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<td>M032331</td>
<td>M</td>
<td>8</td>
<td>M07</td>
<td>6</td>
<td>Geometry</td>
<td>Applying</td>
<td>1</td>
<td>B</td>
</tr>
<tr>
<td>M032623</td>
<td>M</td>
<td>8</td>
<td>M07</td>
<td>7</td>
<td>Geometry</td>
<td>Applying</td>
<td>1</td>
<td>D</td>
</tr>
<tr>
<td>M032679</td>
<td>M</td>
<td>8</td>
<td>M07</td>
<td>8</td>
<td>Geometry</td>
<td>Knowing</td>
<td>1</td>
<td>A</td>
</tr>
<tr>
<td>M032047</td>
<td>M</td>
<td>8</td>
<td>M07</td>
<td>9</td>
<td>Algebra</td>
<td>Applying</td>
<td>1</td>
<td>B</td>
</tr>
<tr>
<td>M032398</td>
<td>M</td>
<td>8</td>
<td>M07</td>
<td>10</td>
<td>Geometry</td>
<td>Reasoning</td>
<td>1</td>
<td>B</td>
</tr>
<tr>
<td>M032507</td>
<td>M</td>
<td>8</td>
<td>M07</td>
<td>11</td>
<td>Data and Chance</td>
<td>Applying</td>
<td>1</td>
<td>C</td>
</tr>
<tr>
<td>M032424</td>
<td>M</td>
<td>8</td>
<td>M07</td>
<td>12</td>
<td>Algebra</td>
<td>Reasoning</td>
<td>1</td>
<td>C</td>
</tr>
<tr>
<td>M032681A</td>
<td>M</td>
<td>8</td>
<td>M07</td>
<td>13</td>
<td>Data and Chance</td>
<td>Knowing</td>
<td>1</td>
<td>See scoring guide</td>
</tr>
<tr>
<td>M032681B</td>
<td>M</td>
<td>8</td>
<td>M07</td>
<td>13</td>
<td>Data and Chance</td>
<td>Applying</td>
<td>1</td>
<td>See scoring guide</td>
</tr>
<tr>
<td>M032681C</td>
<td>M</td>
<td>8</td>
<td>M07</td>
<td>13</td>
<td>Data and Chance</td>
<td>Applying</td>
<td>1</td>
<td>See scoring guide</td>
</tr>
</tbody>
</table>

* For details about how score points were awarded for each derived item, please see “Reviewing the TIMSS and PIRLS 2011 Achievement Item Statistics” in Methods and Procedures in TIMSS and PIRLS 2011: http://timssandpirls.bc.edu/methods/t-achievement-scales.html
Which of these is the BEST estimate of $\frac{7.21 \times 3.86}{10.09}$?

A. $\frac{7\times3}{10}$

B. $\frac{7\times4}{10}$

C. $\frac{7\times3}{11}$

D. $\frac{7\times4}{11}$

Content Domain
Number

Topic Area
Fractions and Decimals

Cognitive Domain
Knowing

Maximum Points
1

Key
B

The graph shows the sales of two types of soft drink over 4 years. If the sales trends continue for the next 10 years, determine the year in which the sales of Cherry Cola will be the same as the sales of Lemon Cola.

A) 2003  
B) 2004  
C) 2005  
D) 2006

Content Domain  
Data and Chance

Topic Area  
Data Interpretation

Cognitive Domain  
Reasoning

Maximum Points  
1

Key  
B

Publisher: TIMSS & PIRLS International Study Center, Lynch School of Education, Boston College.
Pat has red tiles and black tiles. Pat uses the tiles to make square shapes.

The $3 \times 3$ shape has 1 black tile and 8 red tiles.

The $4 \times 4$ shape has 4 black tiles and 12 red tiles.

The table below shows the number of tiles for the first three shapes Pat made. Pat continued making shapes using this pattern. Complete the table for the $6 \times 6$ and $7 \times 7$ shapes.

<table>
<thead>
<tr>
<th>Shape</th>
<th>Number of Black Tiles</th>
<th>Number of Red Tiles</th>
<th>Total Number of Tiles</th>
</tr>
</thead>
<tbody>
<tr>
<td>$3 \times 3$</td>
<td>1</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>$4 \times 4$</td>
<td>4</td>
<td>12</td>
<td>16</td>
</tr>
<tr>
<td>$5 \times 5$</td>
<td>9</td>
<td>16</td>
<td>25</td>
</tr>
<tr>
<td>$6 \times 6$</td>
<td>16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$7 \times 7$</td>
<td>25</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Questions for Red and Black Tiles continue.

**Note:** Consider correctness of rows before considering columns since code 10 takes precedence over code 70.

<table>
<thead>
<tr>
<th>Code</th>
<th>Response</th>
<th>Item: M032757</th>
</tr>
</thead>
</table>
| 20   | Both rows completely correct  
Shape 6 × 6: 20, 36  
Shape 7 × 7: 24, 49 | Correct Response |
| 10   | Entries for one row correct but not both | Partially Correct Response |
| 70   | Entries for one column correct but not both  
Red Tiles: 20, 24  OR  Total Tiles: 36, 49 | Incorrect Response |
| 79   | Other incorrect (including crossed out, erased, stray marks, illegible, or off task) | |
| 99   | Blank | Nonresponse |
Use the patterns in the previous table to answer the following questions.

A. Pat made a shape with a total of 64 tiles, how many were black and how many were red?

Answer: __________ black tiles __________ red tiles

B. Pat made a shape that used 49 black tiles. How many red tiles did Pat use in that shape?

Answer: __________ red tiles

C. Next, Pat made a shape using 44 of the red tiles. How many black tiles would Pat need to complete the black part of the shape?

Answer: __________ black tiles

Content Domain
Algebra

Topic Area
Patterns

Cognitive Domain
Reasoning

Maximum Points
2

Key
See scoring guide
<table>
<thead>
<tr>
<th>Code</th>
<th>Response</th>
<th>Item: M032760A</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Correct Response</strong></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>36 black and 28 red</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Partially Correct Response</strong></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>36 black, red incorrect</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>28 red, black incorrect</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Incorrect Response</strong></td>
<td></td>
</tr>
<tr>
<td>79</td>
<td>Incorrect (including crossed out, erased, stray marks, illegible, or off task)</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Nonresponse</strong></td>
<td></td>
</tr>
<tr>
<td>99</td>
<td>Blank</td>
<td></td>
</tr>
</tbody>
</table>
Use the patterns in the previous table to answer the following questions.

A. Pat made a shape with a total of 64 tiles, how many were black and how many were red?

Answer: __________ black tiles  __________ red tiles

B. Pat made a shape that used 49 black tiles. How many red tiles did Pat use in that shape?

Answer: __________ red tiles

C. Next, Pat made a shape using 44 of the red tiles. How many black tiles would Pat need to complete the black part of the shape?

Answer: __________ black tiles

Content Domain
Algebra

Topic Area
Patterns

Cognitive Domain
Reasoning

Maximum Points
1

Key
See scoring guide

<table>
<thead>
<tr>
<th>Code</th>
<th>Response</th>
<th>Item: M032760B</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>Correct Response</td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>Incorrect Response</td>
<td></td>
</tr>
<tr>
<td>79</td>
<td>Incorrect (including crossed out, erased, stray marks, illegible, or off task)</td>
<td></td>
</tr>
<tr>
<td>99</td>
<td>Nonresponse</td>
<td></td>
</tr>
<tr>
<td>99</td>
<td>Blank</td>
<td></td>
</tr>
</tbody>
</table>
Use the patterns in the previous table to answer the following questions.

