Released Questions with Provincial Data

Mathematics

In This Resource:

- Details of the Assessment
- Results Reported
- Definitions of the Categories of Knowledge and Skills
- Suggested Uses for This Resource
- Questions
- Questions with Answers and Provincial Data

This resource is provided to support educators with the EQAO Grade 9 Assessment of Mathematics. Each question on the assessment is mapped to a category of knowledge and skills and an overall and a specific expectation in *The Ontario Curriculum, Grade 9: Mathematics* (2021). This resource includes the definitions of the categories of knowledge and skills as well as examples of assessment questions. Detailed information about each question, including the overall expectation and category of knowledge and skills to which the question is mapped, the correct answer and provincial data, are provided. For more information about the assessment design, refer to the *Framework* at www.eqao.com.

DETAILS OF THE ASSESSMENT

The EQAO Grade 9 Assessment of Mathematics is an online assessment completed by students at the end of the Grade 9 mathematics course. 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 EQAO Grade 9 Assessment of Mathematics assesses the knowledge and skills that are defined in the expectations found in *The Ontario Curriculum, Grade 9: Mathematics* (2021). The questions assess students' knowledge and skills in the strands:

- Number
- Algebra
- Data
- Geometry and Measurement
- Financial Literacy

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

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 assessment do not assess the Communication category of knowledge and skills.

During each stage of the assessment, students complete questions mapped to each category 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 9 mathematics curriculum, as the EQAO assessment is completed near the end of the Grade 9 mathematics course.

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 Grade 9 Assessment of Mathematics 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.

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.

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.

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.

PREVIOUS VERSIONS

For additional released questions, please refer to the previous editions of this resource: November 2024, November 2023.

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, graphing applications can be used with questions mapped to expectations in the Algebra strand as well as those mapped to other strands, such as Data, or Geometry and Measurement.

Analyze the provincial data for each question and consider how students at each level responded. Consider how the provincial data relates to how your students responded to the question. Review each answer option and how different responses can demonstrate potential strengths and areas for improvement.

QUESTIONS

These released questions are from the EQAO Grade 9 Assessment of Mathematics. This section provides the overall expectation and the category of knowledge and skills for each question.

B. NUMBER

B1. Development of Numbers and Number Sets

demonstrate an understanding of the development and use of numbers, and make connections between sets of numbers

1 KU

Five numbers are shown.

$\frac{3}{4}$	$-\frac{1}{3}$	3	6.4	$-5.\overline{3}$

Select the **TWO** subsets of the number system that all of these numbers belong to.

A the set of integers

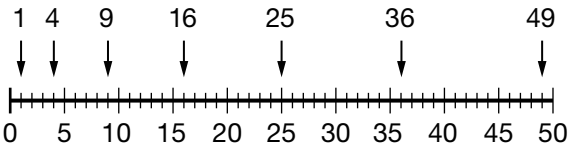
B the set of irrational numbers

C the set of rational numbers

D the set of real numbers

2 TH

On this number line from 0 to 50, the arrows represent the perfect squares.



Select the statement that correctly compares the density of the set of positive integers between 0 and 50 and the set of perfect squares between 0 and 50.

A Both sets are equally dense.

B Both sets are equally dense and contain infinitely many numbers.

C The set of positive integers is more dense than the set of perfect squares.

D The set of positive integers is less dense than the set of perfect squares.

B2. Powers

represent numbers in various ways, evaluate powers, and simplify expressions by using the relationships between powers and their exponents

3 What is the simplified form of this expression?

KU

$$\frac{-36a^4b^6}{-4ab^2}$$

A $9a^3b^4$

B $9a^4b^4$

C $-9a^3b^4$

D $-9a^4b^4$

4 What is the value of this expression in scientific notation?

AP

$$\frac{5^4 \times 5^4 \times 5^{-2}}{5^3 \times 5^{-6}}$$

A 5×10^3

B 1.25×10^2

C 1.953125×10^6

D 1.6384×10^{-10}

B3. Number Sense and Operations

apply an understanding of rational numbers, ratios, rates, percentages, and proportions, in various mathematical contexts, and to solve problems

5 What is the value of this expression?

KU

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

A $5\frac{5}{8}$

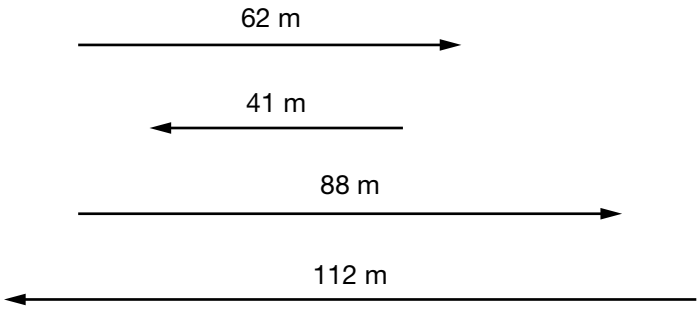
B $5\frac{11}{15}$

C $6\frac{4}{15}$

D $7\frac{3}{5}$

6 These arrows represent a student's movement in a straight line moving right and moving left.

AP



At his final position, where is the student in relation to his initial position?

The student is [ ] of his initial position.

- 3 m to the right
- 3 m to the left
- 303 m to the right
- 303 m to the left

C. ALGEBRA

C1. Algebraic Expressions and Equations

demonstrate an understanding of the development and use of algebraic concepts and of their connection to numbers, using various tools and representations

7 KU Mia calculates the pay she earns, P, in dollars, to make n birdhouses, according to this equation.

$P = 24.50n + 15$

What is Mia's pay for making 8 birdhouses?

