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 mathematics 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 2025, 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 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

Each of these options is a subset of the set of integers.

Select the subset that is **not** infinite.

A the factors of 24

B the powers of 2

C the multiples of 5

D all prime numbers

2 AP

For each set of numbers, the pattern is extended until it reaches the number 49.

Select the set of numbers that is **most** dense.

A {1, 2, 3, 4, ...}

B {3, 5, 7, 9, ...}

C {1, 4, 9, 16, ...}

D {5, 16, 27, 38, ...}

B2. Powers

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

3 Which expression is equivalent to 0.0045?
KU

A 4.5×10^{3}

B 4.5×10^{-3}

C 0.45×10^{3}

D 0.45×10^{-3}

4 Select the expression that is equivalent to 3^{5}.
TH

A $3^{3} \times (3^{2})^{4} \div 3^{5}$

B $3^{4} \times (3^{2})^{3} \div 3^{5}$

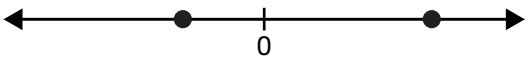
C $3^{4} \times (3^{2})^{5} \div 3^{3}$

D $3^{5} \times (3^{2})^{3} \div 3^{4}$

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 Which numbers **best** represent the points on
KU this number line?



A −3 and 7

B 3 and −7

C −1 and 20

D 1 and −20

6 AP

For a recipe, 400 g of tomatoes and 30 mg of pepper are needed.

Devon uses $\frac{3}{4}$ of the tomatoes and 20% more pepper.

Complete the statement.

Devon uses [ ] of tomatoes and [ ] of pepper.

100 g	10 mg
300 g	24 mg
480 g	36 mg
500 g	50 mg

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 Which expression is a simplified form of $3(4x + 2)$?

A $7x + 2$

B $7x + 5$

C $12x + 2$

D $12x + 6$

8 AP The equation representing the relationship between the cost, C, in dollars, and the number of people, n, who attend an event is given.

$C = 12n + 530$

How many people attend if the event costs $902?

A 360 people

B 119 people

C 75 people

D 31 people

C2. Coding

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

9 Pseudocode is given.

AP

numerator = 14
denominator = 8
quotient = **numerator**/**denominator**
number = rounded **quotient** to the nearest whole number
output "When dividing 14 by 8, the rounded answer is ", **number**, "."

What is the value of **number** for this pseudocode?

A 1

B 1.7

C 1.75

D 2

10 **TH** This pseudocode determines the equation of a linear relation given a point on the line and the slope of the line.

valueX = 0
valueY = 0
valueA = 0
output "Enter the x-coordinate of the point."
store user input as **valueX**
output "Enter the y-coordinate of the point."
store user input as **valueY**
output "Enter the slope of the line."
store user input as **valueA**
valueB = **valueY** − **valueA** * **valueX**
output "The equation of the line is y = ", _____, "x + ", _____, "."

Which option shows the two variables in the correct order to complete the last line of this pseudocode?

A **valueA** and **valueY**

B **valueX** and **valueB**

C **valueB** and **valueA**

D **valueA** and **valueB**

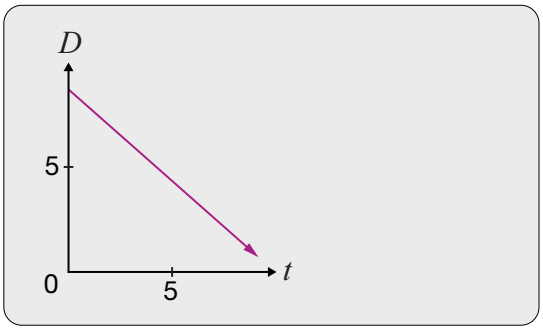
C3. Application of Relations

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

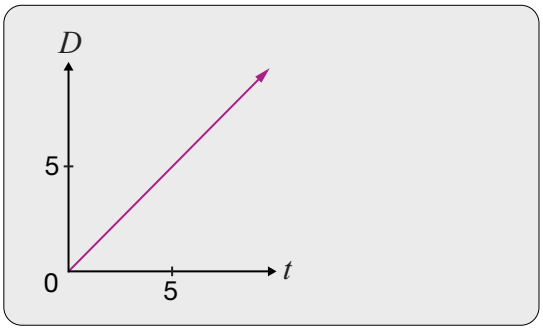
11 **KU** Ling goes on a bike ride at a constant speed. Her total distance travelled, D, increases as the amount of time she spends riding, t, increases.

