

Non-Secure Item*Non-Secure Item***Non-Secure Item***Non-Secure Item**
ISTEP+ Applied Skills Sample for Classroom Use

This document provides examples of the types of items on the *ISTEP+ Part 1 (Applied Skills) Assessment*. The sample items can serve as models when teachers are constructing items for classroom assessment. It should be noted that this document is not a practice test.

On this website, <http://www.doe.in.gov/assessment/istep-grades-3-8>, you may access other critical mathematics information related to the ISTEP+ Assessments, such as:

- Test Blueprints
- Instructional and Assessment Guidance
- A **MUST** see WebEx recording and accompanying PowerPoint presentation containing critical mathematics information located in the Instructional and Assessment Guidance section
- Calculator Policy
- Reference Sheets
- Applied Skills Rubrics also found on the last pages of this document

Grade 6

Sample Applied Skills

Questions

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1. Lynn is baking 20 cakes. She needs blueberries, strawberries, and some other ingredients for her recipe.
- She needs 22 pounds of blueberries.
 - She needs twice as many pounds of blueberries as she does strawberries.

Part A

Write an equation that can be used to determine the number of pounds of strawberries Lynn needs. Be sure to define the variable in your equation.

Define the variable _____

Equation _____

Part B

Lynn buys the blueberries for \$3 per pound and the strawberries for \$2 per pound.

What is the total cost of the blueberries and strawberries?

Show All Work

Answer \$ _____

Part C

In addition to the cost of the berries, Lynn spends \$52 on the other ingredients needed to make the 20 cakes. Lynn wants to make \$5 for each cake she sells, taking into account the amount she spends on ALL ingredients.

For how much should Lynn sell each cake in order to make \$5 per cake? Use words, numbers, and/or symbols to justify your answer.

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Process Standards: 1, 2, 3, 4, 6 Item Type: Extended-Response Points: 3-Content, 3 Process DOK: 3 Calculator: Yes	Content Standard: 6.AF.5: Solve equations of the form $x + p = q$, $x - p = q$, $px = q$, and $x/p = q$ fluently for cases in which p , q and x are all nonnegative rational numbers. Represent real world problems using equations of these forms and solve such problems.
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Exemplary Response:

Let p represent the number of pounds of strawberries Lynn needs

$$2p = 22$$

Or other valid equation and definition of the variable

AND

\$88

AND

Lynn should sell each cake for \$12.

Sample Process:

$$2p = 22$$

$$p = 22/2$$

$$p = 11$$

$$22 \times \$3 = \$66$$

$$11 \times \$2 = \$22$$

$$\$66 + \$22 = \$88$$

$$\$88 + \$52 = \$140$$

$$\$140/20 = \$7 \text{ per cake}$$

$$\$7 + \$5 = \$12$$

Or other valid process

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2. Eric's steps to evaluating an expression are shown.

Expression: $5 \cdot 6^2 + (2 \cdot 8 \cdot 5) + 2 \cdot \frac{1}{2}$

Step 1: $5 \cdot 6^2 + (8 \cdot 10) + 2 \cdot \frac{1}{2}$

Step 2: $5 \cdot 6^2 + 80 + 2 \cdot \frac{1}{2}$

Step 3: $5 \cdot 12 + 80 + 2 \cdot \frac{1}{2}$

Step 4: $5 \cdot 12 + 82 \cdot \frac{1}{2}$

Step 5: $60 + 41$

Step 6: 101

Part A

Describe ALL of the errors Eric makes in his work.

Part B

What is the correct answer if the errors are corrected?

Show All Work

Answer: _____

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Process Standards: 1, 3, 6, 7 Item Type: Constructed-Response Points: 2-Content, 2-Process DOK: 3 Calculator: Yes	Content Standard: 6.C.6: Apply the order of operations and properties of operations (identity, inverse, commutative properties of addition and multiplication, associative properties of addition and multiplication, and distributive property) to evaluate numerical expressions with nonnegative rational numbers, including those using grouping symbols, such as parentheses, and involving whole number exponents. Justify each step in the process.
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Exemplary Response:

In Step 3, Eric did 6×2 to get 12, but he should have done 6×6 to get 36. In Step 4, Eric added 80 and 2, but he needed to multiply 2 and $\frac{1}{2}$ before adding 80. If the errors are corrected, the answer is 261.

