These Questions Can Be Used at Various Times Throughout the Year

This resource comprises five booklets. Each booklet is a compilation of all the questions in a particular strand released between 2012 and 2016. The multiple-choice questions appear first, followed by open-response. The questions are sorted according to the overall expectations in The Ontario Curriculum, Grades 1–8: Mathematics to which each is mapped. Detailed information about the questions, such as the year of release, the overall expectation and the category of knowledge and skills the question is mapped to, is listed after them. This detailed information also includes the answer key for each multiple-choice question. The scoring guides (with the item-specific rubric and student samples at each code) for each open-response question follow.
Suggested uses of these booklets:

• Select specific questions by overall expectation based on student learning.

• Use the scoring guides for the open-response questions to assist students in evaluating the reasonableness and completeness of their solutions.

• Use multiple-choice questions as open-response questions, when appropriate, by not including the answer options. Students can answer the question and then discuss the steps required and other possible answers, including those arrived at through common errors. Discuss whether there are multiple methods that can be used to answer the question. Students can then compare their answer to the multiple-choice options. Encourage the students to identify ways to ensure their solution process is complete and the question is answered fully.

• Use technology in the classroom to have students record multiple-choice answers instantly, which will allow for discussion of correct answers and the common errors demonstrated by the incorrect options (along with other errors not included in these options). This discussion can lead to a deeper understanding of concepts and assist students in correcting their own misunderstandings. Another option is to have students start with the correct answer and work backward to formulate a question.

• Encourage students to use manipulatives, and model how to apply them. For example, number lines can be used with questions mapped to expectations in the Number Sense and Numeration strand as well as those mapped to other strands, such as Patterning and Algebra or Data Management and Probability.

Details of the Assessment

EQAO assessments are comparable from year to year, as they share a common structure. The blueprint, which can be found in the Framework, defines how the questions are spread throughout the curriculum. (For more information, see www.eqao.com.) EQAO releases only half of the assessment each year (and has done so since 2013), so the released questions from a particular year do not cover the full blueprint. The blueprint specifies the number and types of questions (multiple-choice or open-response) that are mapped to a particular group of expectations. Each group of expectations can consist of one or more overall expectations, which themselves include specific expectations. Although EQAO releases only the overall expectation, each question is mapped to a specific expectation. The specific expectations vary from year to year; however, some of them involve knowledge or skills that may be assessed every year, or different parts of the expectation can be assessed on a yearly basis.
EQAO's Definitions of the Categories of Knowledge and Skills

EQAO has adapted the definitions of the categories of knowledge and skills from the achievement chart found in The Ontario Curriculum. These definitions assist EQAO in mapping questions.

A question is mapped to the category of Knowledge and Understanding if students must demonstrate only subject-specific content (knowledge) or comprehension of its meaning and significance (understanding), or both, in order to answer the question. These questions assess basic knowledge or understanding of concepts.

A question is mapped to the category Application if students must select the appropriate tool or get the necessary information and “fit” it to the problem. A question may change from Knowledge and Understanding to Application if context is added.

Questions that require students either to select and sequence a variety of tools or to demonstrate a critical thinking process (e.g., reasoning) are mapped to the category Thinking. Consider whether students need to make a plan to answer the question. Thinking questions require students to select more than one tool and sequence them (e.g., add first then subtract) or use reasoning to determine the answer. There may be more than one way to answer these questions.

Questions where students need to select one tool and use it repeatedly (without any sequencing of tools) are usually mapped to the category Application. However, the selection of a tool, its use more than once and the addition or subtraction of the results requires a plan. Questions requiring such a plan are generally mapped to the category Thinking.

The category and specific expectation each question is mapped to is confirmed by many Ontario educators, including the question writer, review committees and an expert reviewer. In the classroom, these questions can be mapped to a category based on the knowledge and skills the students currently have. If students have never been taught a specific skill, the question could be mapped to Application or even Thinking; however, after they are taught the skill, it could be mapped to Knowledge and Understanding or Application.

As the EQAO assessment is written near the end of the school year, it assumes that students have been taught the knowledge and skills outlined in the curriculum for the year.
How to Use This Resource (continued)

Here are some examples to help distinguish the different categories of knowledge and skills questions are mapped to.

Example 1:
When two multiple-choice questions are the same, the answer options can determine the category of knowledge and skills the question is mapped to.

**VERSION 1**

Which of these is equivalent to 8%?

- a 80
- b 8
- c 0.8
- d 0.08

**VERSION 1**
To answer this question, students need to determine which value is equivalent to 8%. By the end of Grade 6, students should know this answer or be able to calculate it quickly.

The category that the question is mapped to is **Knowledge and Understanding**.

(correct answer: d)

**VERSION 2**

Which of these is equivalent to 8%?