A $39.50

B $181.00

C $196.00

D $211.00

8 Drag and drop the correct expressions to complete each equation correctly.

AP

$x^2 - 4$ $-2x + 2$ $x^2 - 4x$ $2x - 2$ $2x - 4$

$\square = x(x - 4)$

$\square = 4x + 4 - 6x - 2$

C2. Coding

apply coding skills to represent mathematical concepts and relationships dynamically, and to solve problems, in algebra and across the other strands

9 This pseudocode calculates and outputs the perimeter
AP of a rectangle when the dimensions are entered by the user.

```
output "Enter the width in centimetres."
store user input as width
output "Enter the length in centimetres."
store user input as length
perimeter = 2 * width + 2 * length
output perimeter, " cm"
```

Complete the statement.

If a user inputs 21 as the width and [ ] as the length, the output will be 60 cm.

- 9
- 18
- 39
- 162

10 TH Pierre writes code to calculate the total price of an item, including the sale discount and the taxes.

He is defining the initial variables as follows:

- **itemPrice** represents the initial price of the item.
- **percentDiscount** represents the sale discount in percent.

Pierre decides to use a variable, which he is calling **subtotal**, to represent the sale price of the item before taxes are added.

Select the line of code that he should use to calculate the **subtotal**.

A **subtotal** = **itemPrice** * (**percentDiscount**/100)

B **subtotal** = **itemPrice** – (**percentDiscount**/100)

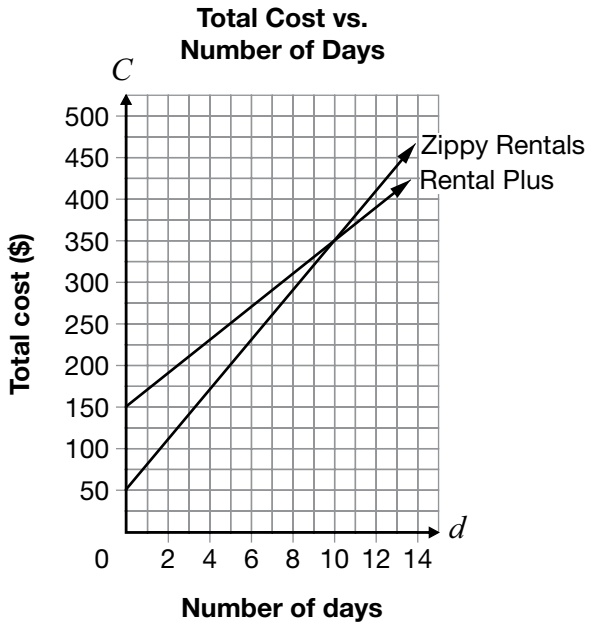
C **subtotal** = **itemPrice** + (**itemPrice** * **percentDiscount**/100)

D **subtotal** = **itemPrice** – (**itemPrice** * **percentDiscount**/100)

C3. Application of Relations

represent and compare linear and non-linear relations that model real-life situations, and use these representations to make predictions

11 This graph shows the relationship between the total cost of renting a car and the
AP number of days it is rented for two companies, Rental Plus and Zippy Rentals.



Which statement is true?

A The initial cost at Rental Plus is $100 less than at Zippy Rentals.

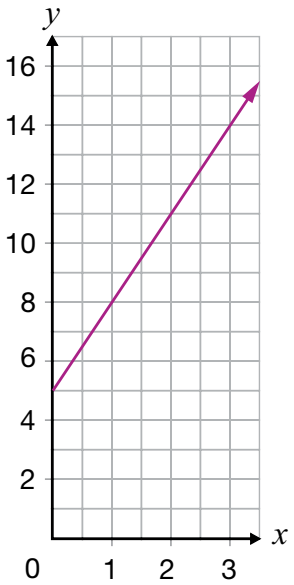
B A 10-day rental costs $350 at both Rental Plus and Zippy Rentals.

C The difference in cost between Rental Plus and Zippy Rentals for a 10-day rental is $100.

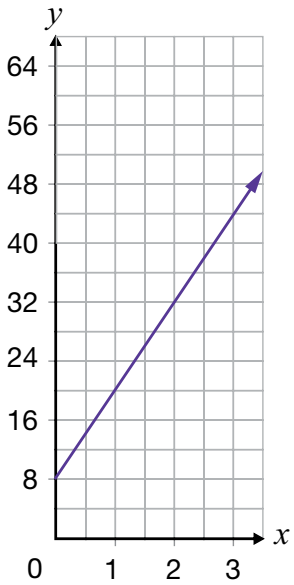
D A rental for more than 10 days costs less at Zippy Rentals than at Rental Plus.

12 The graphs of two linear growing patterns are shown.
TH

Graph A



Graph B



Complete this statement that compares the rates of change of Graph A and Graph B.

Graph [ ] has a rate of change that is [ ] times greater than the rate of change of the other graph.

[ ]
- A
- B

[ ]
- 2
- 3
- 4
- 5

C4. Characteristics of Relations

demonstrate an understanding of the characteristics of various representations of linear and non-linear relations, using tools, including coding when appropriate

13 KU

Three of these options show information about a linear relationship between T and g.

Select the relationship that is **non-linear**.

A $T = 2g + 3$

B

g	T
0	1
1	2
2	4
3	8

C

g	T
0	7
1	5
2	3
3	1

D $T = 12 - 4g$

14 AP

A line is represented by the equation $y = 6x$.

The slope doubles, and the y-intercept decreases by 5.

What is the equation of the **new** line?

