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.
How to Use This Resource

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.
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 similar, the answer options can influence the category of knowledge and skills the question is mapped to.

**VERSION 1**
What is 79 + 22?
- a  91
- b  101
- c  191
- d  911

**VERSION 2**
Which of these expressions represents the answer to 79 + 22?
- a  70 + 20 + 11
- b  70 + 20 + 1
- c  90 + 2
- d  90 + 7

**Example 2:**
When the answer options are similar, the question can be changed to influence the category of knowledge and skills.

**VERSION 1**
Which number pattern shows adding 5 each time?
- a  9, 14, 19, 24, 29,…
- b  9, 13, 17, 21, 25,…
- c  37, 32, 27, 22, 17,…
- d  37, 33, 29, 25, 21,…

**VERSION 1**
Students need simply to answer the question to determine which option is correct. They do not have to select a tool, as the tool (+) is provided. The options are the correct answer and other plausible common adding errors. The category that this question is mapped to is **Knowledge and Understanding**. 
(correct answer: b)

**VERSION 2**
For version 2, the answer options have changed the category, as students need to consider the expressions and determine which one represents the same value. They may determine that 79 is 70 + 9 and that 22 is 20 + 2 and then determine that 9 + 2 is 11. This question is mapped to the category **Application** based on the options provided. 
(correct answer: a)
Example 2 (continued)

VERSIONS 2a and 2b

Versions 2a and 2b are mapped to the category Application. In both versions, the pattern rule is not given, and students are required to determine the amount by which the pattern is increasing. Students can determine the missing numbers and then find them in the options, or they can try each option and see which one works in the pattern.

(correct answer for version 2a: c)
(correct answer for version 2b: b)

VERSION 2a

Three numbers are missing in this pattern. The pattern is increasing by the same amount each time. What are the three missing numbers?

9, 14, 19, __, __, __, 39

- a 20, 21, 22
- b 24, 34, 44
- c 24, 29, 34
- d 29, 39, 49

VERSION 2b

This pattern is increasing by the same amount each time.

19, 24, 29, 34, 39,…

What are the next two terms of this pattern?

- a 41, 43
- b 44, 49
- c 44, 54
- d 49, 59

VERSION 3

This version requires a plan. Students must first determine the amount each pattern is increasing by and then extend the pattern using the appropriate pattern rule. After, the student must identify a number common to both patterns. If there is no common number, they will need to extend one or both patterns further. This question is mapped to the category Thinking.

(correct answer: d)

VERSION 3

Ivy writes the first five numbers of her pattern:
25, 27, 29, 31, 33,…
Her pattern continues to increase by the same amount each time.
Corey writes the first five numbers of his pattern:
1, 8, 15, 22, 29,…
His pattern continues to increase by the same amount each time.

What number is in both of their patterns?

- a 35
- b 36
- c 37
- d 43
Example 3:

Multiple-choice and open-response questions can be mapped to the category of Thinking.

**VERSION 1**

This multiple-choice question is mapped to the category Thinking. Students need to make a plan or use reasoning to answer this multiple-choice question. They need to determine how the shape can be used to cover the grid. They can draw the shape onto the grid or count the number of squares and determine the number of groups of 3 in the total.

(correct answer: b)

**VERSION 2**

This open-response question is also mapped to the category Thinking. Students need to make a plan. They need to determine the area of each playground and then determine the difference between the two. Students can also cross off one block in each playground at a time and determine the number of blocks left over (not crossed out) on Playground A. Work must be shown to demonstrate how the student determined the answer.

Refer to question 26 in the Measurement strand 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. The numbers in the pattern below decrease by the same amount each time.
   81, 72, 63, ____, ____, ____
   What are the next three numbers?
   ○ 54, 45, 36
   ○ 54, 45, 37
   ○ 55, 46, 37
   ○ 55, 47, 39

2. A pattern starts at 3 and ends at 17.
   What could be the pattern rule?
   ○ Add 2 each time.
   ○ Add 3 each time.
   ○ Add 4 each time.
   ○ Add 5 each time.