- a \(\frac{2}{25}\)
- b \(\frac{2}{20}\)
- c \(\frac{1}{8}\)
- d \(\frac{8}{10}\)

**VERSION 2**
For version 2, the answer options have changed the category, as students need to determine which fraction is equivalent to 8%. One approach is to change 8% to a fraction and then compare \(\frac{8}{100}\) to the given fractions to determine which one is equivalent. The students can also change the fractions in the options to percentages and see which one is equivalent to 8%. As students are required to select a tool to answer this question, it is mapped to the category **Application**.

(correct answer: a)
Example 2:

When the answer options are similar, the question can be changed to influence the category of knowledge and skills.

**VERSION 1**

The first term of a pattern is 28 672. The pattern rule is “divide by 4 to get the next term.”

What is the 5th term?

a 28  
b 112  
c 448  
d 7168

**VERSION 2**

A pattern is shown below. Each term increases by the same amount.

4, 41, 78, 115, 152, …

What is the 9th term in the pattern?

a 226  
b 263  
c 300  
d 337

**VERSION 3**

The terms of a pattern are made using toothpicks. Term 1 and Term 5 are not shown.

Determine the total number of toothpicks used in Term 1 to Term 5 of this pattern.

Justify your answer.

The total number of toothpicks used in Term 1 to Term 5 of this pattern is _____.

**VERSION 1**

This question is mapped to the category Knowledge and Understanding. Students start with the first term and apply the given pattern rule to determine the 5th term.

(correct answer: b)

**VERSION 2**

This question does not provide students with the pattern rule. They must first figure out the constant that the terms are increasing by and then apply it to determine the 9th term. Therefore, this question is mapped to Application, as the tool is not given.

(correct answer: c)

**VERSION 3**

This is an open-response question. It is mapped to the category Thinking, as students must make a plan. They must first figure out the pattern and then determine both Term 1 and Term 5. After that, students must determine the number of toothpicks in each term and add them together.

Refer to question 19 in the Patterning and Algebra strand booklet for samples of student responses with annotations.
How to Use This Resource (continued)

Example 3:
Multiple-choice and open-response questions can be mapped to the category Thinking.

VERSION 1

These polygons have been ordered from smallest to largest based on a geometric property.

- Parallelogram
- Isosceles triangle
- Rectangle
- Square
- Regular hexagon

Which property has been used to order the polygons?

a number of sides  
b number of acute angles  
c number of lines of symmetry  
d number of pairs of parallel sides

This multiple-choice question is mapped to the category Thinking. Students need to use reasoning or make a plan. They need to determine which property was used by considering the four properties for each shape and then determining which one is increasing in value. Students can also consider which of the first shape's properties has a value less than that of the second shape's, and then try using that property on the rest of the shapes to see if the value continues to increase.

(correct answer: c)

VERSION 2

Complete the chart.

<table>
<thead>
<tr>
<th>Name</th>
<th>Number of acute angles</th>
<th>Number of obtuse angles</th>
<th>Number of lines of symmetry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Square</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Isosceles trapezoid</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

On the grid, draw and name a quadrilateral that has 2 obtuse angles and no lines of symmetry.

This open-response question is also mapped to the category Thinking. Students need to use reasoning or make a plan to answer the second part. Students must consider which quadrilateral has the given properties and then draw it. They may consider each type of quadrilateral and determine its properties, or they may try to draw one with the given properties.

Refer to question 14 in this booklet for samples of student responses with annotations.
INSTRUCTIONS

Answering Multiple-Choice Questions

Like this: ●  Not like this: × ✓ ◻ ○

• Use a pencil only.
• Fill only one circle for each question.
• Fill the circle completely.
• Cleanly erase any answer you wish to change.

Answering Open-Response Questions

• Write on the space provided in this booklet.
1. Which of the quadrilaterals shown below has
   - no lines of symmetry and
   - two acute angles?
   - Isosceles trapezoid
   - Parallelogram
   - Kite
   - Right trapezoid

2. The quadrilaterals shown below are ordered from smallest to largest based on a geometric property.

   parallelogram  trapezoid  rectangle  square

   Which geometric property was used?
   - number of acute angles
   - number of lines of symmetry
   - number of pairs of equal sides
   - number of pairs of parallel sides

3. These polygons have been ordered from smallest to largest based on a geometric property.

   Parallelogram  Isosceles triangle  Rectangle  Square  Regular hexagon

   Which property has been used to order the polygons?
   - number of sides
   - number of acute angles
   - number of lines of symmetry
   - number of pairs of parallel sides
4. What type of angle is shown below?

- acute
- right
- obtuse
- straight

5. Karim is dividing the angle shown below into smaller equal angles. The first of the smaller angles is shaded.

How many smaller angles can Karim make in total?

- 60
- 12
- 10
- 6

6. Look at the figure below.

Which of the following is a top view of the figure?

- [Option A]
- [Option B]
- [Option C]
- [Option D]
7. Kelly is drawing a rectangle on the grid below.

What are the coordinates of the missing vertex?