A $y = 12x + 5$

B $y = 12x - 5$

C $y = 8x + 5$

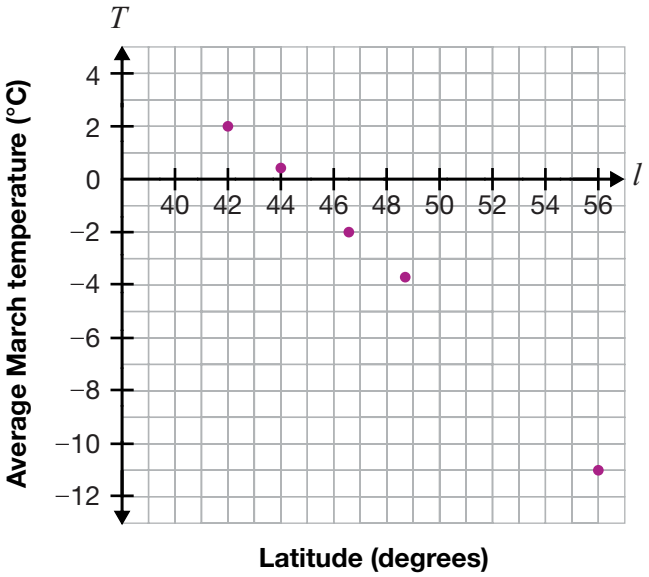
D $y = 8x - 5$

D. DATA

D1. Collection, Representation, and Analysis of Data

describe the collection and use of data, and represent and analyse data involving one and two variables

15 The average temperatures in March and the latitudes for five communities
AP in Ontario are shown on this grid.



The information for four more communities is shown in this table.

Ontario community	Latitude (degrees)	Average March temperature (°C)
Kenora	50	−6.3
Red Lake	51	−7.5
Timmins	48	−7
Brampton	43	1

Which community in the table would be represented by a point on the grid that is an outlier to the data if all the data were included on the same grid?

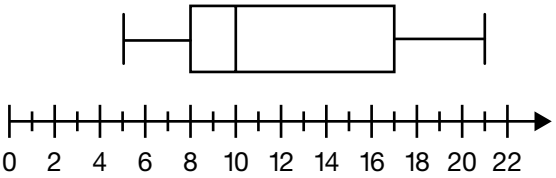
A Kenora

B Red Lake

C Timmins

D Brampton

16 TH This box plot represents the number of hours of community involvement accumulated by some students.



Select the **TWO** data sets that correspond to the box plot.

A 5, 8, 9, 11, 17, 21

B 5, 6, 8, 9, 10, 11, 17, 21

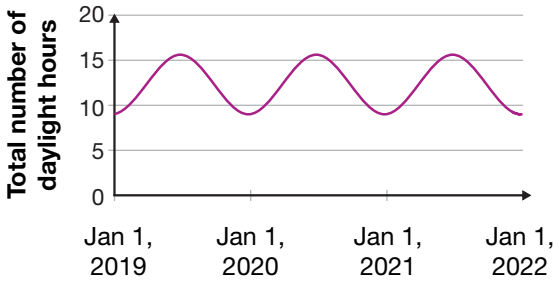
C 5, 6, 8, 9, 11, 17, 19, 21

D 5, 6, 8, 8, 8, 9, 11, 12, 16, 18, 19, 21

D2. Mathematical Modelling

apply the process of mathematical modelling, using data and mathematical concepts from other strands, to represent, analyse, make predictions, and provide insight into real-life situations

17 KU This graph shows three years of data about the number of hours of daylight in a town.



Based on this data, what is the maximum number of daylight hours in a day that would be expected in the year 2022?

A 9 hours

B 10 hours

C 14 hours

D 16 hours

18 AP A class creates this pattern using toothpicks.

Figure 1 Figure 2 Figure 3

Which of these strategies would be **quickest** for the class to use when determining the correct number of toothpicks in the 4257th figure?

A continuing the pattern with toothpicks

B creating and extending a table of values

C setting up an equation for this relationship

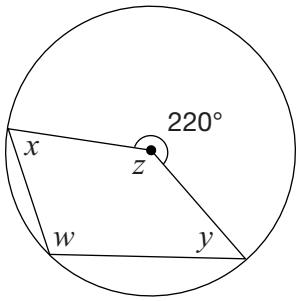
D drawing a graph using the given figures and extrapolating

E. GEOMETRY AND MEASUREMENT

E1. Geometric and Measurement Relationships

demonstrate an understanding of the development and use of geometric and measurement relationships, and apply these relationships to solve problems, including problems involving real-life situations

19 KU Which variable represents an angle that has a measure of 140°?



A w

B x

C y

D z

20 AP In some cities, people refer to distances when walking in terms of blocks.

In a certain city, the length of one block is $\frac{1}{8}$ of a mile.

Hint: 1 mile = 1609.3 m

Which option is closest to the distance a person walks, **in metres**, if the person walks 5 blocks?

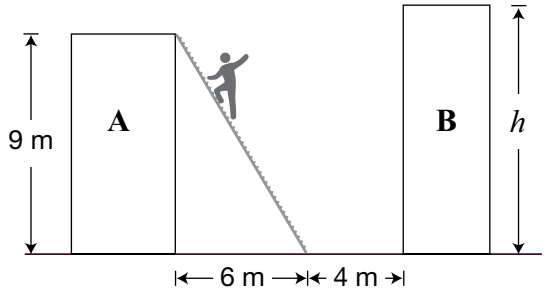
A 201 m

B 625 m

C 1006 m

D 2575 m

21 **TH** A worker accesses two roofs of buildings A and B with the same ladder without moving the foot of the ladder.



What is the exact height, h, of building B?

A $\sqrt{45}$ m

B $\sqrt{101}$ m

C $\sqrt{117}$ m

D $\sqrt{133}$ m

F. FINANCIAL LITERACY

F1. Financial Decisions

demonstrate the knowledge and skills needed to make informed financial decisions

22 Select the **TWO** options that could **best** help a person improve their financial position.
AP

A. reducing non-essential spending

B. choosing free activities instead of paying for activities

C. borrowing money for a non-essential purchase from a high-interest lender

D. buying everything on a credit card and paying only the minimum monthly payment

23 Joelle wants to purchase a laptop for $500. She compares two financing options.
TH

Option A: 10% down payment and a monthly payment of $20.63 for 2 years.

Option B: 0% down payment and a monthly payment of $15.56 for 3 years.