3. Look at the growing pattern below.
   3, ____, ____, ____, 19
   The pattern goes up by the same number each time.
   What are the missing numbers?
   ○ 4, 5, 6
   ○ 6, 9, 12
   ○ 7, 11, 15
   ○ 8, 13, 18
4 Look at the two pattern rules below.
Start at 1 and add 3 each time.
Start at 1 and add 4 each time.
Which of these numbers is in both patterns?

- 4
- 5
- 9
- 13

5 The marbles in the bags on the scale below are all the same size and mass. The scale is balanced.

How many marbles are in the shaded bag?

- 13
- 17
- 52
- 91

6 What number makes the addition question below true?

\[
\begin{array}{c}
\text{☐} \\
+ 47 \\
\hline
72
\end{array}
\]

- 35
- 25
- 24
- 19

7 What number goes in the box to complete the following number sentence?

\[6 + \square - 5 = 20\]

- 11
- 14
- 19
- 31
You may now use a calculator and/or manipulatives.
8. Tianna makes a pattern by repeating the 5 shapes below in the order shown.

What is the 8th shape in this pattern?

- ▲
- □
- ◼
- △

9. Sandy creates a pattern of adding 9 on a number chart.

Which chart below shows Sandy’s pattern?

- Chart A
- Chart B
- Chart C
- Chart D

Resource: Released Questions, 2012–2016 | 11
10 Look at the pattern below.

4, 7, 10, ___, ___, 19

What are the missing numbers?

○ 12, 14
○ 12, 16
○ 13, 15
○ 13, 16

11 Lily creates a number pattern. She starts at 95 and subtracts 5 each time.

Which of the following shows the first 4 numbers of Lily’s pattern?

○ 95, 85, 75, 65
○ 95, 90, 85, 80
○ 95, 100, 105, 110
○ 95, 105, 115, 125

12 A growing number pattern is shown below.

106, 109, 112, 115

What is the pattern rule?

○ add 2
○ add 3
○ add 4
○ add 5

13 Which number pattern shows adding 5 each time?

○ 9, 14, 19, 24, 29, ...
○ 9, 13, 17, 21, 25, ...
○ 37, 32, 27, 22, 17, ...
○ 37, 33, 29, 25, 21, ...

14 This pattern has two missing numbers.

85, ___, 73, 67, ___, 55, 49, 43

What is the rule for this pattern?

○ +12
○ +6
○ −6
○ −12
15 A pattern is made by removing 3 blocks each time.

The pattern continues.
How many blocks will Shape 4 have?
○ 7
○ 8
○ 10
○ 13

16 Look at the number sentence below.

30 − 21 = 9

Which of the following number sentences belongs to the same fact family?
○ 12 − 9 = 3
○ 21 − 12 = 9
○ 21 + 9 = 30
○ 12 + 21 = 33

17 A fact family with one missing number sentence is shown below.

\[
\begin{align*}
26 − 7 &= 19 \\
19 + 7 &= 26 \\
\ ? &= \ \\
7 + 19 &= 26
\end{align*}
\]

Which of the following is the missing number sentence?
○ 26 + 19 = 45
○ 26 − 19 = 7
○ 19 − 7 = 12
○ 26 + 7 = 33
Multiply the numbers on the two cards shown below.

What is the answer?

- 1
- 4
- 5
- 6
Jane has a book with 11 chapters.

She reads chapter 1 on the first day of April. Three days later, she reads chapter 2.

Will Jane finish the book by April 30th if she continues to read one chapter every three days?

Circle one: Yes No

Explain your answer.
20. David makes the shrinking pattern below.
73, 69, 65, 61, ____, ____, ____

Fill in the blanks with the next 3 numbers in David’s pattern.
Describe David’s pattern rule.
________________________________________________________________

Use David’s pattern rule to fill in the missing numbers in the pattern shown below.
____, 26, ____ , ____, 14, _____
Kyle creates this number pattern:
• Start at 1 and add 6 each time.

Marla creates this number pattern:
• Start at 3 and add 7 each time.

Write a number that is in both Kyle’s and Marla’s patterns.

Justify your answer.

