Resource: Released Questions

Assessment of Reading, Writing and Mathematics

Junior Division

November 2023

Mathematics

6

In This Resource:

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This resource is provided to support educators with the mathematics component of the EQAO Assessment of Reading, Writing and Mathematics, Junior Division. Each mathematics question on the assessment is mapped to a category of knowledge and skills and an overall and a specific expectation in *The Ontario Curriculum, Grades 1–8: Mathematics* (2020). This resource includes the definitions of the categories of knowledge and skills as well as examples of adapted assessment questions. Detailed information about each question, including the overall expectation and category of knowledge and skills to which the question is mapped, and the correct answer, are provided. For more information about the assessment design, refer to the *Framework* at www.eqao.com.

DETAILS OF THE ASSESSMENT

The EQAO Assessment of Reading, Writing and Mathematics, Junior Division, is an online assessment completed by students at the end of Grade 6. The mathematics component of the assessment uses a multi-stage computer adaptive testing model that adapts to the individual student's performance as the student progresses through the stages of the assessment (e.g., based on a student's performance in Stage 1, the student will be routed to a set of questions that is overall easier or more difficult in Stage 2). Though students are routed to different question sets, outcomes are put on the same scale, and overall levels of achievement are comparable.

The mathematics component assesses the knowledge and skills that are defined in the expectations found in *The Ontario Curriculum, Grades 1–8: Mathematics* (2020). The questions assess students' knowledge and skills in these strands:

- Number
- Algebra
- Data
- Spatial Sense
- Financial Literacy

Although the assessment does not measure the content in the Social-Emotional Learning (SEL) Skills in Mathematics and the Mathematical Processes strand, students may be required to apply mathematical processes while completing the assessment.

Each question on the assessment is mapped to an overall and a specific curriculum expectation. Each question is also mapped to one of these categories of knowledge and skills:

- Knowledge and Understanding (**KU**)
- Application (**AP**)
- Thinking (**TH**)

Questions in the mathematics component do not assess the Communication category of knowledge and skills.

During each stage of the assessment, students complete questions mapped to each of the three categories of knowledge and skills assessed. The category assigned to each question assumes that students have been taught the knowledge and skills outlined in the Grade 6 mathematics curriculum, as the EQAO assessment is completed near the end of Grade 6.

Regardless of how students are routed as they progress through the stages of the assessment, students complete the same number of questions from each of the various strands assessed, as the assessment follows a blueprint. The blueprint, which can be found in the *Framework,* defines how many questions a student will complete from each strand. This makes the assessment comparable from year to year. (For more information, see www.eqao.com.)

RESULTS REPORTED

The EQAO Assessment of Reading, Writing and Mathematics, Junior Division, is a standards-referenced large-scale assessment based on the expectations and standards (levels of achievement) for student proficiency in *The Ontario Curriculum.* EQAO reports an overall level of achievement in mathematics for each student. EQAO does not provide scores by strand or by category of knowledge and skills at the student level, as each student does not complete enough questions mapped to each strand or skill to report on each accurately. However, through the EQAO secure reporting tool, the agency provides reports by strand and skill at the school, board and provincial levels for schools and boards to use for improvement planning.

DEFINITIONS OF THE CATEGORIES OF KNOWLEDGE AND SKILLS

EQAO has adapted the definitions of the three categories below from the achievement chart for mathematics found in the Ontario mathematics curriculum. This section outlines the definitions EQAO uses to determine the category for each question on the assessment. An example is provided for each category.

Knowledge and Understanding

A question is mapped to Knowledge and Understanding if in order to answer the question students must demonstrate only

- subject-specific content (knowledge) and/or
- comprehension of its meaning and significance (understanding).

These questions assess basic knowledge and/or understanding of concepts.

Example

A pattern is made using blocks. Information about the pattern is shown in this table of values.

Position Number (p)	Number of Blocks (B)
1	7
2	14
3	21
4	28

Which equation represents this pattern?

A $B = 7p$

B $p = 7B$

C $B = 7 + p$

D $p = 7 + B$

Correct answer: **A**

Students need to look at the table of values and determine which of the answer options represents the equation for the pattern. Students do not need to choose a tool. Students can substitute values into the equations from the table to see which answer option works with the pattern.