Or other valid explanation

AND

261

Sample Process:

$$5 \cdot 6^2 + (2 \cdot 8 \cdot 5) + 2 \cdot \frac{1}{2}$$

$$5 \cdot 6^2 + (80) + 2 \cdot \frac{1}{2}$$

$$5 \cdot 36 + (80) + 2 \cdot \frac{1}{2}$$

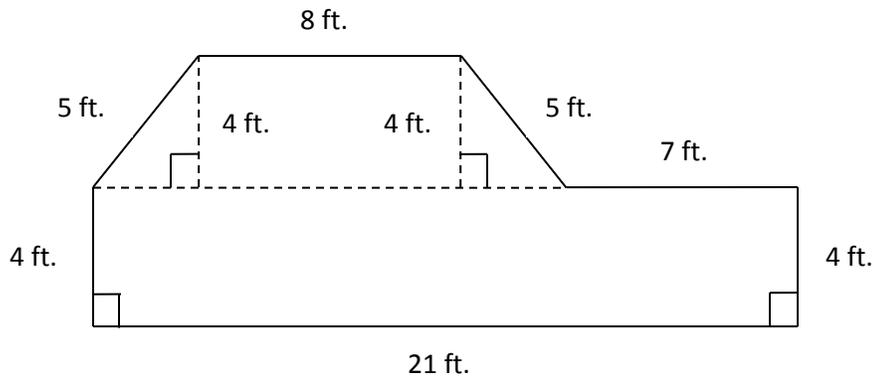
$$180 + 80 + 1$$

261

Or other valid process

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3. Amy is having new carpet installed in one room of her home. A diagram of the room is shown.



Part A

What is the total area, in square feet, of the room?

Show All Work

Answer _____ square feet

Part B

Amy buys a rectangular piece of carpet that is 22 feet by 9 feet. The carpet costs \$2.00 per square foot. The installer charges \$0.75 per square foot to install the carpet but does not charge for the extra carpet not installed.

What is the cost for Amy to buy the carpet and have it installed in the room? Do NOT include tax.

Show All Work

Answer \$ _____

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Process Standards: 1, 2, 4, 5, 7 Item Type: Extended-Response Points: 3-Content, 3-Process DOK: 3 Calculator: Yes	Content Standard: 6.GM.4: Find the area of complex shapes composed of polygons by composing or decomposing into simple shapes; apply this technique to solve real-world and other mathematical problems.
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Exemplary Response:

128 square feet

AND

\$492

Sample Process:

Rectangle: $21 \times 4 = 84$

Trapezoid: $\frac{1}{2} \times 4 \times (14 + 8) = 44$

Total = $84 + 44 = 128$ square feet

$22 \times 9 = 198$ square feet

$198 \times \$2.00 = \396

$128 \times \$0.75 = \96

$\$396 + \$96 = \$492$

Or other valid process

Grade 7

Sample Applied Skills

Questions

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1. A student claims that $8x - 2(4 + 3x)$ is equivalent to $3x$.

The student's steps are shown.

Expression: $8x - 2(4 + 3x)$

Step 1: $8x - 8 + 3x$

Step 2: $8x + 3x - 8$

Step 3: $11x - 8$

Step 4: $3x$

Part A

Describe ALL errors in the student's work.

Part B

If the errors in the student's work are corrected, what will be the final expression?

Show All Work

Expression _____

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Process Standards: 1, 3, 7 Item Type: Constructed-Response Points: 2-Content, 2-Process DOK: 3 Calculator: Yes	Content Standard: 7.AF.1: Apply the properties of operations (e.g., identity, inverse, commutative, associative, distributive properties) to create equivalent linear expressions, including situations that involve factoring (e.g., given $2x - 10$, create an equivalent expression $2(x - 5)$). Justify each step in the process.
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Exemplary Response:

In Step 1, the student did not apply the distributive property correctly. The student forgot to multiply -2 and $3x$. In Step 4, the student should not have subtracted 8 from $11x$ because they are not like terms.
OR other valid descriptions of the errors

AND

$$2x - 8$$

Sample Process:

$$8x - 2(4 + 3x)$$

$$8x - 8 - 6x$$

$$2x - 8$$

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2. Sara follows these two steps to prepare a roast:

1. Preheat the oven for 10 minutes.
2. Place roast in oven and cook for 20 minutes per pound.

Last week, it took a total of 90 minutes for Sara to prepare a roast.