- (11, 7)
- (7, 11)
- (11, 6)
- (6, 11)

8. Points P and Q are two vertices of a rectangle.

Which set of ordered pairs could represent the other two vertices of the rectangle?

- (4, 8) and (9, 8)
- (8, 4) and (8, 9)
- (1, 3) and (1, 8)
- (3, 1) and (8, 1)
9. Tyra enlarges the following shape on the grid below.

What are the coordinates of the two missing points that Tyra needs to complete the enlarged shape?

- (9, 8), (2, 6)
- (8, 9), (6, 2)
- (8, 9), (2, 6)
- (9, 8), (6, 2)

10. Dylan rotates the triangle below 90° counter-clockwise about Point Q.

Which of the following triangles shows the result of this transformation?

- 
- 
- 
- 

Resource: Released Questions, 2012–2016 | 11
11. A shape is shown on the grid.

Which grid shows the image of the shape after a 180° rotation then a 90° rotation counter-clockwise about Point S?

- [ ]
- [ ]
- [ ]
- [ ]

12. The shape on the grid below goes through the following 3 transformations in order:
   • rotation of 180° about Point T
   • reflection across the mirror line
   • translation 5 units left

Which shaded shape is the result?

- [ ] Shape 1
- [ ] Shape 2
- [ ] Shape 3
- [ ] Shape 4
13 Consider the geometric shapes below.

Sort these shapes. Write their labels in the correct sections of the Venn diagram below.

At least 1 line of symmetry  
At least 1 right angle
Complete the chart.

<table>
<thead>
<tr>
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</tr>
<tr>
<td>Isosceles trapezoid</td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

On the grid, draw and name a quadrilateral that has 2 obtuse angles and no lines of symmetry.

Name of quadrilateral: __________________________
Six polygons are shown below.

Isosceles trapezoid A
Square B
Rhombus C
Right triangle D
Regular pentagon E
Parallelogram F

Write the letter of each of these polygons in the appropriate section of the Venn diagram below.

At least 1 line of symmetry
Order of rotational symmetry of at least 2
Rotate the hexagon below 90° counter-clockwise about Point X. Draw this image of the hexagon.

Record the coordinates of the image of Point C.

Image of Point C: ( , )
17 Consider the border around the picture below.

Transform Shape A to cover the border with no gaps or overlaps. Draw any lines of reflection or points of rotation.

Complete the chart for the first 3 transformations you have drawn. Include directions of rotation or units of translation.

<table>
<thead>
<tr>
<th>Transformation</th>
<th>Type of transformation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The grid below shows a triangle that has been moved using transformations from position A to position B, then from position B to position C and finally from position C to position D.

Complete the chart below with descriptions of the transformations needed to move the triangle. Be sure to include all units and directions in the chart. Show points of rotation and lines of reflection on the grid.

<table>
<thead>
<tr>
<th>Transformation</th>
<th>Type of transformation</th>
<th>Description of transformation</th>
</tr>
</thead>
<tbody>
<tr>
<td>A to B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B to C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C to D</td>
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</tbody>
</table>
## Detailed Information About the Questions

### Geometry and Spatial Sense

#### Multiple-Choice Questions

<table>
<thead>
<tr>
<th>QUESTION NUMBER</th>
<th>YEAR QUESTION RELEASED</th>
<th>OVERALL EXPECTATION</th>
<th>COGNITIVE SKILL</th>
<th>KEY</th>
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<tbody>
<tr>
<td>1</td>
<td>2015</td>
<td>1</td>
<td>KU</td>
<td>b</td>
</tr>
<tr>
<td>2</td>
<td>2014</td>
<td>1</td>
<td>TH</td>
<td>b</td>
</tr>
<tr>
<td>3</td>
<td>2016</td>
<td>1</td>
<td>TH</td>
<td>c</td>
</tr>
<tr>
<td>4</td>
<td>2013</td>
<td>1</td>
<td>KU</td>
<td>a</td>
</tr>
<tr>
<td>5</td>
<td>2012</td>
<td>1</td>
<td>TH</td>
<td>b</td>
</tr>
<tr>
<td>6</td>
<td>2012</td>
<td>2</td>
<td>KU</td>
<td>a</td>
</tr>
<tr>
<td>7</td>
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<td>3</td>
<td>AP</td>
<td>a</td>
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<td>8</td>
<td>2013</td>
<td>3</td>
<td>AP</td>
<td>d</td>
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<tr>
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<td>2015</td>
<td>3</td>
<td>AP</td>
<td>b</td>
</tr>
<tr>
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<td>3</td>
<td>TH</td>
<td>d</td>
</tr>
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<td>2016</td>
<td>3</td>
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<td>b</td>
</tr>
<tr>
<td>12</td>
<td>2012</td>
<td>3</td>
<td>TH</td>
<td>a</td>
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</table>