A. Pat made a shape with a total of 64 tiles, how many were black and how many were red?

Answer: ________ black tiles ________ red tiles

B. Pat made a shape that used 49 black tiles. How many red tiles did Pat use in that shape?

Answer: ________ red tiles

C. Next, Pat made a shape using 44 of the red tiles. How many black tiles would Pat need to complete the black part of the shape?

Answer: ________ black tiles
<table>
<thead>
<tr>
<th>Code</th>
<th>Response</th>
<th>Item: M032760C</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Correct Response</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td><strong>Incorrect Response</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>79</td>
<td>Incorrect (including crossed out, erased, stray marks, illegible, or off task)</td>
<td></td>
</tr>
<tr>
<td><strong>Nonresponse</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>99</td>
<td>Blank</td>
<td></td>
</tr>
</tbody>
</table>
Pat wanted to add a line to the table showing how to find the number of tiles needed to make a square of any size. Use the patterns in the table on the opposite page to help you complete the line for shape $n \times n$ in the table below.

<table>
<thead>
<tr>
<th>Shape</th>
<th>Number of Black Tiles</th>
<th>Number of Red Tiles</th>
<th>Total Number of Tiles</th>
</tr>
</thead>
<tbody>
<tr>
<td>$n \times n$</td>
<td>$n^2$</td>
<td>$(n-2)^2$</td>
<td></td>
</tr>
</tbody>
</table>

End of Red and Black Tiles section.

**Content Domain**
- Algebra

**Topic Area**
- Algebraic Expressions

**Cognitive Domain**
- Reasoning

**Maximum Points**
- 2

**Key**
- See scoring guide

<table>
<thead>
<tr>
<th>Code</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>Both expressions correct in simplified form</td>
</tr>
<tr>
<td></td>
<td>Red tiles: $4(n - 1); 4n - 4$; or correct verbal expression</td>
</tr>
<tr>
<td></td>
<td>Total tiles: $n^2; n \times n$; or correct verbal expression, such as “square the number” or “multiply by itself”</td>
</tr>
<tr>
<td>21</td>
<td>Both expressions correct with expression for red tiles in the form of total number of tiles minus number of black tiles e.g., $n^2 - (n - 2)^2$ or equivalent.</td>
</tr>
<tr>
<td>10</td>
<td>Expression for red tiles correct as in 20 but not expression for total tiles</td>
</tr>
<tr>
<td>11</td>
<td>Expression for total tiles correct as in 20 but not expression for red tiles</td>
</tr>
<tr>
<td>70</td>
<td>Incorrect expression including $n$ for red tiles or total or both (includes incorrect attempts to express red tiles as difference from total tiles)</td>
</tr>
<tr>
<td>79</td>
<td>Other incorrect (including crossed out, erased, stray marks, illegible, or off task)</td>
</tr>
<tr>
<td>99</td>
<td>Blank</td>
</tr>
</tbody>
</table>
What is the sum of all the interior angles of pentagon ABCDE? Show your work.

Answer: ________________
**Note:** Units not required provided correct units implied by the work shown

<table>
<thead>
<tr>
<th>Code</th>
<th>Response</th>
<th>Item: M032692</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Correct Response</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>540 degrees with work shown</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Examples:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>$3 \text{ (triangles)} \times 180^\circ = 540^\circ$</td>
<td></td>
</tr>
<tr>
<td></td>
<td>$6 \text{ (right angles)} \times 90^\circ = 540^\circ$</td>
<td></td>
</tr>
<tr>
<td><strong>Partially Correct Response</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>540 degrees with no work shown</td>
<td></td>
</tr>
<tr>
<td><strong>Incorrect Response</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>79</td>
<td>Incorrect (including crossed out, erased, stray marks, illegible, or off task)</td>
<td></td>
</tr>
<tr>
<td><strong>Nonresponse</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>99</td>
<td>Blank</td>
<td></td>
</tr>
</tbody>
</table>
Which of these shows how 36 can be expressed as a product of prime factors?

A. $6 \times 6$
B. $4 \times 9$
C. $4 \times 3 \times 3$
D. $2 \times 2 \times 3 \times 3$

Content Domain
Number

Topic Area
Whole Numbers

Cognitive Domain
Knowing

Maximum Points
1

Key
D
The pie chart shows the percentage of caps for sale at a sporting goods store. If there are 200 caps, what is the total number of caps that are either white or green?

A 55  
B 100  
C 110  
D 145

Content Domain
Number

Topic Area
Ratio, Proportion and Percent

Cognitive Domain
Applying

Maximum Points
1

Key
C

If $t$ is a number between 6 and 9, then $t + 5$ is between what two numbers?

- A. 1 and 4
- B. 10 and 13
- C. 11 and 14
- D. 30 and 45

**Content Domain**
Algebra

**Topic Area**
Algebraic Expressions

**Cognitive Domain**
Knowing

**Maximum Points**
1

**Key**
C

Which number is equal to $\frac{3}{5}$?

- A. 0.8
- B. 0.6
- C. 0.53
- D. 0.35

Content Domain
- Number

Topic Area
- Fractions and Decimals

Cognitive Domain
- Knowing

Maximum Points
- 1

Key
- B
42.65 + 5.748 =

Answer: ____________

Content Domain
Number

Topic Area
Fractions and Decimals

Cognitive Domain
Knowing

Maximum Points
1

Key
See scoring guide
<table>
<thead>
<tr>
<th>Code</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Correct Response</strong></td>
</tr>
<tr>
<td>10</td>
<td>48.398</td>
</tr>
<tr>
<td></td>
<td><strong>Incorrect Response</strong></td>
</tr>
<tr>
<td>70</td>
<td>10013 with decimal point inserted anywhere or without decimal</td>
</tr>
<tr>
<td>79</td>
<td>Other incorrect (including crossed out, erased, stray marks, illegible, or off task)</td>
</tr>
<tr>
<td></td>
<td><strong>Nonresponse</strong></td>
</tr>
<tr>
<td>99</td>
<td>Blank</td>
</tr>
</tbody>
</table>
Kim is packing eggs into boxes.
Each box holds 6 eggs.
She has 94 eggs.
What is the smallest number of boxes she needs to pack all the eggs?

Answer: __________________ boxes

Content Domain
- Number

Topic Area
- Whole Numbers

Cognitive Domain
- Applying

Maximum Points
- 1

Key
- See scoring guide
<table>
<thead>
<tr>
<th>Code</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>16</td>
</tr>
<tr>
<td>70</td>
<td>15 OR 15.6 OR 15.67 OR 15.7 OR $15\frac{2}{3}$</td>
</tr>
<tr>
<td>79</td>
<td>Other incorrect (including crossed out, erased, stray marks, illegible, or off task)</td>
</tr>
<tr>
<td>99</td>
<td>Blank</td>
</tr>
</tbody>
</table>
Which shows a correct method for finding $\frac{1}{3} - \frac{1}{4}$?

A) $\frac{1 - 1}{4 - 3}$

B) $\frac{1}{4 - 3}$

C) $\frac{3 - 4}{3 \times 4}$

D) $\frac{4 - 3}{3 \times 4}$

Content Domain
Number

Topic Area
Fractions and Decimals

Cognitive Domain
Applying

Maximum Points
1

Key
D
Which of these number sentences is true?