Part A

Write an equation that can be used to determine the weight, in pounds, of the roast Sara prepared. Be sure to define the variable in your equation.

Define the variable _____

Equation _____

Part B

What was the weight, in pounds, of the roast Sara prepared?

Show All Work

Answer _____ pounds

Part C

Sara served potatoes with her roast. She bought $\frac{1}{3}$ pound of potatoes for each pound of roast. Potatoes cost \$0.87 per pound. The roast cost \$5.99 per pound.

How much did Sara spend on the potatoes and roast? Do NOT include tax.

Show All Work

Answer \$ _____

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Process Standards: 1, 2, 4, 6 Item Type: Extended-Response Points: 3-Content, 3-Process DOK: 3 Calculator: Yes	Content Standard: 7.AF.2 Solve equations of the form $px + q = r$ and $p(x + q) = r$ fluently, where p , q , and r are specific rational numbers. Represent real-world problems using equations of these forms and solve such problems.
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Exemplary Response:

Let w represent the weight of the roast in pounds.

$$10 + 20w = 90$$

Or other valid equation and definition of the variable

AND

4 pounds

AND

\$25.12

Sample process:

$$10 + 20w = 90$$

$$20w = 80$$

$$w = 4$$

$$4 \times \frac{1}{3} = \frac{4}{3} \text{ pounds of potatoes}$$

$$\frac{4}{3} \times \$0.87 = \$1.16$$

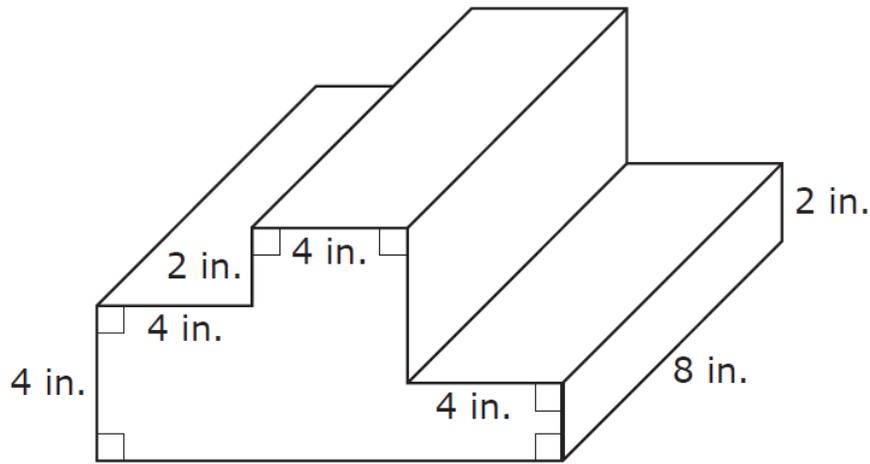
$$4 \times \$5.99 = \$23.96$$

$$\$1.16 + \$23.96 = \$25.12$$

Or other valid process

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3. Malcolm wants to make a stage out of wax to display his model cars. A diagram of the stage is shown.



Part A

What is the volume, in cubic inches, of the stage?

Show All Work

Answer _____ cubic inches

Part B

Malcolm knows 1 pound of wax will fill 30 cubic inches of the stage. A 5-pound bag of wax costs \$8. What is the cost of the wax Malcolm needs to buy to make the stage? Do NOT include tax.