#### Open-Response Questions

<table>
<thead>
<tr>
<th>QUESTION NUMBER</th>
<th>YEAR QUESTION RELEASED</th>
<th>OVERALL EXPECTATION</th>
<th>COGNITIVE SKILL</th>
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<td>13</td>
<td>2012</td>
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<td>AP</td>
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<tr>
<td>14</td>
<td>2016</td>
<td>1</td>
<td>TH</td>
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<td>2015</td>
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<tr>
<td>16</td>
<td>2013</td>
<td>3</td>
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<td>17</td>
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<td>3</td>
<td>AP</td>
</tr>
<tr>
<td>18</td>
<td>2014</td>
<td>3</td>
<td>TH</td>
</tr>
</tbody>
</table>

### Legend

<table>
<thead>
<tr>
<th>Cognitive Skill</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>KU</td>
<td>Knowledge and Understanding</td>
</tr>
<tr>
<td>AP</td>
<td>Application</td>
</tr>
<tr>
<td>TH</td>
<td>Thinking</td>
</tr>
</tbody>
</table>

*This is the number of the overall expectation in the Geometry and Spatial Sense strand that the question is mapped to. The overall expectations are numbered according to the order in which they appear in *The Ontario Curriculum*. 

Resource: Released Questions, 2012–2016 | 19
Item-specific rubrics and sample student responses with annotations

QUESTIONS 13 TO 18
<table>
<thead>
<tr>
<th>Code</th>
<th>Descriptor</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>• Blank: nothing written or drawn in response to the question</td>
</tr>
</tbody>
</table>
| I    | • Illegible: cannot be read; completely crossed out/erased; not written in English  
• Irrelevant content: does not attempt assigned question (e.g., comment on the task, drawings, “?”; “!”; “I don’t know”)  
• Off topic: no relationship of written work to the question |
| 10   | Application of knowledge and skills to sort and classify quadrilaterals shows limited effectiveness due to  
• misunderstanding of concepts  
• incorrect selection or misuse of procedures |
| 20   | Application of knowledge and skills to sort and classify quadrilaterals shows some effectiveness due to  
• partial understanding of the concepts  
• errors and/or omissions in the application of the procedures |
| 30   | Application of knowledge and skills to sort and classify quadrilaterals shows considerable effectiveness due to  
• an understanding of most of the concepts  
• minor errors and/or omissions in the application of the procedures |
| 40   | Application of knowledge and skills to sort and classify quadrilaterals shows a high degree of effectiveness due to  
• a thorough understanding of the concepts  
• an accurate application of the procedures (any minor errors and/or omissions do not detract from the demonstration of a thorough understanding) |
Consider the geometric shapes below.

Sort these shapes. Write their labels in the correct sections of the Venn diagram below.

At least 1 line of symmetry
At least 1 right angle

Annotation:
Response demonstrates a misunderstanding of concepts; three of the geometric shapes are correctly labelled in the sections of the Venn Diagram, “C”, “D” and “F” are labelled incorrectly.
Consider the geometric shapes below.

Sort these shapes. Write their labels in the correct sections of the Venn diagram below.

At least 1 line of symmetry
At least 1 right angle

Annotation:
Response demonstrates a partial understanding of the concepts; some of the geometric shapes are correctly labelled in the sections of the Venn Diagram, “C” and “F” are labelled incorrectly.
Question 13

**Code 30**

Consider the geometric shapes below.

Sort these shapes. Write their labels in the correct sections of the Venn diagram below.

**Annotation:**
Response demonstrates an understanding of most of the concepts; most geometric shapes are correctly labelled in the sections of the Venn Diagram, “F” is omitted. “B” and “E” are labelled in both circles as well as where the circles intersect, although not required, which does not detract from demonstrating an understanding of most of the concepts.
Question 13

Code 40

Consider the geometric shapes below.

A

B

C

D

E

F

Sort these shapes. Write their labels in the correct sections of the Venn diagram below.

At least 1 line of symmetry

At least 1 right angle

Annotation:
Response demonstrates an accurate application of the procedures; all geometric shapes are correctly labelled in the sections of the Venn Diagram.
### Question 14

<table>
<thead>
<tr>
<th>Code</th>
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</tr>
</thead>
<tbody>
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Irrelevant content: does not attempt assigned question (e.g., comment on the task, drawings, “?”; “!”; “I don’t know”)  
Off topic: no relationship of written work to the question |
| 10   | Thinking process to determine geometric properties of 4 quadrilaterals and draw a quadrilateral on a grid shows limited effectiveness due to  
minimal evidence of a solution process  
limited identification of important elements of the problem  
too much emphasis on unimportant elements of the problem  
no conclusions presented  
conclusion presented without supporting evidence |
| 20   | Thinking process to determine geometric properties of 4 quadrilaterals and draw a quadrilateral on a grid shows some effectiveness due to  
an incomplete solution process  
identification of some of the important elements of the problem  
some understanding of the relationships between important elements of the problem  
simple conclusions with little supporting evidence |
| 30   | Thinking process to determine geometric properties of 4 quadrilaterals and draw a quadrilateral on a grid shows considerable effectiveness due to  
a solution process that is nearly complete  
identification of most of the important elements of the problem  
a considerable understanding of the relationships between important elements of the problem  
appropriate conclusions with supporting evidence |
| 40   | Thinking process to determine geometric properties of 4 quadrilaterals and draw a quadrilateral on a grid shows a high degree of effectiveness due to  
a complete solution process  
identification of all important elements of the problem  
a thorough understanding of the relationships between all of the important elements of the problem  
appropriate conclusions with thorough and insightful supporting evidence |
Question 14