A. \( \frac{3}{10} \) of 50 = 50% of 3

B. 3% of 50 = 6% of 100

C. \( 50 \div 30 = 30 \div 50 \)

D. \( \frac{3}{10} \times 50 = \frac{5}{10} \times 30 \)

Content Domain
- Number

Topic Area
- Fractions and Decimals

Cognitive Domain
- Knowing

Maximum Points
- 1

Key
- D

This is a diagram of a rectangular garden. The white area is a rectangular path that is 1 meter wide. Which expression shows the area of the shaded portion of the garden in m²?

A. \(x^2 + 3x\)
B. \(x^2 + 4x\)
C. \(x^2 + 4x - 1\)
D. \(x^2 + 3x - 1\)
$y = \frac{a + b}{c}$

$a = 8, \ b = 6, \ \text{and} \ c = 2$

What is the value of $y$?

A. 7
B. 10
C. 11
D. 14

Content Domain
Algebra

Topic Area
Equations/ Formulas and Functions

Cognitive Domain
Knowing

Maximum Points
1

Key
A

A piece of wood was 40 cm long.
It was cut into 3 pieces.
The lengths in cm are
2x – 5
x + 7
x + 6
What is the length of the longest piece?

Answer: __________ cm

Show your work. If you use a calculator, you still must describe all the steps you used to obtain your answer.
<table>
<thead>
<tr>
<th>Code</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Correct Response</strong></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>15, with $4x + 8 = 40$ or equivalent algebraic reasoning shown</td>
</tr>
<tr>
<td><strong>Partially Correct Response</strong></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>8, with correct working shown or indication of $x = 8$ with correct working</td>
</tr>
<tr>
<td>11</td>
<td>$x + 7$, with correct working shown or indication of $x = 8$</td>
</tr>
<tr>
<td>12</td>
<td>15, with numerical (i.e., non-algebraic) reasoning shown</td>
</tr>
<tr>
<td><strong>Incorrect Response</strong></td>
<td></td>
</tr>
<tr>
<td>70</td>
<td>15 or $x + 7$ with no/incorrect work shown</td>
</tr>
<tr>
<td>79</td>
<td>Other incorrect (including crossed out, erased, stray marks, illegible, or off task)</td>
</tr>
<tr>
<td><strong>Nonresponse</strong></td>
<td></td>
</tr>
<tr>
<td>99</td>
<td>Blank</td>
</tr>
</tbody>
</table>
In this triangle:

\[ AC = BC \]

\[ AB \text{ is twice as long as } CX. \]

What is the size of angle \( B \)?

Answer: __________°
<table>
<thead>
<tr>
<th>Code</th>
<th>Response</th>
<th>Item: M052362</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Correct Response</strong></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>45</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Incorrect Response</strong></td>
<td></td>
</tr>
<tr>
<td>79</td>
<td>Incorrect (including crossed out, erased, stray marks, illegible, or off task)</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Nonresponse</strong></td>
<td></td>
</tr>
<tr>
<td>99</td>
<td>Blank</td>
<td></td>
</tr>
</tbody>
</table>
Lines $m$ and $n$ are parallel.
What is the value of $b$?

Answer: __________

Content Domain
Geometry

Topic Area
Geometric Shapes

Cognitive Domain
Reasoning

Maximum Points
1

Key
See scoring guide

<table>
<thead>
<tr>
<th>Code</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>50</td>
</tr>
</tbody>
</table>

**Correct Response**

**Incorrect Response**

79 Incorrect (including crossed out, erased, stray marks, illegible, or off task)

**Nonresponse**

99 Blank
The perimeter of a square is 36 cm. What is the area of this square?

A) 81 cm²  
B) 36 cm²  
C) 24 cm²  
D) 18 cm²

Content Domain
Geometry

Topic Area
Geometric Measurement

Cognitive Domain
Applying

Maximum Points
1

Key
A

Ryan is packing books into a rectangular box. All the books are the same size.

What is the largest number of books that will fit inside the box?

Answer: ____________________

Content Domain
Geometry

Topic Area
Geometric Measurement

Cognitive Domain
Reasoning

Maximum Points
1

Key
See scoring guide
<table>
<thead>
<tr>
<th>Code</th>
<th>Response</th>
<th>Item: M052206</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Correct Response</strong></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Incorrect Response</strong></td>
<td></td>
</tr>
<tr>
<td>79</td>
<td>Incorrect (including crossed out, erased, stray marks, illegible, or off task)</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Nonresponse</strong></td>
<td></td>
</tr>
<tr>
<td>99</td>
<td>Blank</td>
<td></td>
</tr>
</tbody>
</table>
There are 10 marbles in a bag: 5 red, and 5 blue.
Sue draws a marble from the bag at random. The marble is red.
She puts the marble back into the bag.
What is the probability that the next marble she draws at random is red?

A \[ \frac{1}{2} \]
B \[ \frac{1}{10} \]
C \[ \frac{1}{5} \]
D \[ \frac{1}{10} \]
The graphs for Country X and Country Y show the age structure of each country’s population. The population is divided into three age groups from youngest to oldest. The graphs enable predictions about population growth.

A. Why could the age structure of Country X lead to more rapid population growth than the age structure of Country Y?

B. Why could Country Y expect to have a bigger problem taking care of its elderly population than Country X?
<table>
<thead>
<tr>
<th>Code</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td><strong>Correct Response</strong>&lt;br&gt;Within Country X there is a larger percentage of people in the “having children” or “going to have children” categories than in Country Y.&lt;br&gt;Note: The reference to country X needs to be clear. The comparison with Country Y does not need to be stated.&lt;br&gt;Also, accept “more people” as “proportionately more” and “young or younger” in place of “having children” or “going to have children”&lt;br&gt;Examples:&lt;br&gt;Country X has more people about to have children or having children than country Y&lt;br&gt;There are more people going to have children in country X&lt;br&gt;More young people in country X&lt;br&gt;There is more having children than in country Y</td>
</tr>
<tr>
<td>79</td>
<td><strong>Incorrect Response</strong>&lt;br&gt;Incorrect (including crossed out, erased, stray marks, illegible, or off task)&lt;br&gt;Examples:&lt;br&gt;There are more “going to have children”&lt;br&gt;Country X has more population compared to country Y</td>
</tr>
<tr>
<td>99</td>
<td><strong>Nonresponse</strong>&lt;br&gt;Blank</td>
</tr>
</tbody>
</table>
The graphs for Country X and Country Y show the age structure of each country’s population. The population is divided into three age groups from youngest to oldest. The graphs enable predictions about population growth.

A. Why could the age structure of Country X lead to more rapid population growth than the age structure of Country Y?

B. Why could Country Y expect to have a bigger problem taking care of its elderly population than Country X?

<table>
<thead>
<tr>
<th>Code</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Correct Response</strong></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Within Country Y, there is a relatively larger population of elderly people (“finished having children”) compared with younger populations. Note: The comparison between older and younger people must be made or implied. Country X and Country Y do not have to be mentioned. Examples: <em>More older people than younger people</em>  <em>Too many elderly and very little young people</em>  <em>Not enough young people to take care of the elderly</em>  <em>Less number of people “having children” to keep up the population</em>  <em>Aging population, less youngsters, lesser workforce</em></td>
</tr>
<tr>
<td><strong>Incorrect Response</strong></td>
<td></td>
</tr>
<tr>
<td>79</td>
<td>Incorrect (including crossed out, erased, stray marks, illegible, or off task) Examples: <em>There are many more elders in Y than X</em>  <em>Country Y has a wider range of not having children than country X</em></td>
</tr>
<tr>
<td><strong>Nonresponse</strong></td>
<td></td>
</tr>
<tr>
<td>99</td>
<td>Blank</td>
</tr>
</tbody>
</table>
Which fraction is equivalent to 0.125?