Which statement is correct?

A. Option A costs $5.07 less than Option B.

B. Option B costs $5.07 less than Option A.

C. Option A costs $15.04 less than Option B.

D. Option B costs $15.04 less than Option A.

QUESTIONS WITH ANSWERS AND PROVINCIAL DATA

Sample Data with Observations

In this section, each question is presented with the correct response and its data in a table. This data shows the percentage of students who selected each answer choice by level. The observations that follow each table are provided for consideration as the data in the table is analyzed.

There are no questions in this EQAO resource where more than 100 fully participating students achieved Below Level 1 and responded to the question. Therefore, data is not provided for students who achieved Below Level 1.

	No Response	A	B	C	D
Level 1	1	13	37	29	20
Level 2	0	10	55	22	12
Level 3	0	5	75	14	7
Level 4	0	1	92	4	2

LEGEND			
0–24	25–49	50–79	80–100

The correct answer, option B, was selected by

- 37% of all students who received Level 1;
- 55% of all students who received Level 2;
- 75% of all students who received Level 3 and
- 92% of all students who received Level 4.

Among all the students who received a Level 3 on the assessment,

- 75% selected the correct answer, option B;
- 5% selected option A;
- 14% selected option C and
- 7% selected option D.

One of the incorrect answers, option C, was selected by 29% of students who received a Level 1 and 22% of students who received Level 2.

Reminders:

- The percentages in a row for a particular question and a particular level are not provided when the row's sample size is fewer than 100 students. In these cases, ND (not enough data) is shown.
- The percentages in each row may not add up to 100%, due to rounding.
- The legend provided applies to each table with the data.
- For some of the questions in this resource, the data provided shows the percentage of students whose responses were fully correct, partially correct or incorrect at each achievement level.

Using the Data

There are many things to consider when reviewing the data. It is not possible to know why the students selected the response they did. In a single-selection question with four options, if the percentages in one row (at a specific level) are approximately 25% each, this may demonstrate that many of the students who received the particular level guessed.

B. NUMBER

B1. Development of Numbers and Number Sets

demonstrate an understanding of the development and use of numbers, and make connections between sets of numbers

1 KU

Five numbers are shown.

$\frac{3}{4}$	$-\frac{1}{3}$	3	6.4	$-5.\overline{3}$

Select the **TWO** subsets of the number system that all of these numbers belong to.

A the set of integers

B the set of irrational numbers

C the set of rational numbers

D the set of real numbers

English-Language Schools

	No Response	Fully Correct (C and D)	Partially Correct (C)	Partially Correct (D)	Fully Incorrect
Level 1	0	8	41	27	23
Level 2	0	19	34	28	19
Level 3	0	47	23	23	7
Level 4	0	86	7	7	0

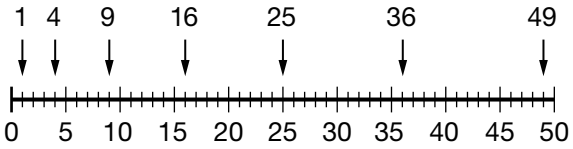
French-Language Schools

	No Response	Fully Correct (C and D)	Partially Correct (C)	Partially Correct (D)	Fully Incorrect
Level 1	ND	ND	ND	ND	ND
Level 2	0	29	26	37	8
Level 3	0	66	9	24	1
Level 4	0	94	0	6	0

QUESTIONS WITH ANSWERS AND PROVINCIAL DATA (continued)

B1. Development of Numbers and Number Sets (continued)

2 On this number line from 0 to 50, the arrows
TH represent the perfect squares.



Select the statement that correctly compares the density of the set of positive integers between 0 and 50 and the set of perfect squares between 0 and 50.

A Both sets are equally dense.

B Both sets are equally dense and contain infinitely many numbers.

C The set of positive integers is more dense than the set of perfect squares.

D The set of positive integers is less dense than the set of perfect squares.

English-Language Schools

	No Response	A	B	C	D
Level 1	1	16	26	38	19
Level 2	0	9	19	52	19
Level 3	0	4	12	73	11
Level 4	0	1	3	93	3

French-Language Schools

	No Response	A	B	C	D
Level 1	ND	ND	ND	ND	ND
Level 2	0	9	22	46	22
Level 3	0	4	12	73	11
Level 4	0	1	3	94	2

QUESTIONS WITH ANSWERS AND PROVINCIAL DATA (continued)

B2. Powers

represent numbers in various ways, evaluate powers, and simplify expressions by using the relationships between powers and their exponents

3 What is the simplified form of this expression?

KU

$$\frac{-36a^4b^6}{-4ab^2}$$

A $9a^3b^4$

B $9a^4b^4$

C $-9a^3b^4$

D $-9a^4b^4$

English-Language Schools

	No Response	A	B	C	D
Level 1	1	26	29	22	22
Level 2	0	41	31	14	14
Level 3	0	77	15	5	3
Level 4	0	97	2	1	0

French-Language Schools

	No Response	A	B	C	D
Level 1	0	26	39	16	20
Level 2	0	44	31	15	11
Level 3	0	78	15	5	2
Level 4	0	99	0	1	0

B2. Powers (continued)

4 AP What is the value of this expression in scientific notation?

$$\frac{5^4 \times 5^4 \times 5^{-2}}{5^3 \times 5^{-6}}$$

A 5×10^3

B 1.25×10^2

C 1.953125×10^6

D 1.6384×10^{-10}

English-Language Schools

	No Response	A	B	C	D
Level 1	ND	ND	ND	ND	ND
Level 2	1	39	13	34	13
Level 3	0	27	15	53	5
Level 4	0	4	9	86	1

French-Language Schools

	No Response	A	B	C	D
Level 1	ND	ND	ND	ND	ND
Level 2	ND	ND	ND	ND	ND
Level 3	0	24	16	55	4
Level 4	0	3	8	89	1