Application

A question is mapped to Application if in order to answer the question students must either

- select the appropriate tool or
- get the necessary information and "fit" it to the problem.

The category that a question is mapped to may change from Knowledge and Understanding to Application if a context is added or if a tool required to answer the question is not provided.

Example

A pattern is made using blocks. Information about the pattern is shown in this table of values.

Position Number (*p*)	Number of Blocks (*B*)
1	7
2	14
3	21
4	28

How many blocks are needed to represent position number 13?

A 35 blocks

B 56 blocks

C 84 blocks

D 91 blocks

Correct answer: **D**

Students need to determine the pattern rule and extend the pattern. Students must first calculate the change in the number of blocks for every increase in position number and then apply that change to determine the number of blocks in position number 13.

Thinking

A question is mapped to Thinking if in order to answer the question students must either

- select and sequence a variety of tools or
- demonstrate a critical thinking process (e.g., reasoning).

Students may need to make a plan to answer these questions.

Example

A pattern is made using blocks. Information about the pattern is shown in this table of values.

Position Number (*p*)	Number of Blocks (*B*)
1	7
2	14
3	21
4	28

Ali has 35 blocks.

How many more blocks will Ali need to create position number 19?

A 63 blocks

B 98 blocks

C 126 blocks

D 133 blocks

Correct answer: **B**

This question requires a plan. The pattern rule is not given, so students must first determine the pattern rule and then extend the pattern. Students must first calculate the change in the number of blocks for every increase in position number and then apply that change to determine the number of blocks in position number 19. After that, students will need to subtract 35 from the total number of blocks needed to make position number 19.

IMPACT OF ANSWER OPTIONS

When two questions are similar in content, the answer options can affect the category of knowledge and skills to which the question is mapped. Consider these two versions.

Version 1

Julio selects one tile from a bag without looking.

Each tile is red, green or blue.

The probability of selecting a red tile is 15%.

The probability of selecting a green tile is 25%.

What is the probability that Julio will select a blue tile?

A 40%

B 50%

C 60%

D 70%

Correct answer: **C**

Students need to choose the tool they would like to use to determine the probability of selecting a blue tile. Students may choose to add the probabilities of selecting a red and a green tile (15% + 25%) and then subtract the sum from 100% (100% – 40%), or students may decide to start at 100% and use subtraction (100% – 15% – 25%) to determine which answer option is correct. The category that this question is mapped to is **Application.**

Version 2

Julio selects one tile from a bag without looking.

Each tile is red, green or blue.

The probability of selecting a red tile is 15%.

The probability of selecting a green tile is 25%.

What is the probability that Julio will select a blue tile?

A 0.4

B $\frac{3}{5}$

C $\frac{5}{10}$

D 70%

Correct answer: **B**

A plan is required for version 2 of this question. First students must choose the tool (addition or subtraction) to be able to calculate the probability of selecting a blue tile as a percentage. After that, students need to determine which decimal number, fraction or percent in the answer options is equivalent to the determined probability of choosing a blue tile. The category that this question is mapped to is **Thinking** based on the answer options provided.

SUGGESTED USES FOR THIS RESOURCE

Here is a suggested list of how the example questions can be used in the classroom:

Use questions without 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 or misconceptions. Discuss whether there are multiple methods that can be used to answer the question. Students can then compare their answer to the given options.

Use technology in the classroom to have students record answers instantly, which will allow for discussion of correct answers and the common errors or misconceptions associated with the incorrect options. The discussion can lead to a deeper understanding of concepts and assist students in correcting their own misconceptions.

Use questions as part of a pre- and post-assessment on a topic to show students their improved understanding within a unit.

Use questions when spiralling as a method to revisit topics.

Encourage students to use manipulatives, and model how to use them effectively. For example, fraction strips or towers can be used with questions mapped to expectations in the Number or Data strand.

QUESTIONS

These questions were adapted from the mathematics component of the junior-division EQAO assessment for use in the classroom. This section provides the overall expectation and the category of knowledge and skills for each question.