A. \( \frac{125}{100} \)

B. \( \frac{125}{1,000} \)

C. \( \frac{125}{10,000} \)

D. \( \frac{125}{100,000} \)

Content Domain
Number

Topic Area
Fractions and Decimals

Cognitive Domain
Knowing

Maximum Points
1

Key
B

The fractions $\frac{4}{14}$ and $\square \frac{21}{21}$ are equivalent.

What is the value of $\square$?

A. 6  
B. 7  
C. 11  
D. 14

Content Domain
Number

Topic Area
Fractions and Decimals

Cognitive Domain
Applying

Maximum Points
1

Key
A

Here is a pattern:

\[
\begin{align*}
3 - 3 &= 0 \\
3 - 2 &= 1 \\
3 - 1 &= 2 \\
3 - 0 &= 3
\end{align*}
\]

What will the next line in the pattern be?

Answer: ________________

Content Domain
Number

Topic Area
Integers

Cognitive Domain
Reasoning

Maximum Points
1

Key
See scoring guide

<table>
<thead>
<tr>
<th>Code</th>
<th>Response</th>
<th>Item: M042186</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>$3 - (-1) = 4$ or $3 + 1 = 4$</td>
<td></td>
</tr>
<tr>
<td>79</td>
<td>Incorrect (including crossed out, erased, stray marks, illegible, or off task)</td>
<td></td>
</tr>
<tr>
<td>99</td>
<td>Blank</td>
<td></td>
</tr>
</tbody>
</table>
Peter, James, and Andrew each had 20 tries at throwing balls into a basket. Complete the missing boxes below.

<table>
<thead>
<tr>
<th>Name</th>
<th>Number of Successful Shots</th>
<th>Percentage of Successful Shots</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peter</td>
<td>10 out of 20</td>
<td>50 %</td>
</tr>
<tr>
<td>James</td>
<td>15 out of 20</td>
<td></td>
</tr>
<tr>
<td>Andrew</td>
<td>18 out of 20</td>
<td>90 %</td>
</tr>
</tbody>
</table>

**Content Domain**
- Number

**Topic Area**
- Ratio, Proportion and Percent

**Cognitive Domain**
- Knowing

**Maximum Points**
- 2

**Key**
- See scoring guide
<table>
<thead>
<tr>
<th>Code</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Correct Response</strong></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>75% and 16, both correct</td>
</tr>
<tr>
<td><strong>Partially Correct Response</strong></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Only 75% correct</td>
</tr>
<tr>
<td>11</td>
<td>Only 16 correct</td>
</tr>
<tr>
<td><strong>Incorrect Response</strong></td>
<td></td>
</tr>
<tr>
<td>79</td>
<td>Incorrect (including crossed out, erased, stray marks, illegible, or off task)</td>
</tr>
<tr>
<td><strong>Nonresponse</strong></td>
<td></td>
</tr>
<tr>
<td>99</td>
<td>Blank</td>
</tr>
</tbody>
</table>
Which of these is equal to $3p^2 + 2p + 2p^2 + p$?

A) $8p$
B) $8p^2$
C) $5p^2 + 3p$
D) $7p^2 + p$

Content Domain
Algebra

Topic Area
Algebraic Expressions

Cognitive Domain
Knowing

Maximum Points
1

Key
C
$k = 7$ and $l = 10$.

What is the value of $P$ when $P = \frac{3kl}{5}$?

Answer: ______________

**Content Domain**
Algebra

**Topic Area**
Equations/ Formulas and Functions

**Cognitive Domain**
Knowing

**Maximum Points**
1

**Key**
See scoring guide

<table>
<thead>
<tr>
<th>Code</th>
<th>Response</th>
<th>Item: M042226</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Correct Response</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>42</td>
<td></td>
</tr>
<tr>
<td><strong>Incorrect Response</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>79</td>
<td>Incorrect (including crossed out, erased, stray marks, illegible, or off task)</td>
<td></td>
</tr>
<tr>
<td><strong>Nonresponse</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>99</td>
<td>Blank</td>
<td></td>
</tr>
</tbody>
</table>
Solve this inequality.
9x – 6 < 4x + 4

Answer: ____________

Content Domain
Algebra

Topic Area
Equations/ Formulas and Functions

Cognitive Domain
Knowing

Maximum Points
1

Key
See scoring guide
<table>
<thead>
<tr>
<th>Code</th>
<th>Response</th>
<th>Item: M042103</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Correct Response</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>$x &lt; 2$ or $2 &gt; x$</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Note: $5x &lt; 10$ is coded as 79.</td>
<td></td>
</tr>
<tr>
<td><strong>Incorrect Response</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>70</td>
<td>$x = 2$</td>
<td></td>
</tr>
<tr>
<td>71</td>
<td>$x &gt; 2$ or $2 &lt; x$</td>
<td></td>
</tr>
<tr>
<td>79</td>
<td>Other incorrect (including crossed out, erased, stray marks, illegible, or off task)</td>
<td></td>
</tr>
<tr>
<td><strong>Nonresponse</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>99</td>
<td>Blank</td>
<td></td>
</tr>
</tbody>
</table>
\[ a + b = 25. \]
What is the value of \[2a + 2b + 4?\]

Answer: ____________

**Content Domain**
Algebra

**Topic Area**
Equations/ Formulas and Functions

**Cognitive Domain**
Applying

**Maximum Points**
1

**Key**
See scoring guide

<table>
<thead>
<tr>
<th>Code</th>
<th>Response</th>
<th>Item: M042086</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>54</td>
<td>Correct Response</td>
</tr>
<tr>
<td>70</td>
<td>104</td>
<td>Incorrect Response</td>
</tr>
<tr>
<td>79</td>
<td>Other incorrect (including crossed out, erased, stray marks, illegible, or off task)</td>
<td>Nonresponse</td>
</tr>
<tr>
<td>99</td>
<td>Blank</td>
<td></td>
</tr>
</tbody>
</table>
What is the value of $x$ in this pattern?

Answer: ____________

Content Domain
- Algebra

Topic Area
- Patterns

Cognitive Domain
- Reasoning

Maximum Points
- 1

Key
- See scoring guide
<table>
<thead>
<tr>
<th>Code</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>24</td>
</tr>
<tr>
<td>70</td>
<td>22</td>
</tr>
<tr>
<td>79</td>
<td>Other incorrect (including crossed out, erased, stray marks, illegible, or off task)</td>
</tr>
<tr>
<td>99</td>
<td>Blank</td>
</tr>
</tbody>
</table>
(0, −1), (1, 3)

Which equation is satisfied by BOTH of these pairs of numbers \((x, y)\)?

A. \(x + y = −1\)
B. \(2x + y = 5\)
C. \(3x − y = 0\)
D. \(4x − y = 1\)

Content Domain
Algebra

Topic Area
Equations/ Formulas and Functions

Cognitive Domain
Applying

Maximum Points
1

Key
D
The length of side of each of the small squares represents 1 cm. Draw an isosceles triangle with a base of 4 cm and a height of 5 cm.
<table>
<thead>
<tr>
<th>Code</th>
<th>Response</th>
<th>Item: M042270</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>Correct triangle drawn (any orientation)</td>
<td></td>
</tr>
<tr>
<td>79</td>
<td>Incorrect (including crossed out, erased, stray marks, illegible, or off task)</td>
<td></td>
</tr>
<tr>
<td>99</td>
<td>Blank</td>
<td></td>
</tr>
</tbody>
</table>
The volume of the rectangular box is 200 cm³. What is the value of $x$?

