Trends in International Mathematics and Science Study (TIMSS)

Released Mathematics Items

Teaching Resource Pack in Mathematics for Year 9 Students

RESEARCH AND DEVELOPMENT DEPARTMENT

www.research.gov.mt

2014
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• Expression equivalent to 4
• What is the value of 2a + 2b + 4
• Solve the inequality
• Next term in the pattern
• What is the value of P

**Content Domain: Geometry**

• Shape made up of same size cubes
• Area of a square is 144 square cm
• Distance between the midpoints
• Degrees minute hand of clock turns
• Figure 1 transformed to 2 and 3
• Value of angle x in figure
• Why PQR is a right angle triangle
• Area of the shaded region in figure
• Shape of cutout figure
• Interior angle of pentagon
• View of the shape directly from above
• Which shape has a line of symmetry
• Half-turn around point O
• Length of rectangular box
• Draw an isosceles triangle
• Calculate the area of a square
• Number of books to fill the box
• What is the size of angle B
• Value of angle b

**Content Domain: Data and Chance**

• How likely to get pink candy
• Number of times spinner in red area
• Car production graph
• Make a pie chart with labels
• Sales of two types of soft drinks
• Mean number of staff members
• Median number of staff members
• Change in mean and median
• Number of regular size bottles
• Chance of getting a button
• Complete and label this pie chart
• How likely student voted for Pat
• Long jump competition
• Probability that the marble is red
• Age structures of Country X and Y
• Problem of taking care of elderly
About TIMSS

The Trends in International Mathematics and Science Study (TIMSS) is an international assessment of the mathematics and science knowledge of 4th and 8th grade students around the world. TIMSS was developed by the International Association for the Evaluation of Educational Achievement (IEA) to allow participating nations to compare students' educational achievement across borders. TIMSS was first administered in 1995, and every 4 years thereafter. Malta participated in 2007 with Form 3 students and in 2011 with Year 5 students. In April 2014, 22 Maltese schools participated in the TIMSS 2015 Field Trial and in April 2015 all state, church and independent school Year 9 students will sit for TIMSS 2015.

SOURCE: TIMSS 2011 Assessment. Copyright © 2013 International Association for the Evaluation of Educational Achievement (IEA). Publisher: TIMSS & PIRLS International Study Center, Lynch School of Education, Boston College, Chestnut Hill, MA and International Association for the Evaluation of Educational Achievement (IEA), IEA Secretariat, Amsterdam, the Netherlands
Introduction

This resource pack contains the released TIMSS 2011 grade 8 (Year 9) science assessment items. This is not a complete set of all TIMSS 2011 assessment items because some items are kept confidential so that they may be used in subsequent cycles of TIMSS to measure trends.

In order to familiarise students with such assessment, the Research and Development Department is disseminating this teacher resource pack which incorporates samples of released questions. The purpose of this pack is to be used as a teaching resource for students in secondary schooling.

The items in this resource pack present different ways of measuring students’ understanding in various content and cognitive domains. Across the top, in the teacher’s section, are three boxes which identify the item’s subject, topic and cognitive domain, as shown in the table below.

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<th>Content Domain</th>
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</thead>
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<td>Subject Matter in Mathematics that the item assesses</td>
<td>Specific Topic assessed within the subject matter</td>
<td>The cognitive or thinking process assess</td>
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<tr>
<td>Number</td>
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<td>Algebraic Expressions</td>
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<td>Geometry</td>
<td>Geometric Shapes</td>
<td>Reasoning</td>
</tr>
<tr>
<td>Data and Chance</td>
<td>Data Interpretation</td>
<td></td>
</tr>
</tbody>
</table>

Student responses can be scored according to the scoring information provided in the pack. Items that coincide with concepts taught in class allow the teacher to gain feedback on the students’ understanding of assessed concepts. The teacher might use the items to identify particular difficulties or misconceptions experienced by individual students, which can serve as the basis for some remedial teaching or focused practice. Teachers are also encouraged to model other questions according to their students’ needs and levels of ability. However, this pack is not intended to coach the students for the test but to familiarise themselves with the types and styles of the items.

This resource pack follows other information sources published by IEA and the Research and Development Department. Data and information has also been disseminated particularly through the TIMSS Malta Report 2013, dissemination workshops (May – July 2013), as well as through meetings and training seminars for School Coordinators and Test Administrators. Further information regarding TIMSS may be accessed on: http://www.iea.nl/timss_2015.html and www.research.gov.mt
Guidelines for Question Format

Questions follow the indicated format:

**Question 1: Ann and Jenny divide 560 zeds**

Ann and Jenny divide 560 zeds between them. If Jenny gets \( \frac{3}{8} \) of the money, how many zeds will Ann get?