B. NUMBER

B1. Number Sense

demonstrate an understanding of numbers and make connections to the way numbers are used in everyday life

1 KU

Which number has 4 as its tenths digit?

A 92.174

B 85.043

C 79.451

D 43.256

2 AP

Order the temperatures from the warmest to the coldest.

0 °C

–6 °C

6 °C

–2 °C

3 °C

Warmest Temperature

↓

↓

↓

↓

Coldest Temperature

3 TH

Select **TWO** numbers that are greater than $\frac{5}{2}$.

A $2\frac{1}{3}$

B $2\frac{3}{5}$

C 2.399

D $\frac{8}{4}$

E 2.65

B2. Operations

use knowledge of numbers and operations to solve mathematical problems encountered in everyday life

4 KU

Select the number that is a prime factor of 20.

A. 4

B. 5

C. 10

D. 20

5 AP

A recipe for muffins requires $\frac{2}{3}$ of one cup of milk.

How many cups of milk are needed to double the recipe?

A. $\frac{2}{6}$

B. $\frac{3}{4}$

C. $\frac{4}{3}$

D. $\frac{4}{6}$

6 TH

A store receives 12 cases of tomatoes.

Each case contains 14 tomatoes.

All of the tomatoes are put into bags.

Each bag can hold 6 tomatoes.

How many bags of tomatoes will the store have?

A. 2 bags

B. 7 bags

C. 25 bags

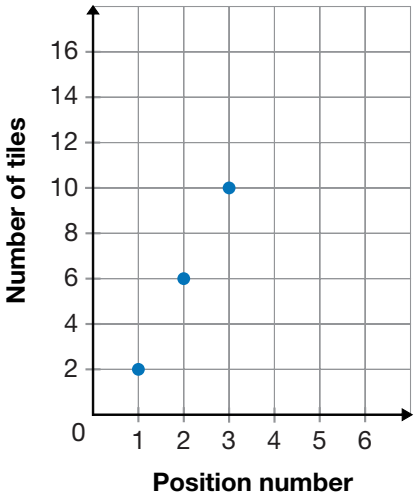
D. 28 bags

C. ALGEBRA

C1. Patterns and Relationships

identify, describe, extend, create, and make predictions about a variety of patterns, including those found in real-life contexts

7 **KU** A pattern is made using tiles. Information about the pattern is shown in this graph.



Which table of values represents the data in this graph?

A

Position number	Number of tiles
1	2
2	6
3	10

B

Position number	Number of tiles
1	2
2	4
3	6

C

Position number	Number of tiles
2	1
6	2
10	3

D

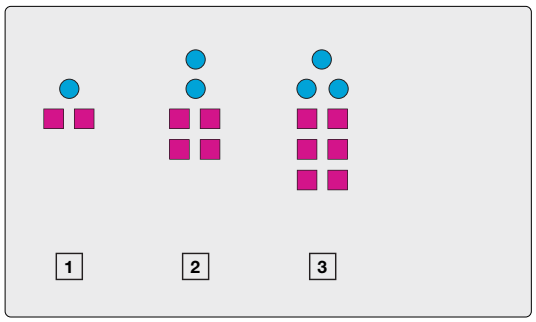
Position number	Number of tiles
2	1
4	2
6	3

8 AP

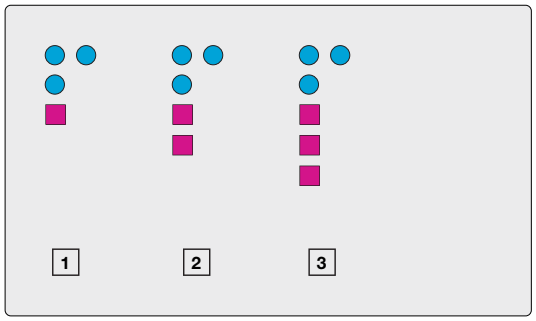
A linear pattern is created using the equation $y = 2x + 3$.

Which option represents the first three terms of the pattern?