Which graph could represent this relationship between D and t?

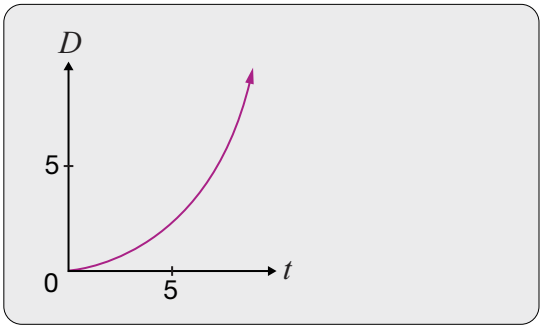
A



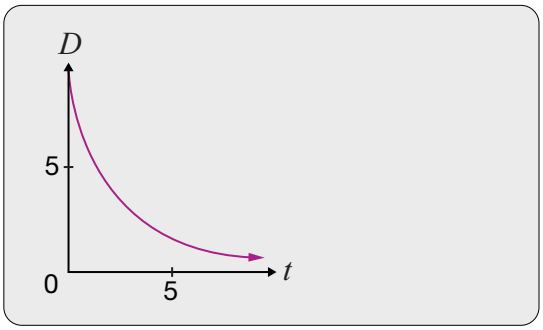
B



C



D

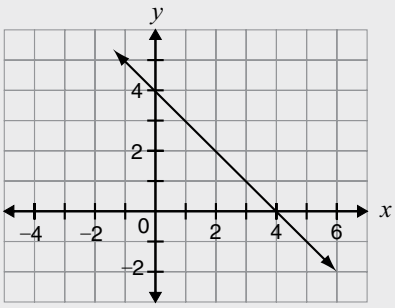


12 **AP** Which option represents a line with a positive rate of change?

A

x	y
−3	3
−1	1
0	0

B



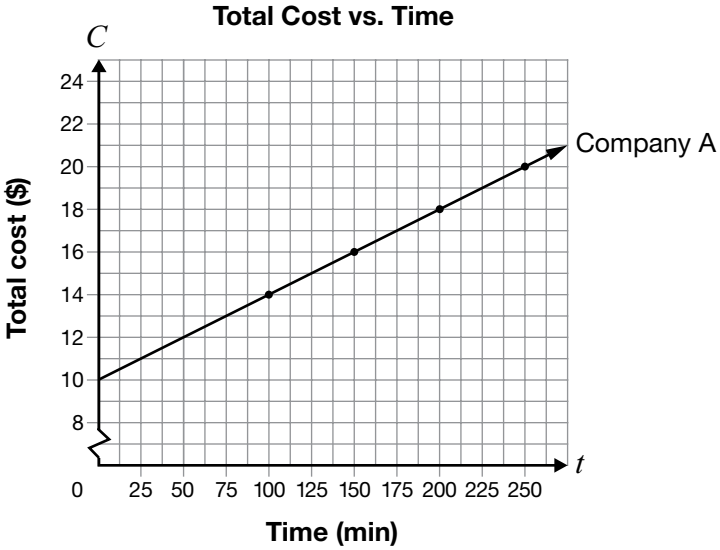
C $x + y = 2$

D $y - x = 2$

13 Two companies offer different costs for cellphone plans.

TH

This graph represents the relationship between the total cost, C, in dollars, and the time, t, in minutes, for Company A.



Company B's total cost is **always** less than Company A's total cost for any number of minutes.

Which equation could represent Company B's total cost, C, in dollars, for t minutes?

A $C = 15$

B $C = 11 + 0.02t$

C $C = 9 + 0.03t$

D $C = 8 + 0.05t$

C4. Characteristics of Relations

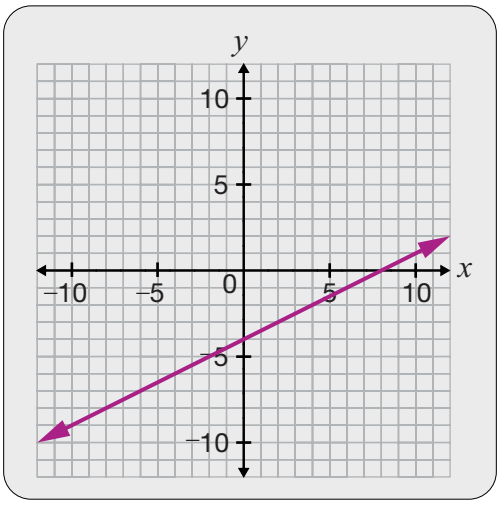
demonstrate an understanding of the characteristics of various representations of linear and non-linear relations, using tools, including coding when appropriate