Code 10

Complete the chart.

<table>
<thead>
<tr>
<th>Name</th>
<th>Number of acute angles</th>
<th>Number of obtuse angles</th>
<th>Number of lines of symmetry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Square</td>
<td>0</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Rectangle</td>
<td>0</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Right trapezoid</td>
<td>2</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Isosceles trapezoid</td>
<td>1</td>
<td>1</td>
<td>3</td>
</tr>
</tbody>
</table>

On the grid, draw and name a quadrilateral that has 2 obtuse angles and no lines of symmetry.

Name of quadrilateral: Trapizoid

Annotation:
Response demonstrates limited identification of the important elements of the problem; name or drawing correct (drawing) with 0 to 5 values correct in chart (5 correct).
Question 14

Complete the chart.

<table>
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<td>0</td>
<td>0</td>
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<tr>
<td>Isosceles trapezoid</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

On the grid, draw and name a quadrilateral that has 2 obtuse angles and 30 lines of symmetry.

Name of quadrilateral: ______________________________________

Annotation: Response demonstrates identification of some of the important elements of the problem; name or drawing correct (drawing) with 6 to 8 values correct in chart (7 correct).
Question 14

Code 30

Complete the chart.

<table>
<thead>
<tr>
<th>Name</th>
<th>Number of acute angles</th>
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<td>0</td>
<td>0</td>
<td>2</td>
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<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Isosceles trapezoid</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

On the grid, draw and name a quadrilateral that has 2 obtuse angles and no lines of symmetry.

Name of quadrilateral: Parallelogram

Annotation:
Response demonstrates a considerable understanding of the relationships between important elements of the problem; name or drawing correct with 9 to 12 values correct in chart (10 correct). Note: Name is correct but drawing is not parallelogram as top and bottom side lengths are not equal (5 units and 6 units) and 1 unit difference in lengths is above acceptable range of +/- half of a unit).
Question 14

Code 40

Complete the chart.

<table>
<thead>
<tr>
<th>Name</th>
<th>Number of acute angles</th>
<th>Number of obtuse angles</th>
<th>Number of lines of symmetry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Square</td>
<td>0</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Rectangle</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Right trapezoid</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Isosceles trapezoid</td>
<td>2</td>
<td>2</td>
<td>0</td>
</tr>
</tbody>
</table>

On the grid, draw and name a quadrilateral that has 2 obtuse angles and no lines of symmetry.

Name of quadrilateral: parallelogram

Annotation:
Response demonstrates identification of all important elements of the problem; name and drawing correct with 11 to 12 values correct in chart (11 correct).
### Question 15

<table>
<thead>
<tr>
<th>Code</th>
<th>Descriptor</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>• Blank: nothing written or drawn in response to the question</td>
</tr>
</tbody>
</table>
| I    | • Illegible: cannot be read; completely crossed out/erased; not written in English  
• Irrelevant content: does not attempt assigned question (e.g., comment on the task, drawings, “?”,”!”,”I don’t know”)  
• Off topic: no relationship of written work to the question |
| 10   | Application of knowledge and skills to sort polygons in a Venn diagram shows limited effectiveness due to  
• misunderstanding of concepts  
• incorrect selection or misuse of procedures |
| 20   | Application of knowledge and skills to sort polygons in a Venn diagram shows some effectiveness due to  
• partial understanding of the concepts  
• errors and/or omissions in the application of the procedures |
| 30   | Application of knowledge and skills to sort polygons in a Venn diagram shows considerable effectiveness due to  
• an understanding of most of the concepts  
• minor errors and/or omissions in the application of the procedures |
| 40   | Application of knowledge and skills to sort polygons in a Venn diagram shows a high degree of effectiveness due to  
• a thorough understanding of the concepts  
• an accurate application of the procedures (any minor errors and/or omissions do not detract from the demonstration of a thorough understanding) |
Question 15

Code 10

Six polygons are shown below.

- Isosceles trapezoid
- Square
- Rhombus
- Right triangle
- Regular pentagon
- Parallelogram

Write the letter of each of these polygons in the appropriate section of the Venn diagram below.