Answer: __________
<table>
<thead>
<tr>
<th>Code</th>
<th>Response</th>
<th>Item: M042201</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>79</td>
<td>Incorrect (including crossed out, erased, stray marks, illegible, or off task)</td>
<td></td>
</tr>
<tr>
<td>99</td>
<td>Blank</td>
<td></td>
</tr>
</tbody>
</table>
Which of these shows the result of a half-turn clockwise around point O?

A

B

C

D

Content Domain
Geometry

Topic Area
Location and Movement

Cognitive Domain
Knowing

Maximum Points
1

Key
D

The results of a long jump competition were reported as follows:

Average Length

Team A 3.6 m
Team B 4.8 m

There were the same number of students in each team.
Which statement about the competition MUST be true?

A. Each student in team B jumped farther than any student in team A.
B. After every student in team A jumped, there was a student in team B who jumped farther.
C. As a group, team B jumped farther than team A.
D. Some students in team A jumped farther than some students in team B.

Content Domain
Data and Chance

Topic Area
Data Interpretation

Cognitive Domain
Reasoning

Maximum Points
1

Key
C
There are 10 red, 8 blue, and 4 white buttons in a bag. What is the chance of taking out either a blue button or a white button?

A) $\frac{4}{22}$  
B) $\frac{8}{22}$  
C) $\frac{10}{22}$  
D) $\frac{12}{22}$

Content Domain
Data and Chance

Topic Area
Chance

Cognitive Domain
Applying

Maximum Points
1

Key
D
Over recent weeks, a shop's average sales of bottles of soda have been 50% in the regular size, 40% in the small size, and 10% in the large size. Next week, the shopkeeper will order 1200 bottles of soda. How many of these bottles should he order in the regular size?

- A 120
- B 480
- C 600
- D 720

**Content Domain**
Data and Chance

**Topic Area**
Chance

**Cognitive Domain**
Applying

**Maximum Points**
1

**Key**
C

480 students were asked to name their favorite sport. The results are shown in this table.

<table>
<thead>
<tr>
<th>Sport</th>
<th>Number of Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hockey</td>
<td>60</td>
</tr>
<tr>
<td>Football</td>
<td>180</td>
</tr>
<tr>
<td>Tennis</td>
<td>120</td>
</tr>
<tr>
<td>Basketball</td>
<td>120</td>
</tr>
</tbody>
</table>

Use the information in the table to complete and label this pie chart.

<table>
<thead>
<tr>
<th>Code</th>
<th>Response</th>
<th>Item: M042207</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>Hockey $\frac{1}{8}$, Football $\frac{3}{8}$, Tennis, Basketball both $\frac{1}{4}$, and labels all correct</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>All sectors correct size but labeling incomplete or missing</td>
<td></td>
</tr>
<tr>
<td>79</td>
<td>Incorrect (including crossed out, erased, stray marks, illegible, or off task)</td>
<td></td>
</tr>
<tr>
<td>99</td>
<td>Blank</td>
<td></td>
</tr>
</tbody>
</table>
\[
\frac{4}{100} + \frac{3}{1000} = 
\]

A. 0.043
B. 0.1043
C. 0.403
D. 0.43

**Content Domain**
Number

**Topic Area**
Fractions and Decimals

**Cognitive Domain**
Knowing

**Maximum Points**
1

**Key**
A

$P$ and $Q$ represent two fractions on the number line above.

$P \times Q = N$.

Which of these shows the location of $N$ on the number line?

A)

B)

C)

D)

Content Domain
Number

Topic Area
Fractions and Decimals

Cognitive Domain
Reasoning

Maximum Points
1

Key
D

Publisher: TIMSS & PIRLS International Study Center, Lynch School of Education, Boston College.
Ann and Jenny divide 560 zeds between them. If Jenny gets \( \frac{3}{8} \) of the money, how many zeds will Ann get?

Answer: ______________

**Content Domain**
Number

**Topic Area**
Fractions and Decimals

**Cognitive Domain**
Applying

**Maximum Points**
1

**Key**
See scoring guide

<table>
<thead>
<tr>
<th>Code</th>
<th>Response</th>
<th>Item: M032064</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Correct Response</strong></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>350</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Incorrect Response</strong></td>
<td></td>
</tr>
<tr>
<td>70</td>
<td>210</td>
<td></td>
</tr>
<tr>
<td>71</td>
<td>(\frac{5}{8})</td>
<td></td>
</tr>
<tr>
<td>79</td>
<td>Other incorrect (including crossed out, erased, stray marks, illegible, or off task)</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Nonresponse</strong></td>
<td></td>
</tr>
<tr>
<td>99</td>
<td>Blank</td>
<td></td>
</tr>
</tbody>
</table>
Which of these could represent the expression $2x + 3x$?

A. The length of this segment:

B. The length of this segment:

C. The area of this figure:

D. The area of this figure:

Content Domain
Algebra

Topic Area
Algebraic Expressions

Cognitive Domain
Knowing

Maximum Points
1

Key
C
The taxi company has a basic charge of 25 zeds and a charge of 0.2 zeds for each kilometer the taxi is driven. Which of these represents the cost in zeds to hire a taxi for a trip of \( n \) kilometers?

A) \( 25 + 0.2n \)
B) \( 25 \times 0.2n \)
C) \( 0.2 \times (25 + n) \)
D) \( 0.2 \times 25 + n \)

Content Domain
Algebra

Topic Area
Algebraic Expressions

Cognitive Domain
Knowing

Maximum Points
1

Key
A

Use the formula $y = 100 - \frac{100}{1 + t}$ to find the value of $y$ when $t = 9$.

Answer: ___________
Note: 100 – 10 is coded as 79

<table>
<thead>
<tr>
<th>Code</th>
<th>Response</th>
<th>Item: M032538</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>Correct Response</td>
<td></td>
</tr>
<tr>
<td>90</td>
<td></td>
<td></td>
</tr>
<tr>
<td>70</td>
<td>Incorrect Response</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>79</td>
<td>Other incorrect (including crossed out, erased, stray marks, illegible, or off task)</td>
<td></td>
</tr>
<tr>
<td>99</td>
<td>Nonresponse</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>Blank</td>
<td></td>
</tr>
</tbody>
</table>
Points $A$, $B$, and $C$ lie on a line and $B$ is between $A$ and $C$. If $AB = 10$ cm and $BC = 5.2$ cm, what is the distance between the midpoints of $AB$ and $BC$?

A. 2.4 cm  
B. 2.6 cm  
C. 5.0 cm  
D. 7.6 cm

Content Domain
Geometry

Topic Area
Geometric Shapes

Cognitive Domain
Reasoning

Maximum Points
1

Key
D

The area of a square is 144 cm². What is the perimeter of the square?

- A 12 cm
- B 48 cm
- C 288 cm
- D 576 cm

**Content Domain**
Geometry

**Topic Area**
Geometric Measurement

**Cognitive Domain**
Applying

**Maximum Points**
1

**Key**
B

The figure above shows a shape made up of cubes that are all the same size. There is a hole all the way through the shape. How many cubes would be needed to fill the hole?