14 KU

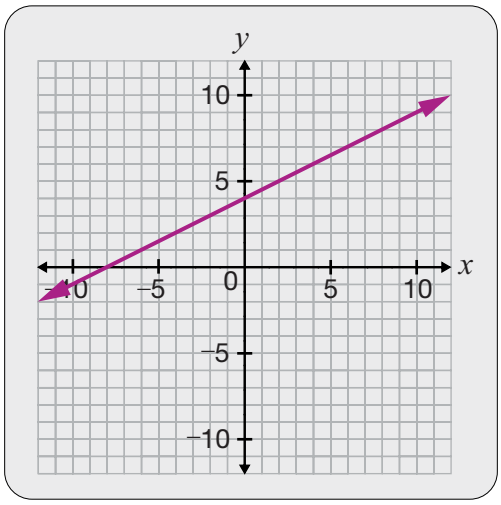
The line represented by $y = \frac{1}{2}x$ is translated up 4 units.

Which graph represents the **new** line?

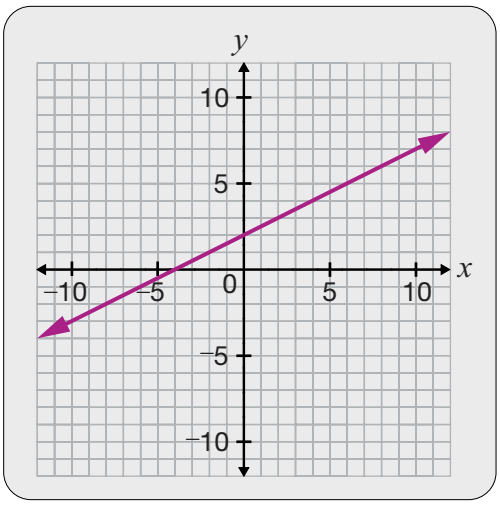
A



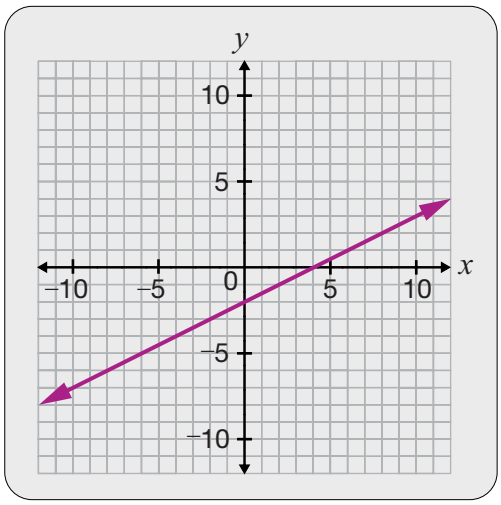
B



C



D



15 AP

Three of these tables of values show information about linear relations.

Select the table of values that shows information about a relation that is not linear.

A

Time (h)	Cost ($)
0	45
1	35
2	25
3	15

B

Time (h)	Cost ($)
0	60
40	120
80	180
120	240

C

Time (h)	Cost ($)
20	100
30	200
45	300
50	400

D

Time (h)	Cost ($)
100	500
150	400
200	300
250	200

16 TH

There are 24 graphic novels in a collection.

Every month, a constant number of graphic novels are added to the collection.

After 8 months, 56 graphic novels have been added to the initial collection.

Which equation represents the relationship between the number of graphic novels in the collection, N, and time, t, in months?

A $N = 24 + 7t$

B $N = 24 + 56t$

C $N = 7 + 24t$

D $N = 56 + 8t$

D. DATA

D1. Collection, Representation, and Analysis of Data

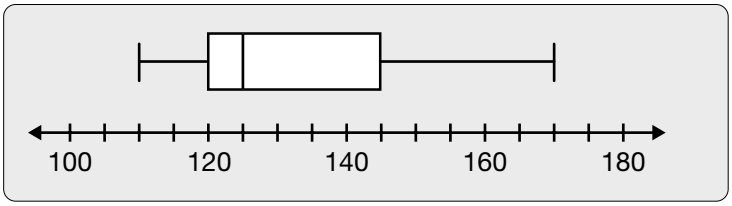
describe the collection and use of data, and represent and analyse data involving one and two variables