Show All Work

Answer \$ _____

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Process Standards: 1, 2, 4, 6, 7 Item Type: Extended-Response Points: 3-Content, 3-Process DOK: 3 Calculator: Yes	Content Standard: 7.GM.6: Solve real-world and other mathematical problems involving volume of cylinders and three-dimensional objects composed of right rectangular prisms.
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Exemplary Response:

384 cubic inches

AND

\$24

Sample process:

$$\text{Volume} = 4 \times 4 \times 8 + 4 \times 6 \times 8 + 4 \times 2 \times 8$$

$$V = 128 + 192 + 64$$

$$V = 384$$

$$384/30 = 12.8 \text{ pounds}$$

3 bags needed

$$3 \times \$8 = \$24$$

Or other valid process

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4. Barbara is learning to speak a foreign language. She already knows 16 words in the foreign language. Her goal is to know a total of 100 words. Over the summer, she will learn 4 new words each day.

Part A

Write an equation that can be used to determine the number of days it will take Barbara to reach her goal of 100 words. Be sure to define the variable in your equation.

Define the variable _____

Equation _____

Part B

How many days will it take Barbara to reach her goal?

Show All Work

Answer _____ days

If Barbara wants to reach her goal 7 days sooner, how many words must she learn each day?

Show All Work

Answer _____ words

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Process Standards: 1, 2, 4, 6 Item Type: Constructed-Response Points: 2-Content, 2-Process DOK: 3 Calculator: Yes	Content Standard: 7.AF.2 Solve equations of the form $px + q = r$ and $p(x + q) = r$ fluently, where p , q , and r are specific rational numbers. Represent real-world problems using equations of these forms and solve such problems.
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Exemplary Response:

Let d represent the number of days it takes Barbara to reach her goal

$$16 + 4d = 100$$

Or other valid equation and definition of the variable

AND

21 days

AND

6 words

Sample process:

$$16 + 4d = 100$$

$$4d = 84$$

$$d = 21$$

$$21 - 7 = 14 \text{ days}$$

$$84/14 = 6$$

Or other valid process

Grade 8

Sample Applied Skills

Questions

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1. Kathy's Internet company charges a connection fee of \$0.21 for each call she makes from her computer. The company also charges \$0.06 per minute for each call made from her computer.

Kathy was charged \$1.95 for five calls in January.

Part A

Write an equation that can be used to determine the number of minutes Kathy talked on the five calls in January. Be sure to define the variable in your equation.

Define the variable _____

Equation _____

Part B

How many total minutes did Kathy talk on the five calls in January?

Show All Work

Answer _____ minutes

Part C

In February, Kathy made a total of 50 calls. She was charged \$40.50.

Kathy claims she talked for a total of 250 minutes on her calls made in February.

Explain why Kathy's claim is incorrect. Use words, numbers, and/or symbols to justify your answer.

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Process Standards: 1, 2, 3, 4, 6 Item Type: Extended-Response Points: 3-Content, 3-Process DOK: 3 Calculator: Yes	Content Standard: 8.AF.1: Solve linear equations with rational number coefficients fluently, including equations whose solutions require expanding expressions using the distributive property and collecting like terms. Represent real-world problems using linear equations and inequalities in one variable and solve such problems.
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Exemplary Response:

Let m represent the number of minutes Kathy talked on the five calls

$$0.06m + 0.21(5) = 1.95$$

Or other valid equation and definition of the variable

AND

15 minutes

AND

Kathy's claim is incorrect because the total cost for 250 minutes and 50 calls would have been \$25.50. 50 calls times \$0.21 is \$10.50. 250 minutes times \$0.06 is \$15. So the total would be \$10.50 + \$15 which is only \$25.50 and she paid \$40.50.

Or other valid explanation

Sample Process:

$$0.06m + 0.21(5) = 1.95$$

$$0.06m + 1.05 = 1.95$$

$$0.06m = 0.90$$

$$m = 15$$

Or other valid process

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2. Part A

Solve the equation $\frac{2}{3}(x + 12) + \frac{2}{3}x = 4$.

Show All Work

Answer _____

Part B

Explain how you know when a linear equation in one variable has infinitely many solutions.

Part C

What does it mean when a linear equation in one variable has infinitely many solutions?

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Process Standards: 1, 3, 6, 7 Item Type: Constructed-Response Points: 2-Content, 2-Process DOK: 3 Calculator: Yes	Content Standard: 8.AF.2: Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by transforming a given equation into simpler forms, until an equivalent equation of the form $x = a$, $a = a$, or $a = b$ results (where a and b are different numbers).
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Exemplary Response:

$$x = -3$$

AND

A linear equation has infinitely many solutions if the variables cancel and a true statement remains, such as, $2 = 2$.