A. 6  
B. 12  
C. 15  
D. 18

Content Domain  
Geometry

Topic Area  
Geometric Measurement

Cognitive Domain  
Applying

Maximum Points  
1

Key  
D

Which of these is the reason that triangle $PQR$ is a right angle triangle?

A. $3^2 + 4^2 = 5^2$
B. $5 < 3 + 4$
C. $3 + 4 = 12 - 5$
D. $3 > 5 - 4$

Content Domain
Geometry

Topic Area
Geometric Shapes

Cognitive Domain
Reasoning

Maximum Points
1

Key
A
The shape shown above is cut out of cardboard. The triangle flaps are then folded up along the dotted lines until they touch the edges of the flaps next to them.

Complete the diagram below to show what the shape would look like when viewed from directly above.

---

**Content Domain**
Geometry

**Topic Area**
Geometric Shapes

**Cognitive Domain**
Knowing

**Maximum Points**
1

**Key**
See scoring guide

---

<table>
<thead>
<tr>
<th>Code</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Correct Response</strong></td>
</tr>
<tr>
<td>10</td>
<td>Correct figure (square with diagonals meeting in center)</td>
</tr>
<tr>
<td></td>
<td><strong>Incorrect Response</strong></td>
</tr>
<tr>
<td>79</td>
<td>Incorrect (including crossed out, erased, stray marks, illegible, or off task)</td>
</tr>
<tr>
<td></td>
<td><strong>Nonresponse</strong></td>
</tr>
<tr>
<td>99</td>
<td>Blank</td>
</tr>
</tbody>
</table>
Which of these transformations, taken in order, can be used so that Figure 1 above becomes Figure 2 and then Figure 3?

A. reflection and then translation
B. reflection and then $\frac{1}{4}$ turn rotation clockwise
C. $\frac{1}{2}$ turn rotation and then translation
D. $\frac{1}{4}$ turn rotation counterclockwise and then reflection

Content Domain
Geometry

Topic Area
Location and Movement

Cognitive Domain
Knowing

Maximum Points
1

Key
B
Of the 400 students in a school, 50 plan to go to university, 100 to a polytechnic, 150 to a business college, and the remainder plan to enter the workforce.

Use the circle below to make a pie chart showing the proportions of students planning to do each of these. Put labels on your chart.
<table>
<thead>
<tr>
<th>Code</th>
<th>Response</th>
<th>Item: M032695</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Correct Response</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| 20   | Pie chart correctly divided and labeled  
(1 section – university; 2 sections – polytechnic; 2 sections – workforce; 3 sections – business college) | |
| **Partially Correct Response** | | |
| 10   | Four sections with at least two, but not all, of correct size and correctly labeled | |
| 11   | Four sections of correct size but no labels, or labels 50, 100, 150, 100 | |
| **Incorrect Response** | | |
| 70   | Four sections with one or none of correct size | |
| 79   | Other incorrect (including crossed out, erased, stray marks, illegible, or off task) | |
| **Nonresponse** | | |
| 99   | Blank | |
A machine has 100 candies and dispenses a candy when a lever is turned. The machine has the same number of blue, pink, yellow, and green candies all mixed together. Megan turned the lever and obtained a pink candy. Peter turned the lever next.

How likely is it that Peter will get a pink candy?

A. It is certain that his candy will be pink.
B. It is more likely than it was for Megan.
C. It is exactly as likely as it was for Megan.
D. It is less likely than it was for Megan.
A workman cut off $\frac{1}{5}$ of a pipe. The piece he cut off was 3 meters long. How many meters long was the original pipe?

A) 8 m  
B) 12 m  
C) 15 m  
D) 18 m

Content Domain
Number

Topic Area
Fractions and Decimals

Cognitive Domain
Applying

Maximum Points
1

Key
C

Which number does K represent on this number line?

A) 27.4
B) 27.8
C) 27.9
D) 28.2

Content Domain
Number

Topic Area
Fractions and Decimals

Cognitive Domain
Knowing

Maximum Points
1

Key
B

Look at this table:

<table>
<thead>
<tr>
<th></th>
<th>4^1</th>
<th>4^2</th>
<th>4^3</th>
<th>4^4</th>
<th>4^5</th>
<th>4^6</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4</td>
<td>16</td>
<td>64</td>
<td>256</td>
<td>1024</td>
<td>4096</td>
</tr>
</tbody>
</table>

Use the table to express the value of 256 × 4096 as a power of 4.

A $4^{10}$
B $4^6$
C $4^9$
D $4^{24}$

Content Domain
Number

Topic Area
Whole Numbers

Cognitive Domain
Applying

Maximum Points
1

Key
A
Place the four digits 3, 5, 7, and 9 into the boxes below in the positions that would give the greatest result when the two numbers are multiplied.

\[
\begin{array}{c}
\phantom{0} \\
\times \\
\phantom{0}
\end{array}
\]

<table>
<thead>
<tr>
<th>Content Domain</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Topic Area</td>
<td>Whole Numbers</td>
</tr>
<tr>
<td>Cognitive Domain</td>
<td>Reasoning</td>
</tr>
<tr>
<td>Maximum Points</td>
<td>1</td>
</tr>
<tr>
<td>Key</td>
<td>See scoring guide</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Code</th>
<th>Response</th>
<th>Item: M042002</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Correct Response</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>$93 \times 75$ or $75 \times 93$</td>
<td></td>
</tr>
<tr>
<td><strong>Incorrect Response</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>70</td>
<td>$95 \times 73$ or $73 \times 95$</td>
<td></td>
</tr>
<tr>
<td>71</td>
<td>$97 \times 53$ or $53 \times 97$</td>
<td></td>
</tr>
<tr>
<td>79</td>
<td>Other incorrect (including crossed out, erased, stray marks, illegible, or off task)</td>
<td></td>
</tr>
<tr>
<td><strong>Nonresponse</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>99</td>
<td>Blank</td>
<td></td>
</tr>
</tbody>
</table>
A. What is the next term in this pattern?

Answer: ________________

B. What would term number 100 be?

Answer: ________________

C. What would term number \( n \) be?

Answer: ________________
<table>
<thead>
<tr>
<th>Code</th>
<th>Response</th>
<th>Item: M042198A</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>6/7</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Correct Response</strong></td>
<td></td>
</tr>
<tr>
<td>79</td>
<td>Incorrect (including crossed out, erased, stray marks, illegible, or off task)</td>
<td></td>
</tr>
<tr>
<td>99</td>
<td>Blank</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Incorrect Response</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Nonresponse</strong></td>
<td></td>
</tr>
</tbody>
</table>
\[
\begin{array}{ccccccc}
1 & 2 & 3 & 4 & 5 & 6 \\
2' & 3' & 4' & 5' & 6' \\
\end{array}
\]

A. What is the next term in this pattern?

Answer: ____________

B. What would term number 100 be?

Answer: ____________

C. What would term number \( n \) be?

Answer: ____________

Content Domain
Algebra

Topic Area
Patterns

Cognitive Domain
Reasoning

Maximum Points
1

Key
See scoring guide

<table>
<thead>
<tr>
<th>Code</th>
<th>Response</th>
<th>Item: M042198B</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td></td>
<td>101</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Correct Response</strong></td>
<td></td>
</tr>
<tr>
<td>70</td>
<td>99</td>
<td></td>
</tr>
<tr>
<td></td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>79</td>
<td>Other incorrect (including crossed out, erased, stray marks, illegible, or off task)</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Incorrect Response</strong></td>
<td></td>
</tr>
<tr>
<td>99</td>
<td>Blank</td>
<td></td>
</tr>
</tbody>
</table>

**Nonresponse**
A. What is the next term in this pattern?

Answer: __________

B. What would term number 100 be?

Answer: __________

C. What would term number $n$ be?

Answer: __________

Content Domain
Algebra

Topic Area
Patterns

Cognitive Domain
Reasoning

Maximum Points
1

Key
See scoring guide
<table>
<thead>
<tr>
<th>Code</th>
<th>Response</th>
<th>Item: M042198C</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>( \frac{n}{n+1} )</td>
<td></td>
</tr>
<tr>
<td>70</td>
<td>( \frac{n-1}{n} )</td>
<td></td>
</tr>
<tr>
<td>79</td>
<td>Other incorrect (including crossed out, erased, stray marks, illegible, or off task)</td>
<td></td>
</tr>
<tr>
<td>99</td>
<td>Blank</td>
<td></td>
</tr>
</tbody>
</table>
Which expression is equivalent to $4(3 + x)$?