Annotation:
Response demonstrates a misunderstanding of concepts; 1 polygon is correctly sorted in the sections of the Venn Diagram (A, B, C, D and E are sorted incorrectly).
Question 15

Code 20

Six polygons are shown below.

- Isosceles trapezoid (A)
- Square (B)
- Rhombus (C)
- Right triangle (D)
- Regular pentagon (E)
- Parallelogram (F)

Write the letter of each of these polygons in the appropriate section of the Venn diagram below.

At least 1 line of symmetry
Order of rotational symmetry of at least 2

Annotation:
Response demonstrates partial understanding of the concepts; 2 polygons are correctly sorted in the sections of the Venn Diagram (B, C, D and E are sorted incorrectly).
Question 15

Annotation:
Response demonstrates an understanding of most of the concepts; 4 polygons are correctly sorted in the sections of the Venn Diagram (D and E are sorted incorrectly).
Six polygons are shown below.

- Isosceles trapezoid
- Square
- Rhombus
- Right triangle
- Regular pentagon
- Parallelogram

Write the letter of each of these polygons in the appropriate section of the Venn diagram below.

 Annotation:
Response demonstrates an accurate application of the procedures; all 6 polygons are correctly sorted in the sections of the Venn Diagram.
### Question 16

<table>
<thead>
<tr>
<th>Code</th>
<th>Descriptor</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>• Blank: nothing written or drawn in response to the question</td>
</tr>
</tbody>
</table>
| I    | • Illegible: cannot be read; completely crossed out/erased; not written in English  
• Irrelevant content: does not attempt assigned question (e.g., comment on the task, drawings, “?”
• “!”, “I don’t know”)  
• Off topic: no relationship of written work to the question |
| 10   | Application of knowledge and skills to rotate a hexagon 90° counter-clockwise shows limited  
effectiveness due to  
• misunderstanding of concepts  
• incorrect selection or misuse of procedures |
| 20   | Application of knowledge and skills to rotate a hexagon 90° counter-clockwise shows some  
effectiveness due to  
• partial understanding of the concepts  
• errors and/or omissions in the application of the procedures |
| 30   | Application of knowledge and skills to rotate a hexagon 90° counter-clockwise shows considerable  
effectiveness due to  
• an understanding of most of the concepts  
• minor errors and/or omissions in the application of the procedures |
| 40   | Application of knowledge and skills to rotate a hexagon 90° counter-clockwise shows a high degree  
of effectiveness due to  
• a thorough understanding of the concepts  
• an accurate application of the procedures (any minor errors and/or omissions do not detract from  
the demonstration of a thorough understanding) |
Question 16

Code 10

Rotate the hexagon below 90° counter-clockwise about Point X. Draw this image of the hexagon.

Record the coordinates of the image of Point C.

Image of Point C: (10, 6)

Annotation:
Response demonstrates misuse of procedures; correctly draws the image of the hexagon with most points labelled accurately but image is rotated on Point A instead of about Point X, 180° instead of 90° and with reversed coordinates for the image shown of Point C (10, 6).
Code 20

Rotate the hexagon below 90° counter-clockwise about Point X. Draw this image of the hexagon.

Record the coordinates of the image of Point C.

Image of Point C: (8, 12)

Annotation:
Response demonstrates partial understanding of the concepts; correctly draws the image of the hexagon but image is rotated on Point X and 180° instead of 90° about Point X and labelled inaccurately with accurate coordinates for the image shown of Point C (8, 12).
Annotation:
Response demonstrates a minor error in the application of the procedures; correctly draws and labels the image of the hexagon but image is rotated on Point X instead of about Point X with accurate coordinates for the image shown of Point C (11, 9).
Code 40

Rotate the hexagon below 90° counter-clockwise about Point X. Draw this image of the hexagon.

Record the coordinates of the image of Point C.

Image of Point C: (13, 9)

Annotation:
Response demonstrates an accurate application of the procedures; correctly draws and labels the image of the hexagon and shows accurate coordinates for the image of Point C.
## Question 17

<table>
<thead>
<tr>
<th>Code</th>
<th>Descriptor</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>• Blank: nothing written or drawn in response to the question</td>
</tr>
</tbody>
</table>
| I    | • Illegible: cannot be read; completely crossed out/erased; not written in English  
• Irrelevant content: does not attempt assigned question (e.g., comment on the task, drawings, “?”,”!”,”I don’t know”)  
• Off topic: no relationship of written work to the question |
| 10   | Application of knowledge and skills to complete the chart for the first 3 transformations shows limited effectiveness due to  
• misunderstanding of concepts  
• incorrect selection or misuse of procedures |
| 20   | Application of knowledge and skills to complete the chart for the first 3 transformations shows some effectiveness due to  
• partial understanding of the concepts  
• errors and/or omissions in the application of the procedures |
| 30   | Application of knowledge and skills to complete the chart for the first 3 transformations shows considerable effectiveness due to  
• an understanding of most of the concepts  
• minor errors and/or omissions in the application of the procedures |
| 40   | Application of knowledge and skills to complete the chart for the first 3 transformations shows a high degree of effectiveness due to  
• a thorough understanding of the concepts  
• an accurate application of the procedures (any minor errors and/or omissions do not detract from the demonstration of a thorough understanding) |
Consider the border around the picture below.

