number of toothpicks in Parts A and B but an incorrect number of toothpicks for Part C. This response receives three points for content and two points for process.

Question 4, Sample C – Measurement Score Point 2; Process Score Point 2

Part A

Shape A has 3 sides. Each side is 8 toothpicks long.

What is the PERIMETER, in toothpicks, of Shape A?

Show All Work

Answer ___24___ toothpicks

Part B

Mark makes Shape B using the same number of toothpicks used in Shape A. Shape B has 4 sides of equal length.

What is the LENGTH, in toothpicks, of each side of Shape B?

Show All Work

Answer ___32___ toothpicks

Part C

Mark uses 22 toothpicks to make Shape C. It is a rectangle that has a length of 6 toothpicks.

What is the WIDTH, in toothpicks, of Shape C?

Perimeter of rectangle $= 2 \times l + 2 \times w$

Show All Work

Answer _____ 35 _____ toothpicks

Scoring Notes: The response demonstrates a partial understanding of how to determine the perimeter of polygons with a valid setup in Parts A and C only. The response demonstrates a partial understanding of making sense of problems and persevering in solving those problems with a correct number of toothpicks in Parts A and C only. This response receives two points for content and two points for process.
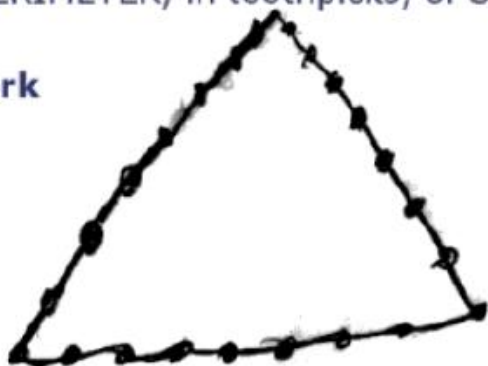
Mark places toothpicks end to end to make the sides of three shapes.

Part A

Shape A has 3 sides. Each side is 8 toothpicks long.

What is the PERIMETER, in toothpicks, of Shape A?

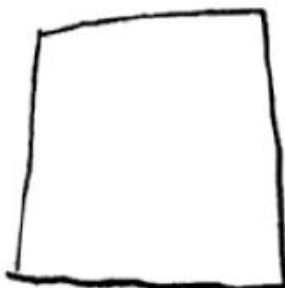**Show All Work**

$8 \times 3 = 24$

Answer _____ 24 _____ toothpicks

Part B

Mark makes Shape B using the same number of toothpicks used in Shape A. Shape B has 4 sides of equal length.

What is the LENGTH, in toothpicks, of each side of Shape B?

Show All Work

$8 \times 4 = 32$

Answer _____ 32 _____ toothpicks

Part C

Mark uses 22 toothpicks to make Shape C. It is a rectangle that has a length of 6 toothpicks.

What is the WIDTH, in toothpicks, of Shape C?

Perimeter of rectangle $= 2 \times l + 2 \times w$

Show All Work

$$6 \times 2 = 12$$
$$+$$
$$5 \times 2 = 10$$
$$\overline{22}$$

Answer _____ 10 _____ toothpicks

Scoring Notes: The response demonstrates a partial understanding of how to determine the perimeter of polygons with a valid setup in Parts A and C only. The response demonstrates a limited understanding of making sense of problems and persevering in solving those problems with a correct number of toothpicks in Part A only. This response receives two points for content and one point for process.
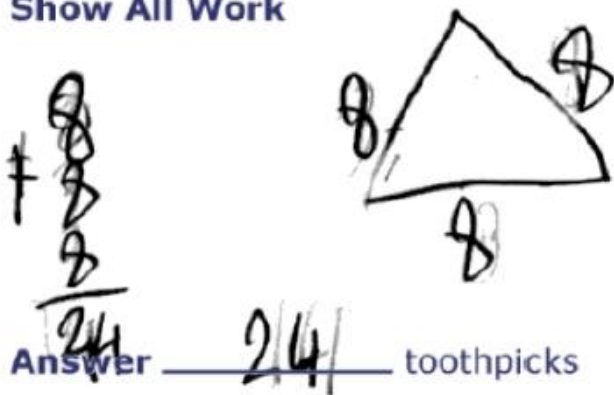
Mark places toothpicks end to end to make the sides of three shapes.

Part A

Shape A has 3 sides. Each side is 8 toothpicks long.

What is the PERIMETER, in toothpicks, of Shape A?

Show All Work

$$\begin{array}{r} 8 \\ \times\ 3 \\ \hline 24 \end{array}$$
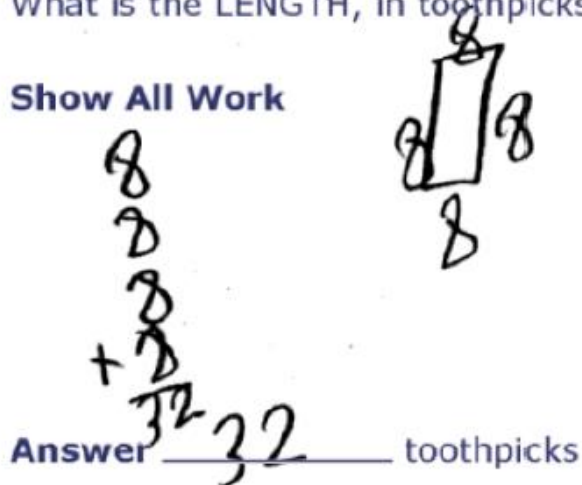
Answer ___24___ toothpicks

Part B

Mark makes Shape B using the same number of toothpicks used in Shape A. Shape B has 4 sides of equal length.