- **A** $12 + x$
- **B** $7 + x$
- **C** $12 + 4x$
- **D** $12x$

**Content Domain**
Algebra

**Topic Area**
Algebraic Expressions

**Cognitive Domain**
Knowing

**Maximum Points**
1

**Key**
C

Publisher: TIMSS & PIRLS International Study Center, Lynch School of Education, Boston College.
\[x + y = 12 \text{ and } 2x + 5y = 36.\]

What are the values of \(x\) and \(y\)?

- A) \(x = 2, y = 10\)
- B) \(x = 4, y = 8\)
- C) \(x = 6, y = 6\)
- D) \(x = 8, y = 4\)

**Content Domain**
Algebra

**Topic Area**
Equations/ Formulas and Functions

**Cognitive Domain**
Knowing

**Maximum Points**
1

**Key**
D

What is the area of this rectangle?

A. \( x^2 + 2 \)
B. \( x^2 + 2x \)
C. \( 2x + 2 \)
D. \( 4x + 4 \)

Which shape has a line of symmetry?

A

B

C

D

Content Domain
Geometry

Topic Area
Geometric Shapes

Cognitive Domain
Knowing

Maximum Points
1

Key
B

The diagram shows a system for locating points

In this system, the position of a point $P$ is described by its distance from origin, $O$, and the amount of counterclockwise turn from a baseline $OA$ to $OP$. Thus, the coordinates of $P$ are $(5, 340^\circ)$.

A. Mark the points $B (3, 30^\circ)$ and $C (4, 120^\circ)$ on the graph above.

B. Draw the angle $BOC$. What is the measure of angle $BOC$?

Angle $BOC = \underline{\hspace{2cm}}^\circ$
Note: Two score points will be given if both parts A and B are correct (code 10). One score point will be given if only part A is correct. No credit is given if only part B is correct.

<table>
<thead>
<tr>
<th>Code</th>
<th>Response</th>
<th>Item: M042300A</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Correct Response</strong></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Both points correctly marked</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Incorrect Response</strong></td>
<td></td>
</tr>
<tr>
<td>70</td>
<td>One point correctly marked</td>
<td></td>
</tr>
<tr>
<td>79</td>
<td>Other incorrect (including crossed out, erased, stray marks, illegible, or off task)</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Nonresponse</strong></td>
<td></td>
</tr>
<tr>
<td>99</td>
<td>Blank</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Code</th>
<th>Response</th>
<th>Item: M042300B</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Correct Response</strong></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>90°</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Incorrect Response</strong></td>
<td></td>
</tr>
<tr>
<td>70</td>
<td>Correct value given for incorrect point(s) drawn in A</td>
<td></td>
</tr>
<tr>
<td>79</td>
<td>Incorrect (including crossed out, erased, stray marks, illegible, or off task)</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Nonresponse</strong></td>
<td></td>
</tr>
<tr>
<td>99</td>
<td>Blank</td>
<td></td>
</tr>
</tbody>
</table>
Pat and Chris were candidates for school president.
Here are the election results:

- Pat  80%
- Chris  20%

How likely would it be for a student asked at random to have voted for Pat?

A. It is certain that the student voted for Pat.
B. It is likely that the student voted for Pat.
C. It is unlikely that the student voted for Pat.
D. It is certain that the student did not vote for Pat.

**Content Domain**
Data and Chance

**Topic Area**
Chance

**Cognitive Domain**
Knowing

**Maximum Points**
1

**Key**
B

The Real Burger Company owns 5 restaurants. The numbers of staff members employed in their 5 restaurants are: 12, 18, 19, 21, and 30 people.

A. What is the mean number of staff members in the 5 restaurants?

Answer: ______________

B. What is the median number of staff members in the 5 restaurants?

Answer: ______________

C. If the restaurant with 30 staff members increased its number of staff members to 50, how would this affect the median and the mean?

Content Domain
Data and Chance

Topic Area
Data Interpretation

Cognitive Domain
Knowing

Maximum Points
1

Key
See scoring guide

Publisher: TIMSS & PIRLS International Study Center, Lynch School of Education, Boston College.
<table>
<thead>
<tr>
<th>Code</th>
<th>Response</th>
<th>Item: M042169A</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>Correct Response</td>
<td></td>
</tr>
<tr>
<td>79</td>
<td>Incorrect Response: Incorrect</td>
<td>including crossed out, erased, stray marks, illegible, or off task</td>
</tr>
<tr>
<td>99</td>
<td>Nonresponse</td>
<td>Blank</td>
</tr>
</tbody>
</table>
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Answer: 

B. What is the median number of staff members in the 5 restaurants?

Answer: 

C. If the restaurant with 30 staff members increased its number of staff members to 50, how would this affect the median and the mean?

Content Domain
Data and Chance

Topic Area
Data Interpretation

Cognitive Domain
Knowing

Maximum Points
1

Key
See scoring guide

<table>
<thead>
<tr>
<th>Code</th>
<th>Response</th>
<th>Item: M042169B</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Correct Response</strong></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Incorrect Response</strong></td>
<td></td>
</tr>
<tr>
<td>79</td>
<td>Incorrect (including crossed out, erased, stray marks, illegible, or off task)</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Nonresponse</strong></td>
<td></td>
</tr>
<tr>
<td>99</td>
<td>Blank</td>
<td></td>
</tr>
</tbody>
</table>
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A. What is the mean number of staff members in the 5 restaurants?

Answer: ________

B. What is the median number of staff members in the 5 restaurants?

Answer: ________

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Content Domain
Data and Chance

Topic Area
Data Interpretation

Cognitive Domain
Applying

Maximum Points
1

Key
See scoring guide
<table>
<thead>
<tr>
<th>Code</th>
<th>Response</th>
<th>Item: M042169C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Correct Response</strong></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>The mean would increase/change, the median would not change. If student gives a new value for the mean, it should be between 21 and 29. If a value is given for the median, it must be correct (i.e., 19 or the answer given for Part B if incorrect)</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Incorrect Response</strong></td>
<td></td>
</tr>
<tr>
<td>70</td>
<td>Both would increase</td>
<td></td>
</tr>
<tr>
<td>79</td>
<td>Other incorrect (including crossed out, erased, stray marks, illegible, or off task)</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Nonresponse</strong></td>
<td></td>
</tr>
<tr>
<td>99</td>
<td>Blank</td>
<td></td>
</tr>
</tbody>
</table>
The table above shows the shadow lengths of four bushes of different heights at 10 a.m. What is the shadow length at 10 a.m. of a bush that has a height of 50 centimeters?