Transform Shape A to cover the border with no gaps or overlaps. Draw any lines of reflection or points of rotation.

Complete the chart for the first 3 transformations you have drawn. Include directions of rotation or units of translation.

<table>
<thead>
<tr>
<th>Transformation</th>
<th>Type of transformation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>I flip A to B</td>
<td>I completely flipped A to section B</td>
</tr>
<tr>
<td>2</td>
<td>I rotated B to</td>
<td>I turned B on the side and moved it down</td>
</tr>
<tr>
<td>3</td>
<td>I pushed C to D</td>
<td>I pushed C 3 cm up to D</td>
</tr>
</tbody>
</table>

Annotation:
Response demonstrates a misunderstanding of concepts and misuse of procedures; shows inaccurate names for two of the transformations (flip and push), line of reflection is omitted in description of reflection (flip), the amount, direction and point of rotation are omitted in description of rotation, and incorrectly describes direction in translation (up instead of right).
Question 17

Consider the border around the picture below.

Transform Shape A to cover the border with no gaps or overlaps. Draw any lines of reflection or points of rotation.

Complete the chart for the first 3 transformations you have drawn. Include directions of rotation or units of translation.

<table>
<thead>
<tr>
<th>Transformation</th>
<th>Type of transformation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>translation slide 3</td>
<td>translation slide 3</td>
</tr>
<tr>
<td>2</td>
<td>rotation</td>
<td>rotation 90° rite</td>
</tr>
<tr>
<td>3</td>
<td>reflection</td>
<td>reflection rite</td>
</tr>
</tbody>
</table>

Annotation:
Response demonstrates a partial understanding of the concepts with errors in the application of the procedures; shows accurate names for the transformations with an accurate description of the translation. Point of rotation omitted and direction inaccurate (90° rite) in the description of the rotation and the description of the reflection does not include a line of reflection.
Consider the border around the picture below.

Transform Shape A to cover the border with no gaps or overlaps. Draw any lines of reflection or points of rotation.

Complete the chart for the first 3 transformations you have drawn. Include directions of rotation or units of translation.

<table>
<thead>
<tr>
<th>Transformation</th>
<th>Type of transformation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>rotation</td>
<td>rotate shape A 90° from point A counter clockwise</td>
</tr>
<tr>
<td>2</td>
<td>translation</td>
<td>translate shape B 3 blocks to the right</td>
</tr>
<tr>
<td>3</td>
<td>rotation</td>
<td>rotate shape C from point B 90° clockwise</td>
</tr>
</tbody>
</table>

Annotation:
Response demonstrates an understanding of most of the concepts with minor errors in the application of procedures; shows correct names for all three transformations and accurate descriptions for the first 2 transformations (rotation and translation) but for the third transformation, the direction of rotation is incorrect (clockwise instead of counter-clockwise).
Question 17

**Code 40**

Consider the border around the picture below.

Transform Shape A to cover the border with no gaps or overlaps. Draw any lines of reflection or points of rotation.

Complete the chart for the first 3 transformations you have drawn. Include directions of rotation or units of translation.

<table>
<thead>
<tr>
<th>Transformation</th>
<th>Type of transformation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>rotation</td>
<td>rotate 90° counterclockwise.</td>
</tr>
<tr>
<td>2</td>
<td>translation</td>
<td>translate 3 blocks to the right.</td>
</tr>
<tr>
<td>3</td>
<td>rotation</td>
<td>rotate 90° counterclockwise</td>
</tr>
</tbody>
</table>

**Annotation:**
Response demonstrates a thorough understanding of the concepts and an accurate application of procedures; shows correct names for the transformations with accurate descriptions. Points are drawn and labelled on the border to indicate points of rotation.
<table>
<thead>
<tr>
<th>Code</th>
<th>Descriptor</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>• Blank: nothing written or drawn in response to the question</td>
</tr>
</tbody>
</table>
| I    | • Illegible: cannot be read; completely crossed out/erased; not written in English  
|      | • Irrelevant content: does not attempt assigned question (e.g., comment on the task, drawings, “?””, “!””, “I don’t know”)  
|      | • Off topic: no relationship of written work to the question |
| 10   | Thinking process to describe the transformations shows limited effectiveness due to  
|      | • minimal evidence of a solution process  
|      | • limited identification of important elements of the problem  
|      | • too much emphasis on unimportant elements of the problem  
|      | • no conclusions presented  
|      | • conclusion presented without supporting evidence |
| 20   | Thinking process to describe the transformations shows some effectiveness due to  
|      | • an incomplete solution process  
|      | • identification of some of the important elements of the problem  
|      | • some understanding of the relationships between important elements of the problem  
|      | • simple conclusions with little supporting evidence |
| 30   | Thinking process to describe the transformations shows considerable effectiveness due to  
|      | • a solution process that is nearly complete  
|      | • identification of most of the important elements of the problem  
|      | • a considerable understanding of the relationships between important elements of the problem  
|      | • appropriate conclusions with supporting evidence |
| 40   | Thinking process to describe the transformations shows a high degree of effectiveness due to  
|      | • a complete solution process  
|      | • identification of all important elements of the problem  
|      | • a thorough understanding of the relationships between all of the important elements of the problem  
|      | • appropriate conclusions with thorough and insightful supporting evidence |
Question 18