17 KU This table contains data on the amount of apple juice produced, in litres, in a week.

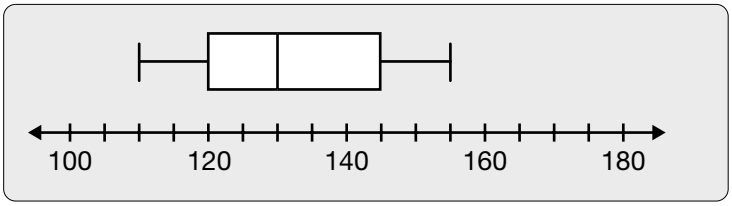
Measure	Amount of apple juice (L)
Minimum	110
Maximum	170
Mean	125
Median	130
Quartile 1	120
Quartile 3	145

Which box plot displays this data?

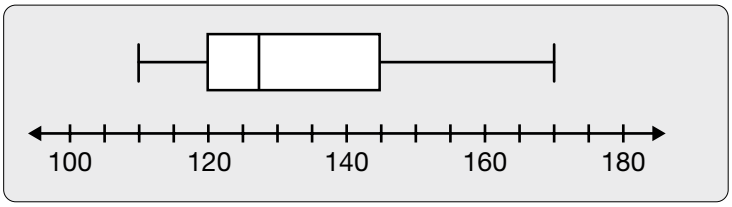
A



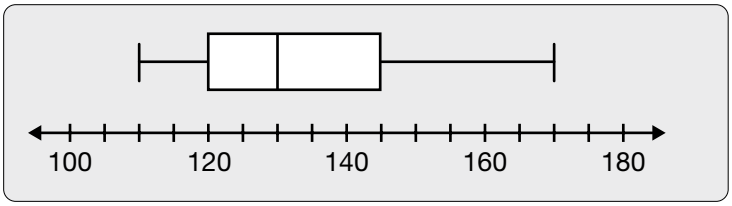
B



C



D

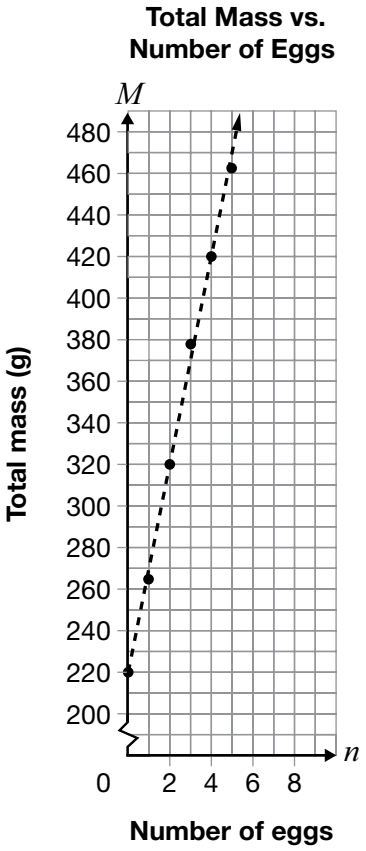


18 AP

Hakim wants to know the average mass of one egg.

He collects data on the total mass of a package of eggs and the number of eggs in the package.

This line of best fit represents the situation.



Which option is the best estimate of the mass of one egg?

A 50 g

B 160 g

C 220 g

D 265 g

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

19 AP Keisha wants to determine the relationship between the height of a student and the number of steps the student takes to walk a certain distance.

What information about her class would help Keisha the **most** in determining this relationship?

A. a list of students in her class

B. a box plot of the heights of the students in her class

C. a scatter plot of the heights versus the foot lengths of the students in her class

D. a scatter plot of the heights versus the lengths of one step for the students in her class

20 TH The table shows data about the population of Canada over time.

Year	Population of Canada (rounded to the nearest million)
1980	23
1990	28
2000	31
2010	34
2020	38

A teacher wants to use this data to predict the population of Canada in 2030.

Which option would help her determine the **best** prediction of the population of Canada in 2030?

A. creating a box plot of the given data

B. creating a scatter plot of the given data

C. determining the mean of the given data

D. creating a Venn diagram of the given data

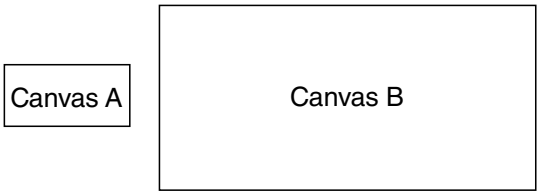
E. GEOMETRY AND MEASUREMENT

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

21 AP An artist paints on Canvas A, which has an area of 561 cm^2.

The painting is enlarged onto Canvas B, which has triple the length and triple the width of Canvas A.