QUESTIONS WITH ANSWERS AND PROVINCIAL DATA (continued)

B3. Number Sense and Operations

apply an understanding of rational numbers, ratios, rates, percentages, and proportions, in various mathematical contexts, and to solve problems

5 What is the value of this expression?

KU

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

A $5\frac{5}{8}$

B $5\frac{11}{15}$

C $6\frac{4}{15}$

D $7\frac{3}{5}$

English-Language Schools

	No Response	A	B	C	D
Level 1	0	56	19	18	8
Level 2	0	45	18	33	4
Level 3	0	6	5	87	1
Level 4	0	0	0	100	0

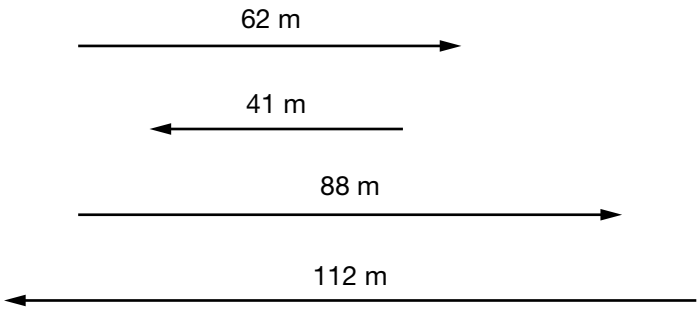
French-Language Schools

	No Response	A	B	C	D
Level 1	ND	ND	ND	ND	ND
Level 2	0	38	18	40	4
Level 3	0	4	4	90	2
Level 4	0	0	0	100	0

B3. Number Sense and Operations (continued)

6 These arrows represent a student's movement in a straight line moving right and moving left.

AP



At his final position, where is the student in relation to his initial position?

The student is [3 m to the left] of his initial position.

- 3 m to the right
- 3 m to the left
- 303 m to the right
- 303 m to the left

English-Language Schools

	No Response	A	B	C	D
Level 1	0	18	28	32	21
Level 2	0	13	53	16	17
Level 3	0	6	81	5	7
Level 4	0	2	97	0	0

French-Language Schools

	No Response	A	B	C	D
Level 1	ND	ND	ND	ND	ND
Level 2	0	14	57	14	15
Level 3	0	6	84	4	5
Level 4	0	1	99	0	0

C. ALGEBRA

C1. Algebraic Expressions and Equations

demonstrate an understanding of the development and use of algebraic concepts and of their connection to numbers, using various tools and representations

7 KU

Mia calculates the pay she earns, P, in dollars, to make n birdhouses, according to this equation.

$P = 24.50n + 15$

What is Mia's pay for making 8 birdhouses?

A $39.50

B $181.00

C $196.00

D $211.00

English-Language Schools

	No Response	A	B	C	D
Level 1	0	51	16	21	13
Level 2	0	19	9	26	46
Level 3	0	1	1	4	94
Level 4	0	0	0	0	100

French-Language Schools

	No Response	A	B	C	D
Level 1	0	44	14	24	18
Level 2	0	15	7	24	54
Level 3	0	1	1	3	95
Level 4	0	0	0	0	100

C1. Algebraic Expressions and Equations (continued)

8 Drag and drop the correct expressions to complete each equation correctly.

AP

$x^2 - 4$ | | | $2x - 2$ | $2x - 4$

$x^2 - 4x$ $= x(x - 4)$

$-2x + 2$ $= 4x + 4 - 6x - 2$

English-Language Schools

	No Response	Two Correct	One Correct	None Correct
Level 1	1	6	27	67
Level 2	0	18	36	46
Level 3	0	63	29	8
Level 4	0	96	4	0

French-Language Schools

	No Response	Two Correct	One Correct	None Correct
Level 1	0	8	31	61
Level 2	0	31	39	30
Level 3	0	70	26	4
Level 4	0	96	4	0

C2. Coding

apply coding skills to represent mathematical concepts and relationships dynamically, and to solve problems, in algebra and across the other strands

9 This pseudocode calculates and outputs the perimeter
AP of a rectangle when the dimensions are entered by the user.

```
output "Enter the width in centimetres."
store user input as width
output "Enter the length in centimetres."
store user input as length
perimeter = 2 * width + 2 * length
output perimeter, " cm"
```

Complete the statement.

If a user inputs 21 as the width and [9] as the length, the output will be 60 cm.

- 9
- 18
- 39
- 162

English-Language Schools

	No Response	A	B	C	D
Level 1	0	11	23	61	6
Level 2	0	30	15	52	3
Level 3	0	83	5	12	1
Level 4	0	100	0	0	0

French-Language Schools

	No Response	A	B	C	D
Level 1	0	13	14	65	8
Level 2	0	32	14	50	4
Level 3	0	83	5	12	1
Level 4	0	100	0	0	0

C2. Coding (continued)

10 TH Pierre writes code to calculate the total price of an item, including the sale discount and the taxes.

He is defining the initial variables as follows:

- **itemPrice** represents the initial price of the item.
- **percentDiscount** represents the sale discount in percent.

Pierre decides to use a variable, which he is calling **subtotal**, to represent the sale price of the item before taxes are added.

Select the line of code that he should use to calculate the **subtotal**.