Or other valid explanation

AND

It means that you can substitute any number for the variable and the equation will be true.

Or other valid explanation

Sample Process:

$$\frac{2}{3}(x + 12) + \frac{2}{3}x = 4$$

$$\frac{2}{3}x + 8 + \frac{2}{3}x = 4$$

$$\frac{4}{3}x + 8 = 4$$

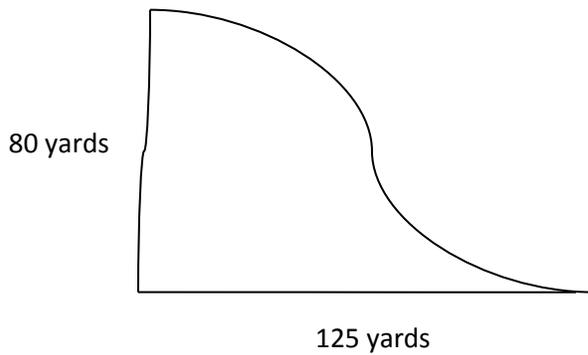
$$\frac{4}{3}x = -4$$

$$x = -3$$

Or other valid process

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3. A diagram of a pond in Paul's neighborhood is shown.



Part A

Paul notices that the shape of the pond is somewhat like a triangle. He claims that he can approximate the perimeter of the pond without doing any measurement of the actual pond or on the diagram. What assumption would Paul need to make in order to justify his claim?

Part B

Based on the assumption in Part A, determine the approximate perimeter of the pond.

Show All Work

Answer _____ yards

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Process Standards: 1, 3, 4, 5, 6, 7 Item Type: Constructed-Response Points: 2-Content, 2-Process DOK: 3 Calculator: Yes	Content Standard: 8.GM.1: Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and other mathematical problems in two dimensions.
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Exemplary Response:

Paul must assume that the shape of the pond resembles a right triangle.

Or other valid assumption

AND

353 yards

Sample Process:

$$80^2 + 125^2 = c^2$$

$$6,400 + 15,625 = c^2$$

$$22,025 = c^2$$

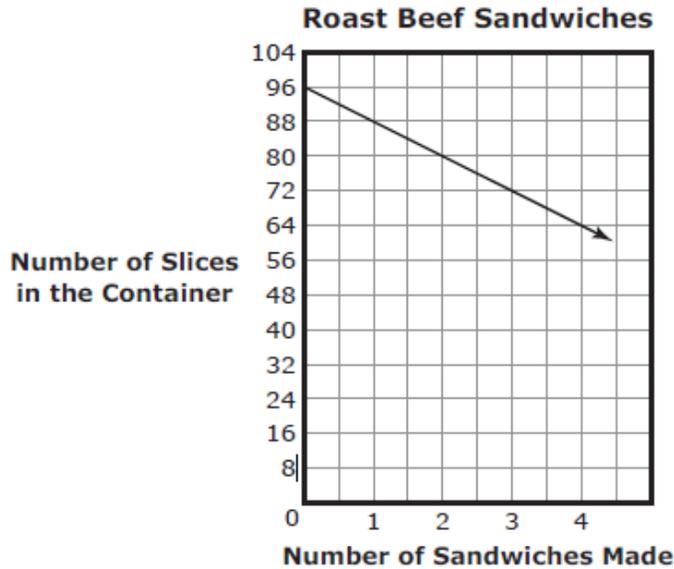
$$\sqrt{22,025} = \sqrt{c^2}$$

$$c \approx 148$$

$$148 + 80 + 125 = 353$$

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4. Amy works in a sandwich shop. She prepares roast beef sandwiches using slices of roast beef from a container. The graph shows the relationship between the number of slices in the container, y , and the number of sandwiches made, x .



Part A

Construct a function that models the relationship shown in the graph.

Function _____

Part B

What are the slope and y -intercept, and what do they represent in this situation?

Slope _____

y -intercept _____

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Part C

In the table, record the number of slices of roast beef remaining in the container after the given number of sandwiches are made.