What is the area of Canvas B?

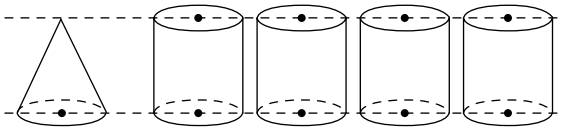
A 187 cm^2

B 1683 cm^2

C 3366 cm^2

D 5049 cm^2

22 AP This cone and these 4 cylinders each have the same height and the same radius.



The volume of the cone is 300 cm^3.

What is the **total** volume of the 4 cylinders?

A 3600 cm^3

B 1200 cm^3

C 900 cm^3

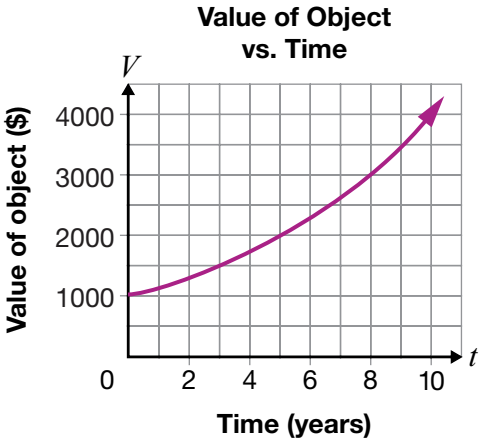
D 400 cm^3

F. FINANCIAL LITERACY

F1. Financial Decisions

demonstrate the knowledge and skills needed to make informed financial decisions

23 **TH** The graph represents the value of an object over time.



How many years does it take for the value of the object to triple its initial value?

A 3 years

B 5 years

C 8 years

D 10 years

24 **TH** Anita is currently living with roommates and is sharing expenses for rent and utilities. She is considering getting her own apartment and living alone.

Her current monthly expenses are given.

Transportation	$150
Food	$300
Personal expenses	$180
Rent	$530
Utilities	$50

If Anita moves, her new rent will be $940 per month and her utilities will be $110 per month.

By what amount will Anita's total monthly expenses increase if she moves and keeps her other expenses the same?

A $410

B $470

C $940

D $1050

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.

Data is not provided in this resource 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 50 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

Each of these options is a subset of the set of integers.

Select the subset that is **not** infinite.

A the factors of 24

B the powers of 2

C the multiples of 5

D all prime numbers

English-Language Schools

	No Response	A	B	C	D
Level 1	0	28	18	15	39
Level 2	0	40	14	7	40
Level 3	0	56	10	3	31
Level 4	ND	ND	ND	ND	ND

French-Language Schools

	No Response	A	B	C	D
Level 1	0	27	22	15	36
Level 2	0	35	20	9	36
Level 3	0	45	12	9	34
Level 4	ND	ND	ND	ND	ND

B1. Development of Numbers and Number Sets (continued)

2 For each set of numbers, the pattern is extended until it reaches the number 49.

AP

Select the set of numbers that is **most** dense.

A {1, 2, 3, 4, ...}

B {3, 5, 7, 9, ...}

C {1, 4, 9, 16, ...}

D {5, 16, 27, 38, ...}

English-Language Schools

	No Response	A	B	C	D
Level 1	0	15	15	16	54
Level 2	0	31	10	10	50
Level 3	0	59	3	5	34
Level 4	0	83	0	1	15

French-Language Schools

	No Response	A	B	C	D
Level 1	0	13	15	19	53
Level 2	0	23	11	13	53
Level 3	0	56	4	6	34
Level 4	0	91	0	1	8

B2. Powers

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

3 Which expression is equivalent to 0.0045?

KU

A 4.5×10^{3}

B 4.5×10^{-3}

C 0.45×10^{3}

D 0.45×10^{-3}

English-Language Schools

	No Response	A	B	C	D
Level 1	0	21	32	23	23
Level 2	0	13	57	9	21
Level 3	0	5	86	1	7
Level 4	0	1	98	0	1

French-Language Schools

	No Response	A	B	C	D
Level 1	0	10	51	18	21
Level 2	0	9	66	6	19
Level 3	0	4	87	1	8
Level 4	0	0	99	0	1