A **subtotal** = **itemPrice** * (**percentDiscount**/100)

B **subtotal** = **itemPrice** – (**percentDiscount**/100)

C **subtotal** = **itemPrice** + (**itemPrice** * **percentDiscount**/100)

D **subtotal** = **itemPrice** – (**itemPrice** * **percentDiscount**/100)

English-Language Schools

	No Response	A	B	C	D
Level 1	ND	ND	ND	ND	ND
Level 2	0	31	30	23	16
Level 3	0	24	17	16	43
Level 4	0	7	1	5	86

French-Language Schools

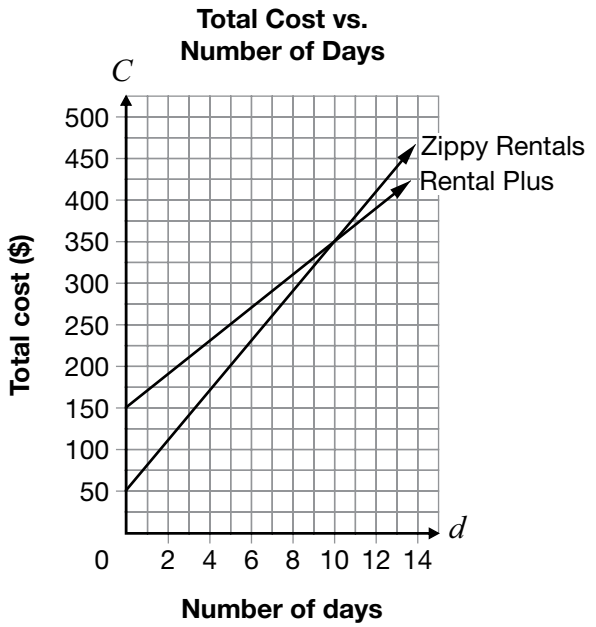
	No Response	A	B	C	D
Level 1	ND	ND	ND	ND	ND
Level 2	ND	ND	ND	ND	ND
Level 3	0	23	19	15	42
Level 4	0	4	2	3	91

QUESTIONS WITH ANSWERS AND PROVINCIAL DATA (continued)

C3. Application of Relations

represent and compare linear and non-linear relations that model real-life situations, and use these representations to make predictions

11 This graph shows the relationship between the total cost of renting a car and the
AP number of days it is rented for two companies, Rental Plus and Zippy Rentals.



Which statement is true?

A The initial cost at Rental Plus is $100 less than at Zippy Rentals.

B A 10-day rental costs $350 at both Rental Plus and Zippy Rentals.

C The difference in cost between Rental Plus and Zippy Rentals for a 10-day rental is $100.

D A rental for more than 10 days costs less at Zippy Rentals than at Rental Plus.

English-Language Schools

	No Response	A	B	C	D
Level 1	0	22	40	28	10
Level 2	0	13	76	7	4
Level 3	0	5	92	2	1
Level 4	ND	ND	ND	ND	ND

French-Language Schools

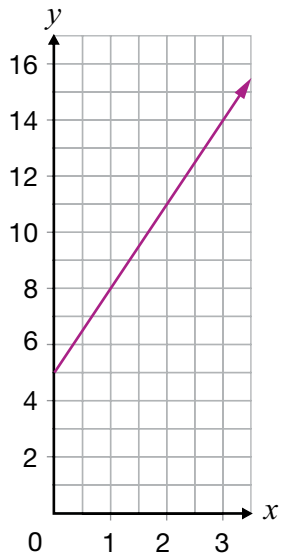
	No Response	A	B	C	D
Level 1	0	18	48	22	13
Level 2	0	13	76	7	4
Level 3	0	4	95	1	0
Level 4	ND	ND	ND	ND	ND

QUESTIONS WITH ANSWERS AND PROVINCIAL DATA (continued)

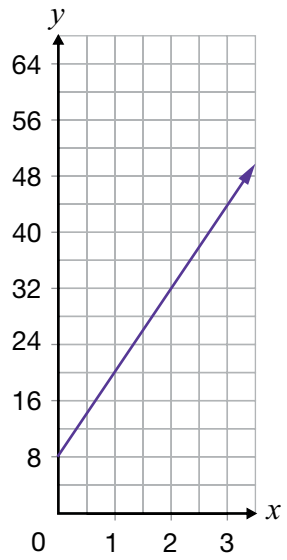
C3. Application of Relations (continued)

12 The graphs of two linear growing patterns are shown.
TH

Graph A



Graph B



Complete this statement that compares the rates of change of Graph A and Graph B.

Graph [B ▾] has a rate of change that is [4 ▾] times greater than the rate of change of the other graph.

[A ▾ / B] [2 ▾ / 3 / 4 / 5]

English-Language Schools

	No Response	Fully Correct (B and C)	Partially Correct (B)	Partially Correct (C)	Fully Incorrect
Level 1	0	15	41	9	34
Level 2	0	29	56	3	12
Level 3	0	60	33	2	4
Level 4	0	92	6	1	0

French-Language Schools

	No Response	Fully Correct (B and C)	Partially Correct (B)	Partially Correct (C)	Fully Incorrect
Level 1	0	17	49	6	28
Level 2	0	34	54	2	10
Level 3	0	66	27	3	4
Level 4	0	94	4	1	1

QUESTIONS WITH ANSWERS AND PROVINCIAL DATA (continued)

C4. Characteristics of Relations

demonstrate an understanding of the characteristics of various representations of linear and non-linear relations, using tools, including coding when appropriate

13 KU Three of these options show information about a linear relationship between T and g.

Select the relationship that is **non-linear**.

A $T = 2g + 3$

B

g	T
0	1
1	2
2	4
3	8

C

g	T
0	7
1	5
2	3
3	1

D $T = 12 - 4g$

English-Language Schools

	No Response	A	B	C	D
Level 1	1	13	27	35	24
Level 2	0	11	42	23	24
Level 3	0	4	75	7	14
Level 4	0	0	98	1	1

French-Language Schools

	No Response	A	B	C	D
Level 1	ND	ND	ND	ND	ND
Level 2	0	11	43	24	22
Level 3	0	4	77	6	14
Level 4	0	1	97	1	2

C4. Characteristics of Relations (continued)

14 AP

A line is represented by the equation $y = 6x$.

The slope doubles, and the y-intercept decreases by 5.

What is the equation of the **new** line?