Roast Beef Sandwiches

Number of Sandwiches Made	Number of Slices in the Container
4	
6	
8	
10	

Part D

The cost of a roast beef sandwich is \$7.00.

How much money has the shop collected from the sale of roast beef sandwiches when the container is empty? Do NOT include tax.

Show All Work

Answer \$ _____

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ISTEP+ Applied Skills Sample for Classroom Use

Process Standards: 1, 2, 4, 6, 8 Item Type: Extended-Response Points: 3-Content, 3-Process DOK: 3 Calculator: Yes	Content Standard: 8.AF.6: Construct a function to model a linear relationship between two quantities given a verbal description, table of values, or graph. Recognize in $y = mx + b$ that m is the slope (rate of change) and b is the y -intercept of the graph, and describe the meaning of each in the context of a problem.
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Exemplary Response:

$$y = -8x + 96$$

Or other valid equation

AND

The slope is -8 and it represents the number of slices used to make each sandwich. Or, it represents a decrease of 8 slices in the container for every sandwich made.

The y -intercept is 96 and it represents the number of slices that are in the container before Amy starts to make sandwiches.

Or other valid explanations

AND

Number of Sandwiches Made	Number of Slices in the Container
4	64
6	48
8	32
10	16

AND

\$84

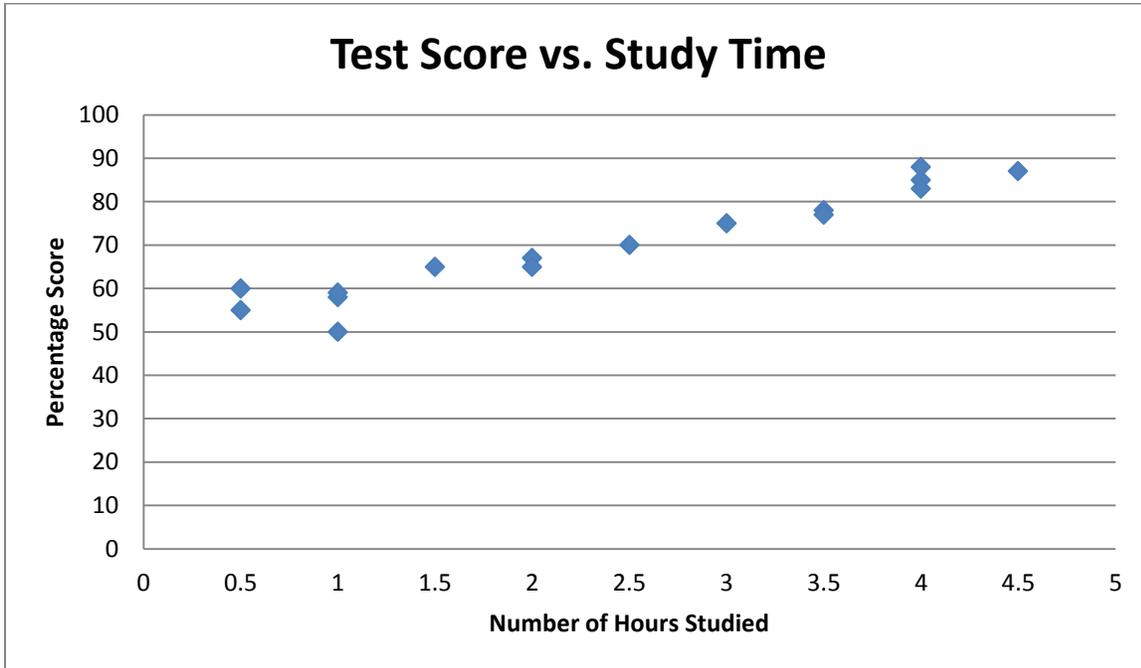
Sample process:

$$96 \div 8 = 12 \text{ sandwiches}$$
$$12 \times \$7 = \$84$$

Or other valid process

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ISTEP+ Applied Skills Sample for Classroom Use

5. The graph shows the relationship between the number of hours studied by students for a final test and their percentage score on the test.



Part A

Draw a line on the graph that BEST models this data.