The number ______ is in both patterns.
### Detailed Information About the Questions

#### Patterning and Algebra

**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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<td>KU</td>
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#### Open-Response Questions

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<tr>
<td>21</td>
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</table>

**Legend**

- **KU** | Knowledge and Understanding
- **AP** | Application
- **TH** | Thinking

*This is the number of the overall expectation in the Patterning and Algebra strand that the question is mapped to. The overall expectations are numbered according to the order in which they appear in *The Ontario Curriculum.*
Primary Division

Grade 3

Open-Response Questions

Item-specific rubrics and sample student responses with annotations

OPEN-RESPONSE QUESTIONS 19 TO 21
### Question 19

<table>
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• Off topic: no relationship of written work to the question |
| 10   | Application of knowledge and skills to identify and describe number patterns involving addition on a calendar shows limited effectiveness due to  
• misunderstanding of concepts  
• incorrect selection or misuse of procedures |
| 20   | Application of knowledge and skills to identify and describe number patterns involving addition on a calendar 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 identify and describe number patterns involving addition on a calendar 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 identify and describe number patterns involving addition on a calendar 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) |
Code 10

Jane has a book with 11 chapters.
She reads chapter 1 on the first day of April. Three days later, she reads chapter 2.

<table>
<thead>
<tr>
<th>April</th>
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<td>S M T W T F S</td>
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<tr>
<td>1 2 3 4 5 6</td>
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<td>7 8 9 10 11 12 13</td>
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<td>14 15 16 17 18 19 20</td>
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<td>21 22 23 24 25 26 27</td>
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<tr>
<td>28 29 30</td>
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</tbody>
</table>

Will Jane finish the book by April 30th if she continues to read one chapter every three days?
Circle one:  Yes  No

Explain your answer.

Yes because the month will not finish.

Annotation:
Response demonstrates a misuse of procedures; shows inconsistent pattern (counting by 2, 3 and 4) that does not stop after 11 chapters.
Jane has a book with 11 chapters.

She reads chapter 1 on the first day of April. Three days later, she reads chapter 2.

Will Jane finish the book by April 30th if she continues to read one chapter every three days?

Circle one: Yes  No

Explain your answer.

Because when she's done the book I'll be April 19.

Annotation:
Response demonstrates errors in the application of the procedures; shows counting by twos on calendar with omission of chapter 4 and conclusion (No) does not match work shown.
Jane has a book with 11 chapters.

She reads chapter 1 on the first day of April. Three days later, she reads chapter 2.

Will Jane finish the book by April 30th if she continues to read one chapter every three days?

Circle one: Yes  No

Explain your answer.

I know this because if you add 1 each time that you skip 2 you will have 11 on the 21st day.

Annotation:
Response demonstrates a minor error in the application of the procedures; shows counting by twos 10 times (instead of threes) with a correct conclusion and explanation based on work shown.
Question 19

**Code 40**

Jane has a book with 11 chapters.

She reads chapter 1 on the first day of April. Three days later, she reads chapter 2

<table>
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</tbody>
</table>

Will Jane finish the book by April 30th if she continues to read one chapter every three days?

Circle one: **Yes**  

Explain your answer. She does not finish the book on April 30th because I marked when I counted in it was May 1. She finishes the book on May 1.

**Annotation:**
Response demonstrates a thorough understanding of the concepts; shows counting by threes 10 times on the calendar with a correct conclusion and explanation (book would be finished May 1st).
### Question 20

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| 10   | Application of knowledge and skills to extend a pattern involving subtraction shows limited effectiveness due to  
• misunderstanding of concepts  
• incorrect selection or misuse of procedures |
| 20   | Application of knowledge and skills to extend a pattern involving subtraction shows some effectiveness due to  
• partial understanding of the concepts  
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| 30   | Application of knowledge and skills to extend a pattern involving subtraction 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 extend a pattern involving subtraction 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) |
David makes the shrinking pattern below.
73, 69, 65, 61, 51, 43, 41
Fill in the blanks with the next 3 numbers in David’s pattern.
Describe David’s pattern rule.

\[ \text{the numbers are decreasing; they are going down by 2} \]

Use David’s pattern rule to fill in the missing numbers in the pattern shown below.
38, 26, 16, 15, 14, \_ \_

Annotation:
Response demonstrates misunderstanding of concepts; incorrectly extends David’s pattern, incorrect pattern rule (down by 11) and errors in filling in missing numbers.
Question 20

David makes the shrinking pattern below.
73, 69, 65, 61, 57, 53, 49

Fill in the blanks with the next 3 numbers in David’s pattern.