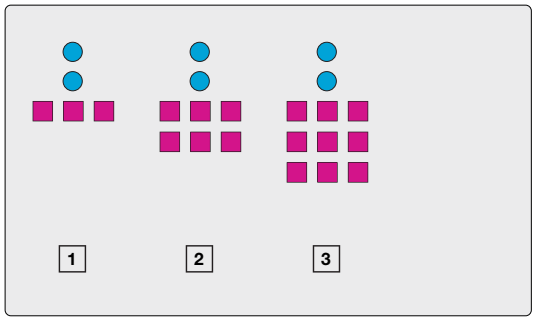
A



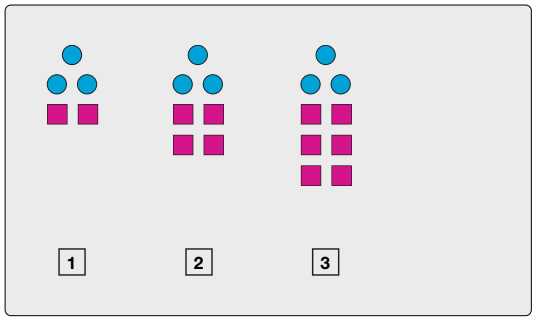
B



C



D



9 TH

Two patterns are shown.

Pattern A

4, 12, 36, 108, ...

The pattern continues to grow in the same way.

Pattern B

21, 49, 77, 105, ...

The pattern continues to increase by the same amount.

How much **greater** is the term value of the 6th term in Pattern A than the 6th term in Pattern B?

A 191

B 648

C 811

D 972

C2. Equations and Inequalities

demonstrate an understanding of variables, expressions, equalities, and inequalities, and apply this understanding in various contexts

10 KU

What is $7p + 4p$?

A $11p$

B 11

C $28p$

D 28

11 AP

Select the value for x that makes this inequality true.

$3x - 6 > 30$

A $x = 6$

B $x = 10$

C $x = 12$

D $x = 13$

12 TH

What value of n makes this equation true?

$7n - 3n = 20 + 12$

A 5

B 8

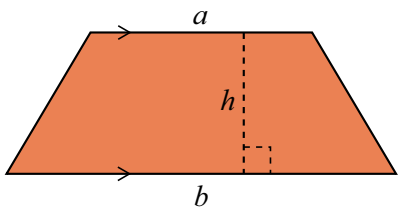
C 28

D 32

C3. Coding

solve problems and create computational representations of mathematical situations using coding concepts and skills

13 KU Code is written to calculate the area, **A,** of a trapezoid.



Part of the code is missing.

```
start
    input a
    input b
    input h
    calculate [          ]
    display A
end
```

What is the missing part of the code?

A **A** = **b** * **h**

B **A** = **a** * **b** * **h**

C **A** = (**a** + **b**) * **h**

D **A** = (**a** + **b**) * **h**/2

14 AP This code will be used to round a decimal number between 0 and 1 to the nearest whole number. Two lines of code are missing.

```
start
    input number
    [                    ]
    display answer
end
```

Which option should go into the box to complete the code?

A if **number** < 0.5 then **answer** = 0
else **answer** = 1

B if **number** < 0.05 then **answer** = 0
else **answer** = 1

C if **number** > 0.5 then **answer** = 0
else **answer** = 1

D if **number** > 0.05 then **answer** = 0
else **answer** = 1

C4. Mathematical Modelling

Currently there are no EQAO questions mapped to this overall expectation. There are no specific expectations for this overall expectation.

D. DATA

D1. Data Literacy

manage, analyse, and use data to make convincing arguments and informed decisions, in various contexts drawn from real life