What is the LENGTH, in toothpicks, of each side of Shape B?

Show All Work

Answer ___6___ toothpicks

Part C

Mark uses 22 toothpicks to make Shape C. It is a rectangle that has a length of 6 toothpicks.

What is the WIDTH, in toothpicks, of Shape C?

Perimeter of rectangle $= 2 \times l + 2 \times w$

Show All Work

$$\begin{array}{l} \times \frac{9}{4} \\ \hline 24 \end{array} \qquad \begin{array}{l} + \frac{6}{3} \\ \hline 18 \end{array} \qquad \begin{array}{l} + \frac{6}{6} \\ \hline 12 \end{array}$$

Answer _____ $3\frac{1}{2}$ _____ toothpicks

Scoring Notes: The response demonstrates a limited understanding of how to determine the perimeter of polygons with a valid setup in Part A only. The response demonstrates a partial understanding of making sense of problems and persevering in solving those problems with a correct number of toothpicks in Parts A and C only. This response receives one point for content and two points for process.

Part A

Shape A has 3 sides. Each side is 8 toothpicks long.

What is the PERIMETER, in toothpicks, of Shape A?

Show All Work

Answer _____24_____ toothpicks

Part B

Mark makes Shape B using the same number of toothpicks used in Shape A. Shape B has 4 sides of equal length.

What is the LENGTH, in toothpicks, of each side of Shape B?

Show All Work

Answer _____32_____ toothpicks

Part C

Mark uses 22 toothpicks to make Shape C. It is a rectangle that has a length of 6 toothpicks.

What is the WIDTH, in toothpicks, of Shape C?

Perimeter of rectangle $= 2 \times l + 2 \times w$

Show All Work

$$
\begin{array}{r}
22 \\
22 \\
+ \ 6\ 6 \\
\hline
56
\end{array}
$$

Answer __56__ toothpicks

Scoring Notes: The response demonstrates a limited understanding of how to determine the perimeter of polygons with a valid setup in Part A only. The response demonstrates a limited understanding of making sense of problems and persevering in solving those problems with a correct number of toothpicks in Part A only. This response receives one point for content and one point for process.
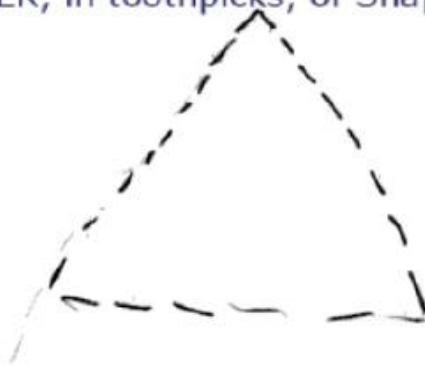
Part A

Shape A has 3 sides. Each side is 8 toothpicks long.

What is the PERIMETER, in toothpicks, of Shape A?

Show All Work

Answer ____23____ toothpicks

Part B

Mark makes Shape B using the same number of toothpicks used in Shape A. Shape B has 4 sides of equal length.

What is the LENGTH, in toothpicks, of each side of Shape B?

Show All Work

Sape a 3
+ Sape B 4
7

Answer ____7____ toothpicks

Part C

Mark uses 22 toothpicks to make Shape C. It is a rectangle that has a length of 6 toothpicks.

What is the WIDTH, in toothpicks, of Shape C?

Perimeter of rectangle $= 2 \times l + 2 \times w$

Show All Work

$$6 + 6 = 12$$

$$L = 6$$
$$w = 12$$

Answer ___12___ toothpicks

Scoring Notes: The response demonstrates limited or no understanding of how to determine the perimeter of polygons with an invalid setup for Parts A, B, and C. The response demonstrates limited or no understanding of making sense of problems and persevering in solving those problems with an incorrect number of toothpicks in Parts A, B, and C. This response receives zero points for content and zero points for process.
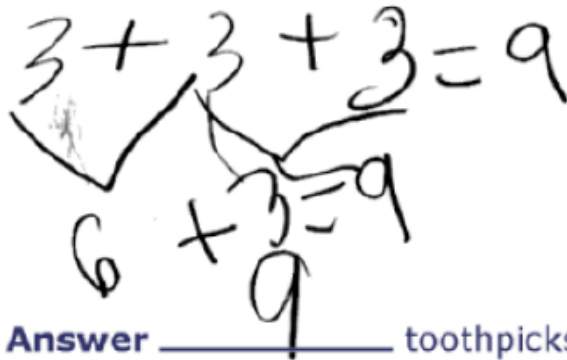
Mark places toothpicks end to end to make the sides of three shapes.

Part A

Shape A has 3 sides. Each side is 8 toothpicks long.

What is the PERIMETER, in toothpicks, of Shape A?

Show All Work

$$3 + 3 + 3 = 9$$

$$6 + 3 = 9$$

Answer _____ toothpicks

Part B

Mark makes Shape B using the same number of toothpicks used in Shape A. Shape B has 4 sides of equal length.

What is the LENGTH, in toothpicks, of each side of Shape B?

Show All Work

$$3 + 1$$

4

Answer _____ toothpicks

Part C

Mark uses 22 toothpicks to make Shape C. It is a rectangle that has a length of 6 toothpicks.

What is the WIDTH, in toothpicks, of Shape C?

Perimeter of rectangle $= 2 \times l + 2 \times w$

Show All Work

$22 + 6 = 28$

Answer $\underline{\quad 28 \quad}$ toothpicks