Describe David’s pattern rule.

David's pattern rule is the number __.

Use David’s pattern rule to fill in the missing numbers in the pattern shown below.

29, 26, 23, 20, 14, 12

Annotation:
Response demonstrates errors and omissions in the application of the procedures; correctly extends David’s pattern, but incomplete pattern rule (omits reference to decreasing) and errors in filling in missing numbers (decreases by 3 and 2).
David makes the shrinking pattern below.
73, 69, 65, 61, 57, 53, 49

Fill in the blanks with the next 3 numbers in David’s pattern.

Describe David’s pattern rule.

The pattern rule is counting by 4.

Use David’s pattern rule to fill in the missing numbers in the pattern shown below.
30, 26, 22, 18, 14, 10

Annotation:
Response demonstrates a minor omission in the application of the procedures; correctly extends David’s pattern and fills in missing numbers but incomplete pattern rule (omits reference to decreasing).
David makes the shrinking pattern below.

$73, 69, 65, 61, 57, 53, 49$

Fill in the blanks with the next 3 numbers in David’s pattern.

Describe David’s pattern rule.

$-4$

Use David’s pattern rule to fill in the missing numbers in the pattern shown below.

$20, 26, 22, 18, 14, 10$

Annotation:
Response demonstrates an accurate application of the procedures; correctly extends David’s pattern, identifies pattern rule ($-4$) and fills in missing numbers.
### Question 21

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| 10   | Application of knowledge and skills to extend Kyle and Marla’s patterns and determine a number in both patterns shows limited effectiveness due to  
• misunderstanding of concepts  
• incorrect selection or misuse of procedures |
| 20   | Application of knowledge and skills to extend Kyle and Marla’s patterns and determine a number in both patterns shows some effectiveness due to  
• partial understanding of the concepts  
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• 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 21

Code 10

Kyle creates this number pattern:
• Start at 1 and add 6 each time.

Marla creates this number pattern:
• Start at 3 and add 7 each time.

Write a number that is in both Kyle’s and Marla’s patterns.
Justify your answer.

7 because
If you add
1 + 6 = 7.

The number 7 is in both patterns.

Annotation:
Response demonstrates minimal evidence of a solution process; correctly identifies second term of only one pattern (Kyle’s) with incorrect conclusion.
Question 21

Code 20

Kyle creates this number pattern:
• Start at 1 and add 6 each time.

Marla creates this number pattern:
• Start at 3 and add 7 each time.

Write a number that is in both Kyle’s and Marla’s patterns.
Justify your answer.

\[ K \quad 1 + 6 = 7 \]
\[ M \quad 3 + 7 = 10 \]

The number \( 7 \) is in both patterns.

Annotation:
Response demonstrates omissions in the application of the procedures; correctly identifies only second term of both patterns (7 and 10) with incorrect conclusion.
Question 21

Code 30

Kyle creates this number pattern:
• Start at 1 and add 6 each time.

Marla creates this number pattern:
• Start at 3 and add 7 each time.

Write a number that is in both Kyle’s and Marla’s patterns.

Justify your answer.

\[
\begin{align*}
1 & \quad 6 & \quad 12 & \quad 18 & \quad 24 & \quad 30 & \quad 36 & \quad 42 \\
3 & \quad 14 & \quad 21 & \quad 28 & \quad 35 & \quad 42 & \\
\end{align*}
\]

The number \(42\) is in both patterns.

**Annotation:**
Response demonstrates minor errors in the application of the procedures; minor error extending both patterns (second term incorrect for both) but evidence of increasing by 6s and 7s with correct conclusion based on errors.
Question 21

Code 40

Kyle creates this number pattern:
• Start at 1 and add 6 each time.

Marla creates this number pattern:
• Start at 3 and add 7 each time.

Write a number that is in both Kyle’s and Marla’s patterns.
Justify your answer.

The number 31 is in both patterns.

Annotation:
Response demonstrates an accurate application of the procedures; correctly extends both patterns with correct conclusion.