Answer: __________

**Teacher’s Notes**

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<tr>
<th>Content Domain</th>
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<tbody>
<tr>
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**Scoring**

**Correct Response**
- 350

**Incorrect Response**
- 210
- 5/8
- Other incorrect (including crossed out, erased, stray marks, illegible, or off task)
Content Domain:

NUMBER
**Question 1: Ann and Jenny divide 560 zeds**

Ann and Jenny divide 560 zeds between them. If Jenny gets \( \frac{3}{8} \) of the money, how many zeds will Ann get?

Answer: ____________

**Teacher’s Notes**

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</table>

**Scoring**

Correct Response
- 350

Incorrect Response
- 210
- 5/8
- Other incorrect (including crossed out, erased, stray marks, illegible, or off task)
Question 2: $\frac{4}{100} + \frac{3}{1000}$

\[
\begin{align*}
\frac{4}{100} & + \frac{3}{1000} \\
0.04 & + 0.003
\end{align*}
\]

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

Teacher’s Notes

<table>
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<td>Fractions and Decimals</td>
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</table>

Correct Response: A
Question 3: \( \frac{7.21 \times 3.86}{10.09} \)

Which of these is the BEST estimate of \( \frac{7.21 \times 3.86}{10.09} \)?

A. \( \frac{7 \times 3}{10} \)

B. \( \frac{7 \times 4}{10} \)

C. \( \frac{7 \times 3}{11} \)

D. \( \frac{7 \times 4}{11} \)

Teacher’s Notes

<table>
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</thead>
<tbody>
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</table>

Correct Response: B
Question 4: The percentage of caps for sale

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 white or green?

A. 55  
B. 100  
C. 110  
D. 145

Teacher’s Notes

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</table>

Correct Response  C
Question 5: 36 as a product of prime factors

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. \( 2 \times 2 \times 3 \times 3 \)

Teacher’s Notes

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<td>Knowing</td>
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Correct Response: D
Question 6: Location of N on number line

\[ P \times Q = N \]

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

Teacher’s Notes

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Correct Response  D
Question 7: Write 3 \( \frac{5}{6} \) in decimal form

Write \( 3 \frac{5}{6} \) in decimal form, rounded to 2 decimal places

Answer: _____________________

Teacher’s Notes

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Scoring

Correct Response
• 3.83

Incorrect Response
• 3.56
• Other incorrect (including crossed out, erased, stray marks, illegible, or off task)
**Question 8: Numbers to get greatest results**

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.

```
   
   X
```

**Teacher’s Notes**

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**Scoring**

**Correct Response**
- 93 x 75 OR 75 x 93

**Incorrect Response**
- 95 x 73 OR 73 x 95
- 97 x 53 OR 53 x 97
- Other incorrect (including crossed out, erased, stray marks, illegible, or off task)
Question 9: Express $256 \times 4,096$ as power of 4

Look at this table:

<table>
<thead>
<tr>
<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>4</td>
<td>16</td>
<td>64</td>
<td>256</td>
<td>1,024</td>
<td>4,096</td>
</tr>
</tbody>
</table>

Use the table to express the value of $256 \times 4,096$ as a power of 4.

A. $4^{10}$
B. $4^{16}$
C. $4^{20}$
D. $4^{24}$

Teacher’s Notes

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<td>Applying</td>
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Correct Response: A
Question 10: What is K on a number line

Which number does K represent on this number line?

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

Teacher’s Notes

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</tr>
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Correct Response: B
**Question 11: Equivalent expression**

The fractions \( \frac{4}{14} \) and \( \frac{\square}{21} \) are equivalent

What is the value of \( \square \) ?

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

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**Teacher’s Notes**

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</tbody>
</table>

**Correct Response**

A
Question 12: Equivalent fraction for 0.125

Which fraction is equivalent to 0.125?

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

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

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

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

Teacher’s Notes

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Correct Response

B
Question 13: Length of the original pipe

A workman cut off $\frac{1}{3}$ of a pipe. The piece he cut off was 3 metres long. How many metres long was the original pipe?