B2. Powers (continued)

4 Select the expression that is equivalent to 3^5.
TH

A $3^3 \times (3^2)^4 \div 3^5$

B $3^4 \times (3^2)^3 \div 3^5$

C $3^4 \times (3^2)^5 \div 3^3$

D $3^5 \times (3^2)^3 \div 3^4$

English-Language Schools

	No Response	A	B	C	D
Level 1	1	25	32	19	24
Level 2	0	16	51	16	17
Level 3	0	5	84	5	6
Level 4	0	0	99	0	1

French-Language Schools

	No Response	A	B	C	D
Level 1	0	13	38	24	24
Level 2	0	12	66	9	12
Level 3	0	4	89	2	5
Level 4	0	0	99	0	1

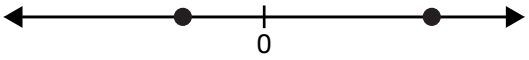
QUESTIONS WITH ANSWERS AND PROVINCIAL DATA (continued)

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 Which numbers **best** represent the points on this number line?

KU



A −3 and 7

B 3 and −7

C −1 and 20

D 1 and −20

English-Language Schools

	No Response	A	B	C	D
Level 1	0	67	18	8	6
Level 2	0	95	3	1	0
Level 3	0	99	1	0	0
Level 4	ND	ND	ND	ND	ND

French-Language Schools

	No Response	A	B	C	D
Level 1	0	58	26	9	8
Level 2	0	95	2	3	0
Level 3	0	99	0	1	0
Level 4	ND	ND	ND	ND	ND

B3. Number Sense and Operations (continued)

6 AP

For a recipe, 400 g of tomatoes and 30 mg of pepper are needed.

Devon uses $\frac{3}{4}$ of the tomatoes and 20% more pepper.

Complete the statement.

Devon uses [300 g] of tomatoes and [36 mg] of pepper.

100 g	10 mg
300 g	24 mg
480 g	36 mg
500 g	50 mg

English-Language Schools

	No Response	Two Correct	First Correct Only	Second Correct Only	None Correct
Level 1	0	12	41	12	34
Level 2	0	44	37	8	10
Level 3	0	86	10	3	1
Level 4	0	99	1	0	0

French-Language Schools

	No Response	Two Correct	First Correct Only	Second Correct Only	None Correct
Level 1	0	7	51	13	29
Level 2	0	27	51	8	13
Level 3	0	69	26	2	3
Level 4	0	97	3	1	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 Which expression is a simplified form of $3(4x + 2)$?

A $7x + 2$

B $7x + 5$

C $12x + 2$

D $12x + 6$

English-Language Schools

	No Response	A	B	C	D
Level 1	0	22	12	25	41
Level 2	0	7	4	17	72
Level 3	0	1	1	3	96
Level 4	0	0	0	0	100

French-Language Schools

	No Response	A	B	C	D
Level 1	0	15	13	22	50
Level 2	0	3	3	13	81
Level 3	0	0	1	2	97
Level 4	0	0	0	0	100

C1. Algebraic Expressions and Equations (continued)

8 AP The equation representing the relationship between the cost, C, in dollars, and the number of people, n, who attend an event is given.

$C = 12n + 530$

How many people attend if the event costs $902?

A 360 people

B 119 people

C 75 people

D 31 people

English-Language Schools

	No Response	A	B	C	D
Level 1	0	28	26	27	19
Level 2	0	10	13	25	51
Level 3	0	1	2	4	93
Level 4	0	0	0	0	100

French-Language Schools

	No Response	A	B	C	D
Level 1	1	30	25	25	19
Level 2	0	11	11	22	56
Level 3	0	1	1	3	94
Level 4	0	0	0	0	100

C2. Coding

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

9 AP

Pseudocode is given.

numerator = 14
denominator = 8
quotient = **numerator**/**denominator**
number = rounded **quotient** to the nearest whole number
output "When dividing 14 by 8, the rounded answer is ", **number**, "."

What is the value of **number** for this pseudocode?