A $y = 12x + 5$

B $y = 12x - 5$

C $y = 8x + 5$

D $y = 8x - 5$

English-Language Schools

	No Response	A	B	C	D
Level 1	0	25	50	14	10
Level 2	0	12	80	3	4
Level 3	0	7	92	1	1
Level 4	ND	ND	ND	ND	ND

French-Language Schools

	No Response	A	B	C	D
Level 1	0	23	58	11	8
Level 2	0	8	86	2	4
Level 3	0	3	95	1	1
Level 4	ND	ND	ND	ND	ND

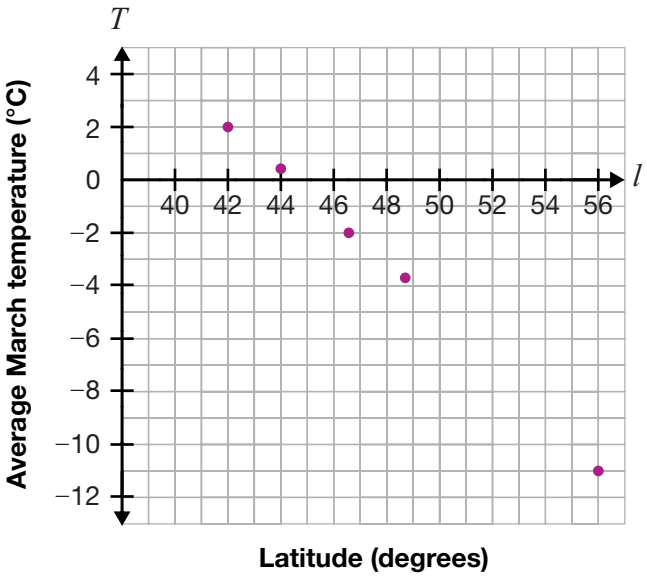
QUESTIONS WITH ANSWERS AND PROVINCIAL DATA (continued)

D. DATA

D1. Collection, Representation, and Analysis of Data

describe the collection and use of data, and represent and analyse data involving one and two variables

15 The average temperatures in March and the latitudes
AP for five communities in Ontario are shown on this grid.



The information for four more communities is shown in this table.

Ontario community	Latitude (degrees)	Average March temperature (°C)
Kenora	50	−6.3
Red Lake	51	−7.5
Timmins	48	−7
Brampton	43	1

Which community in the table would be represented by a point on the grid that is an outlier to the data if all the data were included on the same grid?

A Kenora

B Red Lake

C Timmins

D Brampton

English-Language Schools

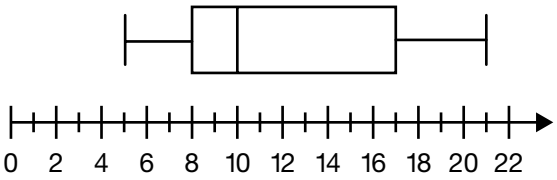
	No Response	A	B	C	D
Level 1	ND	ND	ND	ND	ND
Level 2	0	8	19	20	54
Level 3	0	4	9	42	45
Level 4	0	1	2	81	16

French-Language Schools

	No Response	A	B	C	D
Level 1	ND	ND	ND	ND	ND
Level 2	0	6	24	20	50
Level 3	0	7	15	24	54
Level 4	0	1	3	61	34

D1. Collection, Representation, and Analysis of Data (continued)

16 TH This box plot represents the number of hours of community involvement accumulated by some students.



Select the **TWO** data sets that correspond to the box plot.

A 5, 8, 9, 11, 17, 21

B 5, 6, 8, 9, 10, 11, 17, 21

C 5, 6, 8, 9, 11, 17, 19, 21

D 5, 6, 8, 8, 8, 9, 11, 12, 16, 18, 19, 21

English-Language Schools

	No Response	Fully Correct (A and D)	Partially Correct (A)	Partially Correct (D)	Fully Incorrect
Level 1	0	5	47	15	32
Level 2	0	6	51	16	27
Level 3	0	26	37	21	16
Level 4	0	74	13	11	2

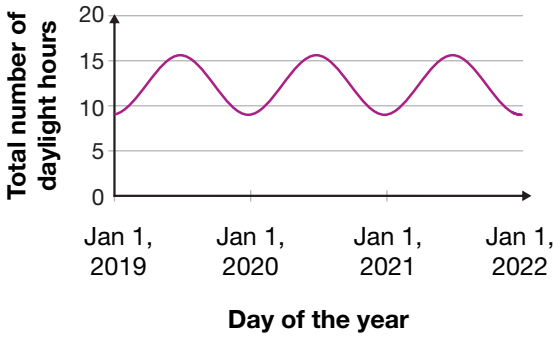
French-Language Schools

	No Response	Fully Correct (A and D)	Partially Correct (A)	Partially Correct (D)	Fully Incorrect
Level 1	ND	ND	ND	ND	ND
Level 2	0	6	47	18	29
Level 3	0	20	39	23	18
Level 4	0	67	14	15	3

D2. Mathematical Modelling

apply the process of mathematical modelling, using data and mathematical concepts from other strands, to represent, analyse, make predictions, and provide insight into real-life situations

17 KU This graph shows three years of data about the number of hours of daylight in a town.



Based on this data, what is the maximum number of daylight hours in a day that would be expected in the year 2022?

A 9 hours

B 10 hours

C 14 hours

D 16 hours

English-Language Schools

	No Response	A	B	C	D
Level 1	0	28	30	15	27
Level 2	0	31	11	7	51
Level 3	0	20	3	2	75
Level 4	ND	ND	ND	ND	ND

French-Language Schools

	No Response	A	B	C	D
Level 1	ND	ND	ND	ND	ND
Level 2	0	39	11	4	45
Level 3	0	24	4	3	69
Level 4	ND	ND	ND	ND	ND

D2. Mathematical Modelling (continued)

18 A class creates this pattern using toothpicks.
AP

Figure 1 Figure 2 Figure 3

Which of these strategies would be **quickest** for the class to use when determining the correct number of toothpicks in the 4257th figure?