<table>
<thead>
<tr>
<th>Bush height (cm)</th>
<th>Shadow length (cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>16</td>
</tr>
<tr>
<td>40</td>
<td>32</td>
</tr>
<tr>
<td>60</td>
<td>48</td>
</tr>
<tr>
<td>80</td>
<td>64</td>
</tr>
</tbody>
</table>

A) 36 cm  
B) 38 cm  
C) 40 cm  
D) 42 cm
Write $3\frac{5}{6}$ in decimal form, rounded to 2 decimal places.

Answer: ______________

Content Domain
Number

Topic Area
Fractions and Decimals

Cognitive Domain
Knowing

Maximum Points
1

Key
See scoring guide
<table>
<thead>
<tr>
<th>Code</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Item: M032725</td>
</tr>
<tr>
<td><strong>Correct Response</strong></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>3.83</td>
</tr>
<tr>
<td><strong>Incorrect Response</strong></td>
<td></td>
</tr>
<tr>
<td>70</td>
<td>3.56</td>
</tr>
<tr>
<td>79</td>
<td>Other incorrect (including crossed out, erased, stray marks, illegible, or off task)</td>
</tr>
<tr>
<td><strong>Nonresponse</strong></td>
<td></td>
</tr>
<tr>
<td>99</td>
<td>Blank</td>
</tr>
</tbody>
</table>
Simplify the expression \( \frac{3x}{8} + \frac{x}{4} + \frac{x}{2} \). Show your work.

Answer: ________________
<table>
<thead>
<tr>
<th>Code</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>( \frac{9}{x} ) or ( \frac{1}{8} - \frac{x}{8} ) with work shown</td>
</tr>
<tr>
<td>10</td>
<td>( \frac{9}{8} ) or ( \frac{1}{8} ) with no work shown</td>
</tr>
<tr>
<td>11</td>
<td>Any two terms combined correctly or three terms with a common denominator</td>
</tr>
<tr>
<td>70</td>
<td>( \frac{5}{14} ) or ( \frac{x}{14} )</td>
</tr>
<tr>
<td>71</td>
<td>Any other expression involving 5x or 14</td>
</tr>
<tr>
<td>79</td>
<td>Other incorrect (including crossed out, erased, stray marks, illegible, or off task)</td>
</tr>
<tr>
<td>99</td>
<td>Blank</td>
</tr>
</tbody>
</table>

**Item: M032683**
What does $xy + 1$ mean?

- A. Add 1 to $y$, then multiply by $x$.
- B. Multiply $x$ and $y$ by 1.
- C. Add $x$ to $y$, then add 1.
- D. Multiply $x$ by $y$, then add 1.

**Content Domain**
Algebra

**Topic Area**
Algebraic Expressions

**Cognitive Domain**
Knowing

**Maximum Points**
1

**Key**
D

There were \( m \) boys and \( n \) girls in a parade. Each person carried 2 balloons. Which of these expressions represents the total number of balloons that were carried in the parade?

A. \( 2(m + n) \)
B. \( 2 + (m + n) \)
C. \( 2m + n \)
D. \( m + 2n \)

Content Domain
Algebra

Topic Area
Algebraic Expressions

Cognitive Domain
Knowing

Maximum Points
1

Key
A
How many degrees does a minute hand of a clock turn through from 6:20 a.m. to 8:00 a.m. on the same day?

- **A** 680°
- **B** 600°
- **C** 540°
- **D** 420°

**Content Domain**
Geometry

**Topic Area**
Geometric Shapes

**Cognitive Domain**
Applying

**Maximum Points**
1

**Key**
B

In the figure above, what is the area of the shaded region in cm²?

A) 24  B) 44  C) 48  D) 72

Content Domain
Geometry

Topic Area
Geometric Measurement

Cognitive Domain
Applying

Maximum Points
1

Key
D
A piece of paper in the shape of a rectangle is folded in half as shown in the figure above. It is then cut along the dotted line, and the small piece that is cut is opened. What is the shape of the cutout figure?

A. an isosceles triangle  
B. two isosceles triangles  
C. a right triangle  
D. an equilateral triangle

Content Domain  
Geometry  
Topic Area  
Geometric Shapes  
Cognitive Domain  
Knowing  
Maximum Points  
1  
Key  
A

What is the sum of the three consecutive whole numbers with $2n$ as the middle number?

- A. $6n + 3$
- B. $6n$
- C. $6n - 1$
- D. $6n - 3$

**Content Domain**
Algebra

**Topic Area**
Algebraic Expressions

**Cognitive Domain**
Applying

**Maximum Points**
1

**Key**
B
In the figure above, what is the value of $x$?

A. 30°  
B. 40°  
C. 45°  
D. 65°

Content Domain
Geometry

Topic Area
Geometric Shapes

Cognitive Domain
Reasoning

Maximum Points
1

Key
B

Publisher: TIMSS & PIRLS International Study Center, Lynch School of Education, Boston College.
The spinner is for Steve's new game. Out of 600 spins, approximately how many times should he expect the arrow to land on the red sector?

A) 30
B) 40
C) 50
D) 60

Content Domain
Data and Chance

Topic Area
Chance

Cognitive Domain
Applying

Maximum Points
1

Key
C

Jo has three metal blocks. The weight of each block is the same. When she weighed one block against 8 grams, this is what happened.

When she weighed all three blocks against 20 grams, this is what happened.

Which of the following could be the weight of one metal block?

A 5 g  
B 6 g  
C 7 g  
D 8 g  

Content Domain
Algebra

Topic Area
Equations/ Formulas and Functions

Cognitive Domain
Reasoning

Maximum Points
1

Key
C

The solid line (———) on the graph shows car production by the NU Car Motor Company during a particular day.

The dotted line (-----) shows what the total number of cars produced would be if the rate of production were constant.

A. By what time had a total of 150 cars been produced?

   Answer: _____________

B. What was the average number of cars produced per hour on this day?

   Answer: _____________

C. During which hour were the most cars produced?

   Between _____________ and _____________

<table>
<thead>
<tr>
<th>Code</th>
<th>Response</th>
<th>Item: M032681A</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Correct Response</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>10 a.m.</td>
<td></td>
</tr>
<tr>
<td><strong>Incorrect Response</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>70</td>
<td>11 a.m.</td>
<td></td>
</tr>
<tr>
<td>79</td>
<td>Other incorrect (including crossed out, erased, stray marks, illegible, or off task)</td>
<td></td>
</tr>
<tr>
<td><strong>Nonresponse</strong></td>
<td></td>
<td></td>
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<tr>
<td>99</td>
<td>Blank</td>
<td></td>
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   Between __________ and __________

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<thead>
<tr>
<th>Code</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>50</td>
</tr>
<tr>
<td>70</td>
<td>400</td>
</tr>
<tr>
<td>79</td>
<td>Other incorrect (including crossed out, erased, stray marks, illegible, or off task)</td>
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<td>99</td>
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</tr>
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   Between _____________ and _____________
<table>
<thead>
<tr>
<th>Code</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>1 p.m. and 2 p.m.</td>
</tr>
<tr>
<td>79</td>
<td>Incorrect (including crossed out, erased, stray marks, illegible, or off task)</td>
</tr>
<tr>
<td>99</td>
<td>Blank</td>
</tr>
</tbody>
</table>

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