15 KU Which type of graph would **best** show the change in monthly precipation over a period of 6 months?

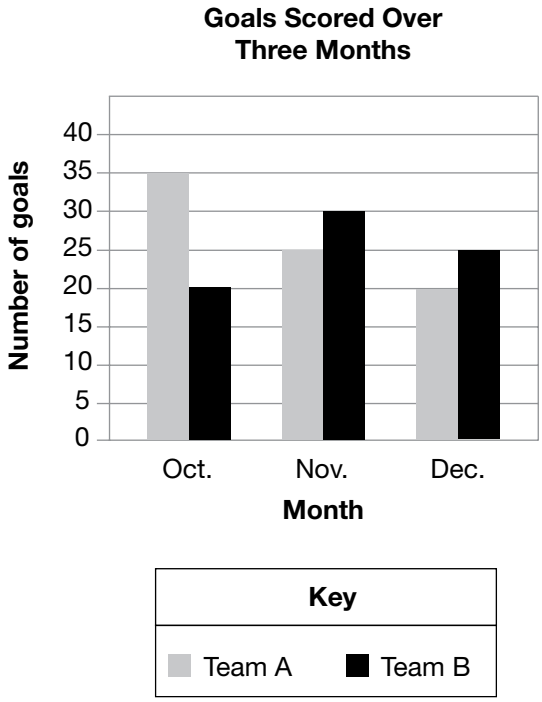
A histogram

B line plot

C broken-line graph

D pictograph

16 AP This graph shows the number of goals scored over three months by Team A and Team B.



How many more goals did Team A score than Team B in October and November?

A 5 goals

B 10 goals

C 15 goals

D 20 goals

17TH Select the set of numbers that has a mean and range of 11.

A 3, 18, 21, 5, 14, 11, 5

B 9, 8, 16, 11, 8, 18, 7

C 11, 14, 11, 8, 19, 17, 11

D 12, 9, 15, 10, 12, 20, 13

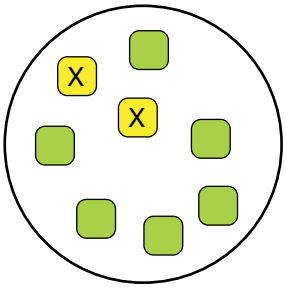
D2. Probability

describe the likelihood that events will happen, and use that information to make predictions

18 **KU**

A tile is selected without looking.

What is the probability of choosing a tile with an X?



A $\frac{2}{8}$

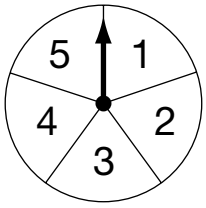
B $\frac{6}{8}$

C $\frac{8}{2}$

D $\frac{8}{6}$

19 **AP**

This spinner is divided into 5 equal sections.



The arrow on the spinner is spun.

What is the probability that the arrow lands on an even number on this spinner?

A $\frac{1}{5}$

B $\frac{2}{5}$

C $\frac{3}{5}$

D $\frac{4}{5}$

20 **TH** A teacher has containers of different coloured paint.

- 0.11 are blue.
- $\frac{2}{8}$ are red.
- 4% are yellow.
- $\frac{1}{5}$ are purple.
- The rest are green.

The teacher picks a container of paint randomly.

What is the probability that the teacher picks a container of green paint?

A 18%

B 40%

C 55%

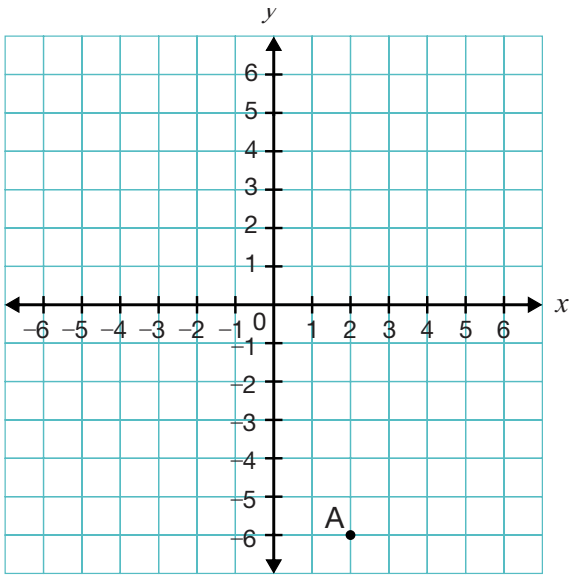
D 60%

E. SPATIAL SENSE

E1. Geometric and Spatial Reasoning

describe and represent shape, location, and movement by applying geometric properties and spatial relationships in order to navigate the world around them

21 What are the coordinates of point A?
KU



A (2, –6)

B (–2, 6)

C (–6, 2)

D (6, –2)