A 1

B 1.7

C 1.75

D 2

English-Language Schools

	No Response	A	B	C	D
Level 1	0	3	18	61	17
Level 2	0	2	8	54	36
Level 3	0	1	2	27	70
Level 4	0	0	0	6	94

French-Language Schools

	No Response	A	B	C	D
Level 1	0	1	20	69	9
Level 2	0	2	11	57	30
Level 3	0	0	5	33	62
Level 4	0	0	1	8	91

C2. Coding (continued)

10 **TH** This pseudocode determines the equation of a linear relation given a point on the line and the slope of the line.

valueX = 0
valueY = 0
valueA = 0
output "Enter the x-coordinate of the point."
store user input as **valueX**
output "Enter the y-coordinate of the point."
store user input as **valueY**
output "Enter the slope of the line."
store user input as **valueA**
valueB = **valueY** − **valueA** * **valueX**
output "The equation of the line is y = ", _____, "x + ", _____, "."

Which option shows the two variables in the correct order to complete the last line of this pseudocode?

A **valueA** and **valueY**

B **valueX** and **valueB**

C **valueB** and **valueA**

D **valueA** and **valueB**

English-Language Schools

	No Response	A	B	C	D
Level 1	ND	ND	ND	ND	ND
Level 2	0	35	26	19	20
Level 3	0	38	15	13	33
Level 4	0	21	2	2	75

French-Language Schools

	No Response	A	B	C	D
Level 1	ND	ND	ND	ND	ND
Level 2	0	39	31	15	15
Level 3	0	26	17	18	39
Level 4	0	16	2	4	79

QUESTIONS WITH ANSWERS AND PROVINCIAL DATA (continued)

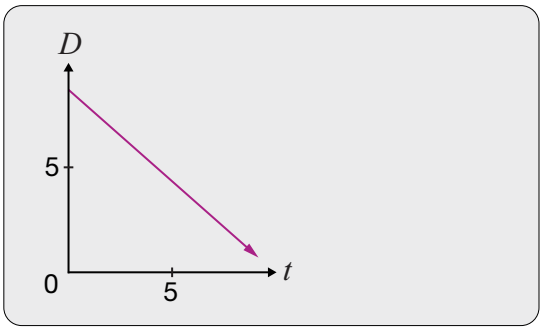
C3. Application of Relations

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

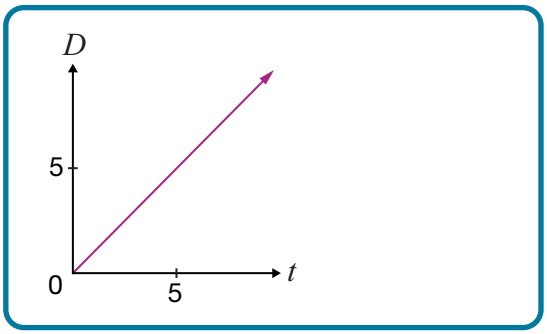
11 KU Ling goes on a bike ride at a constant speed. Her total distance travelled, D, increases as the amount of time she spends riding, t, increases.

Which graph could represent this relationship between D and t?

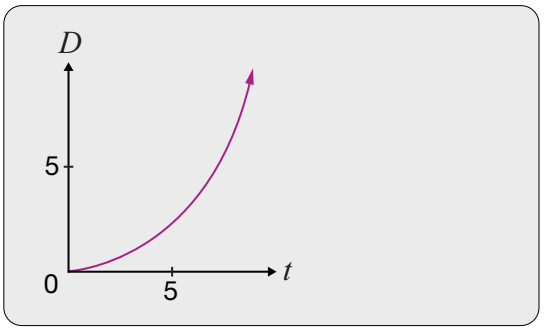
A



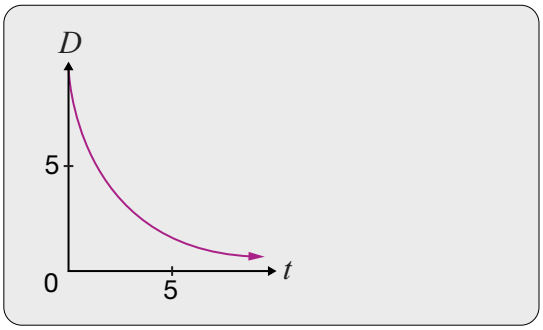
B



C



D



English-Language Schools

	No Response	A	B	C	D
Level 1	0	14	36	30	20
Level 2	0	4	66	25	5
Level 3	0	2	86	10	1
Level 4	ND	ND	ND	ND	ND

French-Language Schools

	No Response	A	B	C	D
Level 1	0	9	26	47	19
Level 2	0	4	62	32	3
Level 3	0	1	85	14	0
Level 4	ND	ND	ND	ND	ND