Part B

Based on the data, describe how the percentage score relates to the number of hours studied.

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Part C

Write an equation that represents the line you drew in Part A, and define the variables in your equation. Use rounded whole number values in your equation.

Define the Variables _____

Equation _____

Part D

What are the values of the slope and y-intercept, and what do they represent in this situation?

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ISTEP+ Applied Skills Sample for Classroom Use

Process Standards: 1, 2, 4, 6, 7 Item Type: Extended-Response Points: 3-Content, 3-Process DOK: 3 Calculator: Yes	Content Standard: 8.DSP.1: Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantitative variables. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association. 8.DSP.2: Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and describe the model fit by judging the closeness of the data points to the line. 8.DSP.3: Write and use equations that model linear relationships to make predictions, including interpolation and extrapolation, in real-world situations involving bivariate measurement data; interpret the slope and y-intercept.
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Exemplary Response:

Note: Scoring guidelines for ISTEP+ Applied Skills questions are determined by a committee of Indiana educators working closely with the IDOE and CTB McGraw Hill Education.

A line drawn on the graph that closely fits the data.

AND

In general, the percentage score increases as the number of hours studied increases.

Or other valid description

AND

A valid equation based on the line drawn in Part A, for example, $y = 8x + 50$.

AND

The slope is 8 and it represents an increase of 8 percentage points on the test for every 1 hours studied. The y-intercept is 50 and it represents a percentage score of 50 on the test if no hours are spent studying.

Or other valid descriptions

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Constructed Response Rubric

Content Rubric	
2	A score of two indicates a thorough understanding of the mathematical concepts embodied in the task. The response <ul style="list-style-type: none"> • shows 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 <ul style="list-style-type: none"> • contains errors in the 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 processes related to the task. The response <ul style="list-style-type: none"> • 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. • attends to precision in explanations and the overall body of work.
1	A score of one indicates a partial understanding of the processes related to the task. The response contains one or more of the following errors. The response <ul style="list-style-type: none"> • shows a strategy that contains minor errors. • identifies some of the important elements of the problem and shows a general understanding of the relationships among them. • contains errors related to the precision of work.
0	A score of zero indicates limited or no understanding of the processes related to the task.

Scoring Notes

- 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 Process.
- A student can receive the top score point in Process if an error made in the Content portion is used with an appropriate strategy to solve the problem.
- A computation error deducts a point from either the Content score or Process score depending on where the error occurs. Multiple computation errors may deduct points from the Content score, Process score, or both scores depending on where the errors occur and the number of errors in the response.

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Extended Response Rubric

Content Rubric	
3	A score of three indicates a thorough understanding of the mathematical concepts embodied in the task. The response <ul style="list-style-type: none"> • shows 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 <ul style="list-style-type: none"> • contains minor errors in the content related work.
1	A score of one indicates a limited understanding of the mathematical concepts embodied in the task. The response <ul style="list-style-type: none"> • contains major errors in the content related work.
0	A score of zero indicates no understanding of the mathematical concepts embodied in the task.
Process Rubric	
3	A score of three indicates a thorough understanding of the processes related to the task. The response <ul style="list-style-type: none"> • 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. • attends to precision in explanations and the overall body of work.
2	A score of two indicates a partial understanding of the processes related to the task. The response contains one or more of the following errors. The response <ul style="list-style-type: none"> • shows a strategy that contains minor errors. • identifies some of the important elements of the problem and shows a general understanding of the relationships among them. • contains minor errors related to the precision of work.
1	A score of one indicates a limited understanding of the processes related to the task. The response contains one or more of the following errors. The response <ul style="list-style-type: none"> • shows a strategy that contains major errors. • shows a limited understanding of the relationships among the elements of the problem. • contains major errors related to the precision of work.
0	A score of zero indicates no understanding of the processes related to the task.

Scoring Notes

- 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 Process.
- A student can receive the top score point in Process if an error made in the Content portion is used with an appropriate strategy to solve the problem.
- A computation error deducts a point from either the Content score or Process score depending on where the error occurs. Multiple computation errors may deduct points from the Content score, Process score, or both scores depending on where the errors occur and the number of errors in the response.