22 Which quadrilateral has two diagonals that bisect each other and has rotational symmetry of order 4?
AP

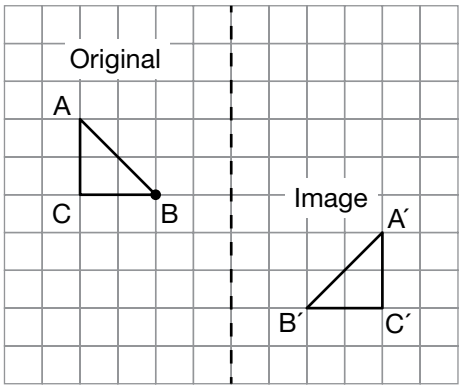
A rectangle

B square

C parallelogram

D trapezoid

23 This grid shows the original triangle ABC and its image.
TH



Which option describes the two transformations that move the original triangle onto its image?

A Reflect the original triangle across the dotted line, and then translate 3 units down.

B Rotate the original triangle 180° about point B, and then translate 4 units to the left.

C Reflect the original triangle across the dotted line, and then translate 3 units to the right.

D Rotate the original triangle 180° about point B, and then translate 4 units to the right.

E2. Measurement

compare, estimate, and determine measurements in various contexts

24 What is the sum of the interior angles of a rectangle?
KU

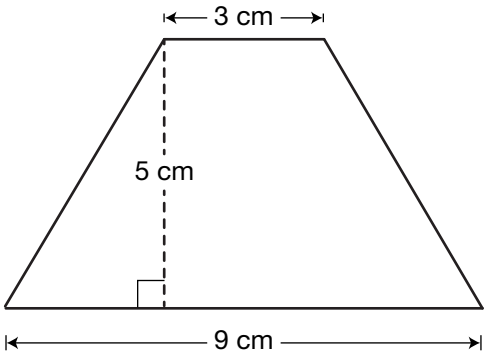
A 90°

B 180°

C 270°

D 360°

25 What is the area of this trapezoid?
AP



A 15 cm^2

B 30 cm^2

C 45 cm^2

D 60 cm^2

26 A group of 6 students share 3 L of water equally.
TH

How many **millilitres** of water does each student receive?

A 50 mL

B 500 mL

C 2000 mL

D 3000 mL

F. FINANCIAL LITERACY

F1. Money and Finances

demonstrate the knowledge and skills needed to make informed financial decisions

27 KU

Diego wants to put $10 every month into a bank account that pays no interest.

Select the word that describes this type of financial goal.

A donating

B saving

C earning

D investing

28 AP

Which option is **not** a type of loan?

A ATM fees

B line of credit

C cash advance

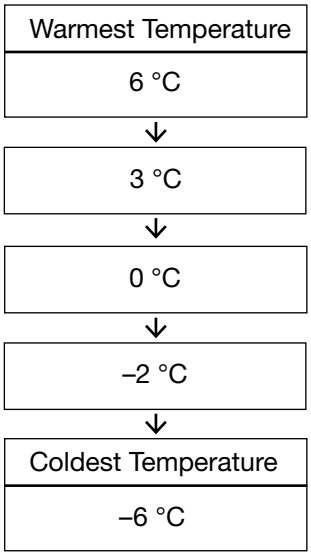
D mortgage

DETAILS OF THE QUESTIONS

QUESTION NUMBER	OVERALL EXPECTATION	COGNITIVE SKILL	KEY
1	B1	KU	C
2	B1	AP	*
3	B1	TH	B, E
4	B2	KU	B
5	B2	AP	C
6	B2	TH	D
7	C1	KU	A
8	C1	AP	D
9	C1	TH	C
10	C2	KU	A
11	C2	AP	D
12	C2	TH	B
13	C3	KU	D
14	C3	AP	A
15	D1	KU	C
16	D1	AP	B
17	D1	TH	B
18	D2	KU	A
19	D2	AP	B
20	D2	TH	B
21	E1	KU	A
22	E1	AP	B
23	E1	TH	A
24	E2	KU	D
25	E2	AP	B
26	E2	TH	B
27	F1	KU	B
28	F1	AP	A

LEGEND
Cognitive Skill
KU – Knowledge and Understanding
AP – Application
TH – Thinking

*** Solution for question 2**



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