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

Teacher’s Notes

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Correct Response: C
**Question 14: Complete the missing boxes**

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></td>
<td>80 %</td>
</tr>
</tbody>
</table>

**Teacher’s Notes**

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<tr>
<td>NUMBER</td>
<td>Ratio, Proportion and Percent</td>
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</tr>
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</table>

**Scoring**

**Correct Response**
- 75 and 16, both correct

**Partially Correct Response**
- Only 75 correct
- Only 16 correct

**Incorrect Response**
- Other incorrect (including crossed out, erased, stray marks, illegible, or off task)
Question 15: Next line in the pattern

Here is a pattern:

\[3 - 3 = 0\]
\[3 - 2 = 1\]
\[3 - 1 = 2\]
\[3 - 0 = 3\]

What will the next line in the pattern be?

Answer: ____________________

Teacher’s Notes

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Scoring

Correct Response
• \[3 - (-1) = 4\] or \[3 + 1 = 4\]

Incorrect Response
• Other incorrect (including crossed out, erased, stray marks, illegible, or off task)
Question 16: Packing eggs into boxes

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: ____________________

Teacher’s Notes

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Scoring

Correct Response
• 16

Incorrect Response
• 15 OR 15.6 OR 15.67 OR 15 ⅔
• Other incorrect (including crossed out, erased, stray marks, illegible, or off task)
Question 17: Which number sentence is true

Which of these number sentences is true?

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

B. \( 3 \% \times 50 = 6 \% \times 100 \)

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

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

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</table>

Correct Response: D
Question 18: Select the decimal equal to $\frac{3}{5}$

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

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

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Correct Response | B
Question 19: Method of subtracting fractions

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. $\frac{4-3}{3 \times 4}$

Teacher’s Notes

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Correct Response: D
Question 20: Add 42.65 to 5.748

42.65 + 5.748 =

Answer: ____________

Teacher’s Notes

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</table>

Scoring

Correct Response
- 48.398

Incorrect Response
- 10,013 with decimal point inserted anywhere or without decimal
- Other incorrect (including crossed out, erased, stray marks, illegible, or off task)
Question 21: Sum of 3 consecutive whole numbers

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. $6n - 3$

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Correct Response B
Content Domain:

ALGEBRA
Question 22: m boys and n girls in a parade

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. $m + 2n$

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<td>Algebraic Expressions</td>
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</table>

Correct Response: A
Question 23: The shadow lengths of four bushes

<table>
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<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>

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?

A. 36 cm
B. 38 cm
C. 40 cm
D. 42 cm

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Correct Response: C
Question 24: Which represents 2x plus 3x

Which of these could represent the expression \(2x + 3x\)?

A. The length of this segment: \(\frac{5}{x}

B. The length of this segment: \(\frac{2}{x}

C. The area of this figure: \(x^2

D. The area of this figure: \(x^2

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Correct Response: C
Question 25: Jo has 3 metal blocks to weigh

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

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Correct Response: C
Question 26: Cost in zeds for taxi trip of n km

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 $n$ kilometres?

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

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Correct Response: A
Question 27: Find the value of \( y \) when \( t \) is 9

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

Answer: _________________

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Scoring

Correct Response
- 90

Incorrect Response
- 10
- Other incorrect (including crossed out, erased, stray marks, illegible, or off task)
Question 28: If \( t \) is a number between 6 and 9

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

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Correct Response: C
**Question 29: Simplify \( \frac{3x}{8} \) plus \( \frac{x}{4} \) plus \( \frac{x}{2} \)**

Simplify the expression \( \frac{3x}{8} + \frac{x}{4} + \frac{x}{2} \).

Show your work

Answer: ____________________

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**Scoring**

**Correct Response**
- \( \frac{5}{8}x \) or \( 1\frac{1}{8}x \) with work shown

**Partially Correct Response**
- \( \frac{9}{8}x \) or \( 1\frac{1}{8}x \) with no work shown
- Any two terms combined correctly or threeterms with a common denominator

**Incorrect Response**
- \( \frac{5}{14}x \)
- Any other expression involving 5x or 14
- Other incorrect (including crossed out, erased, stray marks, illegible, or off task)
Question 30: What does xy plus 1 mean

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.

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Correct Response: D
Question 31: Red & Black Tiles _Complete table

Pat has red tiles and black tiles. Pat uses the tiles to make square shapes.