A continuing the pattern with toothpicks

B creating and extending a table of values

C setting up an equation for this relationship

D drawing a graph using the given figures and extrapolating

English-Language Schools

	No Response	A	B	C	D
Level 1	0	21	29	26	24
Level 2	0	4	15	68	13
Level 3	0	0	2	95	2
Level 4	0	0	0	100	0

French-Language Schools

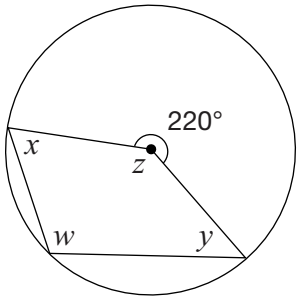
	No Response	A	B	C	D
Level 1	ND	ND	ND	ND	ND
Level 2	0	4	11	72	13
Level 3	0	0	1	97	1
Level 4	0	0	0	100	0

E. GEOMETRY AND MEASUREMENT

E1. Geometric and Measurement Relationships

demonstrate an understanding of the development and use of geometric and measurement relationships, and apply these relationships to solve problems, including problems involving real-life situations

19 Which variable represents an angle that has
KU a measure of 140°?



A w

B x

C y

D z

English-Language Schools

	No Response	A	B	C	D
Level 1	0	37	24	21	18
Level 2	0	38	15	14	33
Level 3	0	16	4	3	77
Level 4	0	2	0	0	98

French-Language Schools

	No Response	A	B	C	D
Level 1	ND	ND	ND	ND	ND
Level 2	0	30	10	15	45
Level 3	0	11	3	2	84
Level 4	0	1	0	0	99

E1. Geometric and Measurement Relationships (continued)

20 **AP** In some cities, people refer to distances when walking in terms of blocks.

In a certain city, the length of one block is $\frac{1}{8}$ of a mile.

Hint: 1 mile = 1609.3 m

Which option is closest to the distance a person walks, **in metres**, if the person walks 5 blocks?

A 201 m

B 625 m

C 1006 m

D 2575 m

English-Language Schools

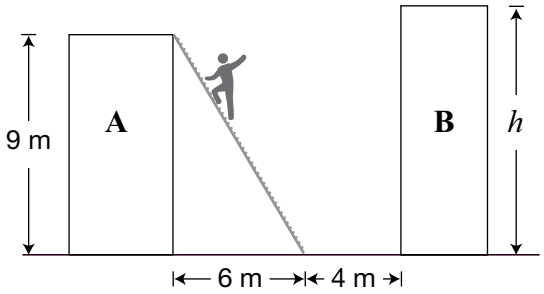
	No Response	A	B	C	D
Level 1	0	18	30	26	25
Level 2	0	18	24	44	13
Level 3	0	7	8	81	4
Level 4	0	1	0	98	1

French-Language Schools

	No Response	A	B	C	D
Level 1	ND	ND	ND	ND	ND
Level 2	0	19	22	49	10
Level 3	0	5	5	86	4
Level 4	0	0	0	99	1

E1. Geometric and Measurement Relationships (continued)

21 **TH** A worker accesses two roofs of buildings A and B with the same ladder without moving the foot of the ladder.



What is the exact height, h, of building B?

A $\sqrt{45}$ m

B $\sqrt{101}$ m

C $\sqrt{117}$ m

D $\sqrt{133}$ m

English-Language Schools

	No Response	A	B	C	D
Level 1	0	48	26	16	10
Level 2	0	29	29	28	13
Level 3	0	6	43	37	14
Level 4	0	0	86	6	8

French-Language Schools

	No Response	A	B	C	D
Level 1	ND	ND	ND	ND	ND
Level 2	0	20	29	39	12
Level 3	0	4	46	37	13
Level 4	0	0	89	5	6

F. FINANCIAL LITERACY

F1. Financial Decisions

demonstrate the knowledge and skills needed to make informed financial decisions

22 Select the **TWO** options that could **best** help
AP a person improve their financial position.

A reducing non-essential spending

B choosing free activities instead of paying for activities

C borrowing money for a non-essential purchase from a high-interest lender

D buying everything on a credit card and paying only the minimum monthly payment

English-Language Schools

	No Response	Fully Correct (A and B)	Partially Correct (A)	Partially Correct (B)	Fully Incorrect
Level 1	0	51	26	18	5
Level 2	0	80	16	4	1
Level 3	0	91	8	1	0
Level 4	0	97	3	0	0

French-Language Schools

	No Response	Fully Correct (A and B)	Partially Correct (A)	Partially Correct (B)	Fully Incorrect
Level 1	ND	ND	ND	ND	ND
Level 2	0	74	22	2	1
Level 3	0	90	9	1	0
Level 4	0	98	2	0	0

F1. Financial Decisions (continued)

23 Joelle wants to purchase a laptop for $500.
TH She compares two financing options.

Option A: 10% down payment and a monthly payment of $20.63 for 2 years.

Option B: 0% down payment and a monthly payment of $15.56 for 3 years.

Which statement is correct?

A Option A costs $5.07 less than Option B.

B Option B costs $5.07 less than Option A.

C Option A costs $15.04 less than Option B.

D Option B costs $15.04 less than Option A.

English-Language Schools

	No Response	A	B	C	D
Level 1	ND	ND	ND	ND	ND
Level 2	1	23	29	36	12
Level 3	0	11	12	68	9
Level 4	0	2	1	95	2

French-Language Schools

	No Response	A	B	C	D
Level 1	ND	ND	ND	ND	ND
Level 2	ND	ND	ND	ND	ND
Level 3	0	11	14	62	12
Level 4	0	1	2	95	2

Information Centre: 1-888-327-7377 (Ontario)
416-916-0708 (outside Ontario)
info@eqao.com
eqao.com