ISTEP+ Part 1
Item Sampler for Mathematics
Grade 10

Updated September 2016
Purpose of the Item Sampler

• To describe the item types found in ISTEP+ Part 1 Mathematics
• To provide and explain exemplary responses for the item types found in ISTEP+ Part 1
• To explain how open-ended math items are scored
• To provide model items that teachers may use when constructing items for classroom assessments

Note: Item Samplers are not practice tests.
Scoring

• Constructed Response
  – Content: 2 points
  – Process: 2 points

• Extended Response
  – Content: 3 points
  – Process: 3 points
Important Process Standards

• PS.1: Make sense of problems and persevere in solving them.
• PS.2: Reason abstractly and quantitatively.
• PS.3: Construct viable arguments and critique the reasoning of others.
• PS.4: Model with mathematics.
• PS.5: Use appropriate tools strategically.
• PS.6: Attend to precision.
• PS.7: Look for and make use of structure.
• PS.8: Look for and express regularity and repeated reasoning.
Sample Constructed-Response  
Grade 10

<table>
<thead>
<tr>
<th>Content Standard: A1.QE.5: Represent real-world problems using quadratic equations in one or two variables and solve such problems with and without technology. Interpret the solution and determine whether it is reasonable.</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Process Standard: 4</td>
<td></td>
</tr>
<tr>
<td>Item Type: Constructed Response</td>
<td>Pts: 4</td>
</tr>
</tbody>
</table>

The Grade 10 item is shown on the next slide.
A rectangle with an area of 104 square inches has a width that is 5 inches less than its length.

**Part A**

Write an equation representing the area of the rectangle. Use $x$ to represent the length of the rectangle. Solve your equation for all values of $x$.

**Show All Work**

**Part B**

Use your solution to the equation to identify the width and length of the rectangle. Explain how you determined which value(s) of $x$ to use.

**Show All Work**
Sample Constructed-Response
Grade 10

Exemplary Response:

Part A

Area = (length)*(width)
Let x = length, then width = x – 5
Area = x(x – 5)
104 = x(x – 5)

AND

Part B

The length is 13 inches and the width is 8 inches.
Sample Constructed-Response  
Grade 10

Exemplary Response:

Part A

\[ 104 = x(x - 5) \]
\[ x(x - 5) = 104 \]
\[ x^2 - 5x - 104 = 0 \]
\[ (x - 13)(x + 8) = 0 \]

\[ x = -8 \text{ or } 13 \]

AND

A distance or length cannot be negative. So the result \( x = -8 \) can be excluded. Since the length equals 13, the width equals 8.

- Other valid process
Sample Extended-Response
Grade 10

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.

Process Standards: 2, 3, 4

<table>
<thead>
<tr>
<th>Item Type: Extended Response</th>
<th>Pts: 6</th>
<th>DOK: 2</th>
<th>Grade: 10</th>
</tr>
</thead>
</table>

The Grade 10 item is shown on the next slide.
Sample Extended-Response
Grade 10

The table shows the price, $P$, for renting a car for $d$ days from a car-rental company.

<table>
<thead>
<tr>
<th>Number of Days, $d$</th>
<th>Price, $P$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$115</td>
</tr>
<tr>
<td>2</td>
<td>$150</td>
</tr>
<tr>
<td>3</td>
<td>$185</td>
</tr>
<tr>
<td>4</td>
<td>$220</td>
</tr>
</tbody>
</table>

Part A

Construct a linear function that models the relationship between the price, $P$, and the number of days, $d$, for which the car is rented. Show the steps that are required in order to construct the model.

Part B

What is the slope of the line in Part A? What does it represent in the context of the problem?

Show All Work

Part C

What is the value of this function when $d' = 0$? What does this value represent in the context of the problem?

Show All Work
Sample Extended-Response
Grade 10

Exemplary Response:

Part A

\[ P = 35d + 80 \]

And

Part B

Slope = 35

Or other valid response or value based on an incorrect linear function in Part A.

And

Part C

$80

Or other valid response or value based on an incorrect linear function in Part A.
Sample Extended-Response
Grade 10

Exemplary Response:

Sample Process:

Part A

\[ m = \frac{(150 - 115)}{(2 - 1)} = \frac{35}{1} = 35 \]

\[ P = 35d + b \]

\[ 115 = 35(1) + b \]

\[ 115 = 35 + b \]

\[ 80 = b \]

\[ P = 35d + 80 \]

(or other valid process)

And

Part B

The slope (35) represents the cost per day to rent the car.

And

Part C

Because someone will not rent a car for 0 days, the value when \( d = 0 \) represents cost/fees that all customers pay regardless of the number of days they rent the car or other valid explanation.
Best Practices

• Teachers use the Item Samplers as models for the creation of their own math items.

• Students use them to learn to show their work and develop strategies for responding to different math item types.
Frequently Asked Questions

- Responses outside of the given lines (paper-and-pencil test)
- Scoring multiple-part items
- Grammar and spelling
Resources

– Item Samplers
– Testing Windows
– Program Manual
– Blueprints
– Experience Online
– Instructional and Assessment Guidance
– Released Items and Scoring Notes
– Rubrics
Questions

• Please contact Joe Staten for questions related to Mathematics assessments at jstaten@doe.in.gov.

• For other questions, please contact the Office of Student Assessment by calling (317) 232-9050 or via email at INassessments@doe.in.gov.