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 x 6 and 7 x 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 x 3</td>
<td>1</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>4 x 4</td>
<td>4</td>
<td>12</td>
<td>16</td>
</tr>
<tr>
<td>5 x 5</td>
<td>9</td>
<td>16</td>
<td>25</td>
</tr>
<tr>
<td>6 x 6</td>
<td>16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 x 7</td>
<td>25</td>
<td></td>
<td></td>
</tr>
</tbody>
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</table>

Scoring

Correct Response
- Both rows completely correct
  - Shape 6 x 6: 20, 36
  - Shape 7 x 7: 24, 49

Partially Correct Response
- Entries for one row correct but not both

Incorrect Response
- Entries for one column correct but not both
- Red Tiles: 20, 24 OR Total Tiles: 36, 49
- Other incorrect (including crossed out, erased, stray marks, illegible, or off task)
Question 32: Red&Black Tiles _ Shape with 64 tiles

Red and Black Tiles (Continued)

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

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Scoring

Correct Response
• 36 black and 28 red

Partially Correct Response
• 36 black, red incorrect
• 28 red, black incorrect

Incorrect Response
• Incorrect (including crossed out, erased, stray marks, illegible, or off task)
Question 33: Red & Black Tiles _Shape with 49 tiles

Red and Black Tiles (Continued)

Use the patterns in the previous table to answer the following questions.

B. Pat made a shape that used 49 black tiles.

   How many red tile did Pat use in that shape?

Answer: _________________ red tiles

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Scoring

Correct Response
- 32

Incorrect Response
- Incorrect (including crossed out, erased, stray marks, illegible, or off task)
Question 34: Red & Black Tiles _Shape with 44 tiles

Red and Black Tiles (Continued)

Use the patterns in the previous table to answer the following questions.

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

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Scoring

Correct Response
- 100

Incorrect Response
- Incorrect (including crossed out, erased, stray marks, illegible, or off task)
**Question 35: Red & Black Tiles _Figure n_**

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 Titles</th>
</tr>
</thead>
<tbody>
<tr>
<td>( n \times n )</td>
<td>((n - 2)^2)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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**Scoring**

**Correct Response**
- Both expressions correct in simplified form:
  Red tiles \(4(n-1)\); or correct verbal expression
  Total tiles: \(n^2\), \(nxn\); or correct verbal expression, such as “square the number” or “multiply by itself”
- Both expressions correct with reexpression 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

**Partially Correct Response**
- Expression for red tiles correct as in 20 but not expression for total tiles
- Expression for total tiles correct as in 20 but not expression for red tiles.

**Incorrect Response**
- Incorrect expression including \(n\) for red tiles or total or both (includes incorrect attempts to express red tiles as difference from total tiles)
- Incorrect (including crossed out, erased, stray marks, illegible, or off task)
Question 36: What is the area of the rectangle

What is the area of this rectangle?

A. \( x^2 + n2 \)
B. \( x^2 + 2x \)
C. \( 2x + 2 \)
D. \( 4x + 4 \)

Teacher's Notes

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Correct Response: B
Question 37: Expression equivalent to 4 (3+x)

Which expression is equivalent to 4(3 + x)?

A. 12 + x  
B. 7 + x  
C. 12 + 4x  
D. 12x

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Correct Response: C
Question 38: What is the value of $2a + 2b + 4$

$a + b = 25$

What is the value of $2a + 2b + 4$?

Answer: ___________________
Question 39: Solve the inequality

Solve this inequality

\[9x - 6 < 4x + 4\]

Answer: ___________________

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Scoring

Correct Response

- \(x < 2\) or \(2 > x\)
  
  Note: \(5x < 10\) is coded as incorrect

Incorrect Response

- \(x = 2\)
- \(x > 2\) OR \(2 < x\)
- Incorrect (including crossed out, erased, stray marks, illegible, or off task)
Question 40: Next term in the pattern

\[
\begin{array}{cccc}
1 & 2 & 3 & 4 \\
2 & 3 & 4 & 5 \\
\end{array}
\]

A. What is the next term in this pattern?

Answer: ___________________
Question 41: Term number 100 in the pattern

\[
\frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \frac{4}{5}, \frac{5}{6}
\]

B. What would term number 100 be?

Answer: ___________________

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Scoring

Correct Response

\[ \frac{100}{101} \]

Incorrect Response

\[ \frac{99}{100} \]

• Other incorrect (including crossed out, erased, stray marks, illegible, or off task)
Question 42: Term number $n$ in the pattern

\[
\begin{array}{cccc}
1 & 2 & 3 & 4 \\
2 & 3 & 4 & 5 \\
\end{array}
\]

C. What would term number $n$ be?

Answer: ___________________

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Scoring

Correct Response
- $n(n+1)$

Incorrect Response
- $n^{-1}$
- Other incorrect (including crossed out, erased, stray marks, illegible, or off task)
**Question 43: What is the value of P**

Given: \( k = 7 \) and \( l = 10 \)

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

**Answer:** _____________________
Question 44: Shape made up of same size cubes

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

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Correct Response  D
Question 45: Area of a square is 144 square cm.