Code 10

The grid below shows a triangle that has been moved using transformations from position A to position B, then from position B to position C and finally from position C to position D.

Complete the chart below with descriptions of the transformations needed to move the triangle. Be sure to include all units and directions in the chart. Show points of rotation and lines of reflection on the grid.

<table>
<thead>
<tr>
<th>Transformation</th>
<th>Type of transformation</th>
<th>Description of transformation</th>
</tr>
</thead>
<tbody>
<tr>
<td>A to B</td>
<td>Rotation</td>
<td>Point A 90° counter clockwise</td>
</tr>
<tr>
<td>B to C</td>
<td>Rotation</td>
<td>Point B 10° clockwise</td>
</tr>
<tr>
<td>C to D</td>
<td>Reflection</td>
<td>The triangle moves away</td>
</tr>
</tbody>
</table>

Annotation:
Response demonstrates limited identification of important elements of the problem; only the second and third transformations are named correctly and errors describing A to B (not a rotation), B to C (omits point of rotation) and C to D (description unclear and mirror line omitted).
The grid below shows a triangle that has been moved using transformations from position A to position B, then from position B to position C and finally from position C to position D.

Complete the chart below with descriptions of the transformations needed to move the triangle. Be sure to include all units and directions in the chart. Show points of rotation and lines of reflection on the grid.

<table>
<thead>
<tr>
<th>Transformation</th>
<th>Type of transformation</th>
<th>Description of transformation</th>
</tr>
</thead>
<tbody>
<tr>
<td>A to B</td>
<td>translation</td>
<td>7 units right, 5 units up</td>
</tr>
<tr>
<td>B to C</td>
<td>Rotation</td>
<td>Rotate clockwise 90°</td>
</tr>
<tr>
<td>C to D</td>
<td>Reflection</td>
<td>Reflect on line segment AB</td>
</tr>
</tbody>
</table>

Annotation:
Response demonstrates identification of some of the important elements of the problem; correct names for all three transformations but errors describing A to B (incorrect description), B to C (omits point of rotation) and C to D (incorrect placement of mirror line).
The grid below shows a triangle that has been moved using transformations from position A to position B, then from position B to position C and finally from position C to position D.

Complete the chart below with descriptions of the transformations needed to move the triangle. Be sure to include all units and directions in the chart. Show points of rotation and lines of reflection on the grid.

<table>
<thead>
<tr>
<th>Transformation</th>
<th>Type of transformation</th>
<th>Description of transformation</th>
</tr>
</thead>
<tbody>
<tr>
<td>A to B</td>
<td>translation</td>
<td>up 5, left 0</td>
</tr>
<tr>
<td>B to C</td>
<td>rotation</td>
<td>rotate 90° around X</td>
</tr>
<tr>
<td>C to D</td>
<td>reflection</td>
<td>reflect over line of reflection</td>
</tr>
</tbody>
</table>

**Annotation:**
Response demonstrates a considerable understanding of the relationships between important elements of the problem; correct names for all three transformations and accurate descriptions of A to B and C to D (including mirror line) but omission describing B to C (omitted direction of rotation).
The grid below shows a triangle that has been moved using transformations from position A to position B, then from position B to position C and finally from position C to position D.

Complete the chart below with descriptions of the transformations needed to move the triangle. Be sure to include all units and directions in the chart. Show points of rotation and lines of reflection on the grid.

<table>
<thead>
<tr>
<th>Transformation</th>
<th>Type of transformation</th>
<th>Description of transformation</th>
</tr>
</thead>
<tbody>
<tr>
<td>A to B</td>
<td>Translation</td>
<td>Translate 6 units left, then 5 units up.</td>
</tr>
<tr>
<td>B to C</td>
<td>Rotation</td>
<td>A rotation of 90° cw about point B</td>
</tr>
<tr>
<td>C to D</td>
<td>Reflection</td>
<td>A reflection across line segment DE</td>
</tr>
</tbody>
</table>

Annotation:
Response demonstrates a thorough understanding of the relationships between all of the important elements of the problem; correct names for all three transformations with accurate descriptions of A to B, B to C (including point of rotation) and C to D (including mirror line).