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

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Correct Response: B
**Question 46: Distance between the midpoints**

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

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Correct Response: **D**
Question 47: Degrees minute hand of clock turns

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°

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Correct Response | B
Question 48: Figure 1 transformed to 2 and 3

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

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Correct Response B
Question 49: Value of angle x in figure

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

A. 30°
B. 40°
C. 45°
D. 65°

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Correct Response | B
Question 50: Why PQR is a right angle triangle

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. $3 > 5 - 4$

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

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

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Correct Response: D
Question 52: Shape of cutout figure

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

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Correct Response  A
Question 53: Interior angle of pentagon

What is the sum of all the interior angles of pentagon ABCDE? Show your work.

Answer: ___________________

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Scoring

Correct Response
• 540 degrees with work shown
  Examples:
  3 (triangles) x 180° = 540°
  6 (right angles) x 90° = 540°

Partially Correct Response
• 540 degrees with no work shown

Incorrect Response
• Incorrect (including crossed out, erased, stray marks, illegible, or off task)
Question 54: View of the shape directly from above

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.

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Scoring

Correct Response
• Correct figure (square with diagonals meeting in center)

Incorrect Response
• Incorrect (including crossed out, erased, stray marks, illegible, or off task)
Question 55: Which shape has a line of symmetry

Which shape has a line of symmetry?

A. 
B. 
C. 
D. 

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Correct Response: B
Question 56: Half-turn around point O

Which of these shows the result of a half-turn clockwise around point O?

A.  
B.  
C.  
D.  

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Correct Response: D
Question 57: Length of the rectangular box

The volume of the rectangular box is 200 cm$^3$. What is the value of $x$?

Answer: ___________________

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Scoring

Correct Response
• 10

Incorrect Response
• Incorrect (including crossed out, erased, stray marks, illegible, or off task)
Question 58: Draw an isosceles triangle

The length of side of each of the small squares represents 1 cm. Draw an isosceles triangle with a base of 4cm and a height of 5cm.

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<td>GEOMETRY</td>
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Scoring

Correct Response
• Correct triangle drawn (any orientation)

Incorrect Response
• Incorrect (including crossed out, erased, stray marks, illegible, or off task)
Question 59: Calculate the area of a square

The perimeter of a square is 36 cm.

What is the area of this square?

A. 81 cm$^2$
B. 36 cm$^2$
C. 24 cm$^2$
D. 18 cm$^2$

Teacher’s Notes

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Correct Response: A
Question 60: Number of books to fill the box

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: ________________

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Scoring

Correct Response
- 12

Incorrect Response
- Incorrect (including crossed out, erased, stray marks, illegible, or off task)
Question 61: What is the size of angle $B$

In this triangle:

$AC = BC$

$AB$ is twice as long as $CX$.

What is the size of angle $B$?

Answer: ________________

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Scoring

Correct Response
• 45

Incorrect Response
• Incorrect (including crossed out, erased, stray marks, illegible, or off task)
Question 62: Value of angle $b$

Lines $m$ and $n$ are parallel

What is the value of $b$?

Answer: ___________________

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Scoring

Correct Response
• 50

Incorrect Response
• Incorrect (including crossed out, erased, stray marks, illegible, or off task)
Content Domain:

DATA AND CHANCE
Question 63: How likely to get pink candy

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

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Correct Response: D
The spinner is for Steve’s new game. Out of 6000 spins, approximately how many times should he expect the arrow to land on the red sector?

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

**Teacher’s Notes**

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**Correct Response**: C
Question 65: Car production graph/time cars made

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: __________________

Teacher’s Notes

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Scoring

Correct Response
• 10 a.m.

Incorrect Response
• 11 a.m.
• Incorrect (including crossed out, erased, stray marks, illegible, or off task)
Question 66: Car production graph/avg by hour

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.

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

Answer: __________________

Teacher’s Notes

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Scoring

Correct Response
• 50

Incorrect Response
• 400
• Incorrect (including crossed out, erased, stray marks, illegible, or off task)
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.

C. During which hour were the most cars produced?

Answer: __________________

Teacher’s Notes

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Scoring

Correct Response
- 1 p.m. and 2 p.m.

Incorrect Response
- Incorrect (including crossed out, erased, stray marks, illegible, or off task)
Question 68: Make a pie chart with labels

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

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</table>

Scoring

Correct Response
- Pie Chart correctly divided and labeled (1 section – university, 2 sections – polytechnic, 2 sections – workforce, 3 sections – business college)

Partially Correct Response
- Four sections with at least two, but not all, of correct size and correctly labeled
- Four sections of correct size but no labels, or labels 50, 100, 150, 100

Incorrect Response
- Four sections with one or none of correct size
- Incorrect (including crossed out, erased, stray marks, illegible, or off task)
Question 69: Sales of two types of soft drinks

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

Teacher's Notes

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</table>

Correct Response: B
Question 70: Mean number of staff members

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

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

Answer: __________________

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Scoring

Correct Response

• 20

Incorrect Response

• Incorrect (including crossed out, erased, stray marks, illegible, or off task)
**Question 71: Median number of staff members**

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

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

Answer: ________________

**Teacher’s Notes**

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</table>

**Scoring**

**Correct Response**
- 19

**Incorrect Response**
- Incorrect (including crossed out, erased, stray marks, illegible, or off task)
Question 72: Change in mean and median

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

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?

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Scoring

Correct Response
• The mean would increase/change, the median would not change. If the 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)

Incorrect Response
• Both would increase
• Incorrect (including crossed out, erased, stray marks, illegible, or off task)
Question 73: Number of regular size bottles

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 1,200 bottles of soda. How many of these bottles should he order in the regular size?

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

Teacher’s Notes

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</table>

Correct Response: C
Question 74: Chance of getting a button

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. $\frac{12}{22}$

Teacher’s Notes

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</table>

Correct Response: D
Question 75: Complete and label this pie chart

480 students were asked to name their favourite 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.

Teacher’s Notes

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</tbody>
</table>

Scoring

Correct Response
• Hockey 1/8, Football 3/8, Tennis, Basketball both ¼, and labels all correct

Partially Correct Response
• All sectors correct size but labeling incomplete or missing

Incorrect Response
• Incorrect (including crossed out, erased, stray marks, illegible, or off task)
Question 76: How likely student voted for Pat

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.

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Correct Response  B
Question 77: Long jump competition

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

<table>
<thead>
<tr>
<th>Average Length</th>
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<tbody>
<tr>
<td>Team A</td>
</tr>
<tr>
<td>Team B</td>
</tr>
</tbody>
</table>

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.

Teacher’s Notes

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</table>

Correct Response: C
Question 78: Probability that the marble is red

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. \( \frac{4}{10} \)

C. \( \frac{1}{5} \)

D. \( \frac{1}{10} \)

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Correct Response A
Question 79: Age structures of country X and Y

The graphs for Country X and 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?
**Teacher’s Notes**

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**Scoring**

**Correct Response**

• Within Country X there is a larger percentage of people in the ‘having children’ or ‘going to have children’ categories than in Country Y.

Note: The reference to Country X needs to be clear. The comparison with Country Y does not need to be stated.

Also, accept ‘more people’ as ‘proportionately more’ and ‘young or younger’ in place of ‘having children’ or ‘going to have children’

Examples: Country X has more people about to have children or having children than Country Y.

There are more people going to have children in Country X.

More young people in Country X.

**Incorrect Response**

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

Examples: There are more ‘going to have children’

Country X had more population compared to Country Y.
Question 80: Problem of taking care of elderly

The graphs for Country X and 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.

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

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**Scoring**

**Correct Response**
- Within Country Y there is a larger percentage of older people 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: More older people than younger people
- Not enough young people to take care of the elderly
- Less number of people ‘having children’ to keep up the populations
- Aging population, less youngsters, lesser workforce.

**Incorrect Response**
- Incorrect (including crossed out, erased, stray marks, illegible, or off task)

Examples: There are many more elders in Y than X
- Country Y has a wider range of not having children than Country X.
For further information about TIMSS in Malta please contact

TIMSS National Centre
Research and Development Department
Ministry for Education and Employment

www.research.gov.mt
email: timss.mede@gov.mt
Tel: 25982722, 25982737, 25982257