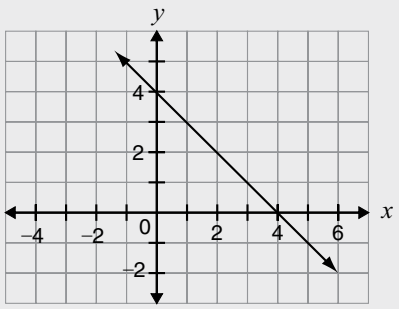
C3. Application of Relations (continued)

12 Which option represents a line with a positive rate of change?
AP

A

x	y
−3	3
−1	1
0	0

B



C $x + y = 2$

D $y - x = 2$

English-Language Schools

	No Response	A	B	C	D
Level 1	ND	ND	ND	ND	ND
Level 2	0	12	12	61	15
Level 3	0	8	3	50	38
Level 4	0	1	0	5	94

French-Language Schools

	No Response	A	B	C	D
Level 1	ND	ND	ND	ND	ND
Level 2	0	6	17	66	11
Level 3	0	8	7	53	32
Level 4	0	1	0	6	93

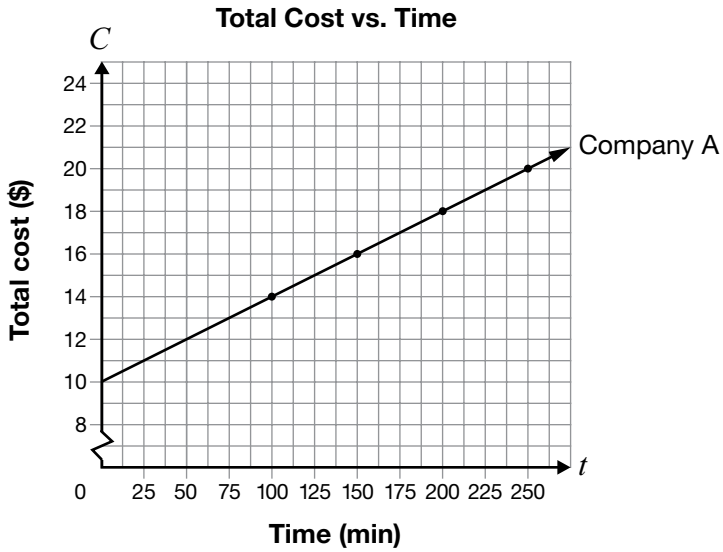
QUESTIONS WITH ANSWERS AND PROVINCIAL DATA (continued)

C3. Application of Relations (continued)

13 Two companies offer different costs for cellphone plans.

TH

This graph represents the relationship between the total cost, C, in dollars, and the time, t, in minutes, for Company A.



Company B's total cost is **always** less than Company A's total cost for any number of minutes.

Which equation could represent Company B's total cost, C, in dollars, for t minutes?

A $C = 15$

B $C = 11 + 0.02t$

C $C = 9 + 0.03t$

D $C = 8 + 0.05t$

English-Language Schools

	No Response	A	B	C	D
Level 1	ND	ND	ND	ND	ND
Level 2	1	9	39	22	30
Level 3	0	4	34	40	22
Level 4	0	0	15	79	5

French-Language Schools

	No Response	A	B	C	D
Level 1	ND	ND	ND	ND	ND
Level 2	0	10	34	17	38
Level 3	0	5	29	44	23
Level 4	0	1	13	82	4

QUESTIONS WITH ANSWERS AND PROVINCIAL DATA (continued)

C4. Characteristics of Relations

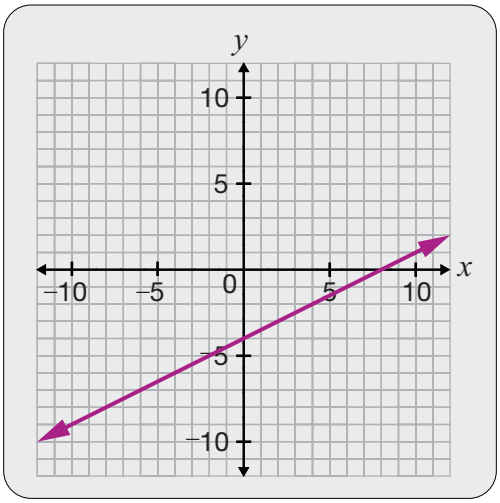
demonstrate an understanding of the characteristics of various representations of linear and non-linear relations, using tools, including coding when appropriate

14 KU

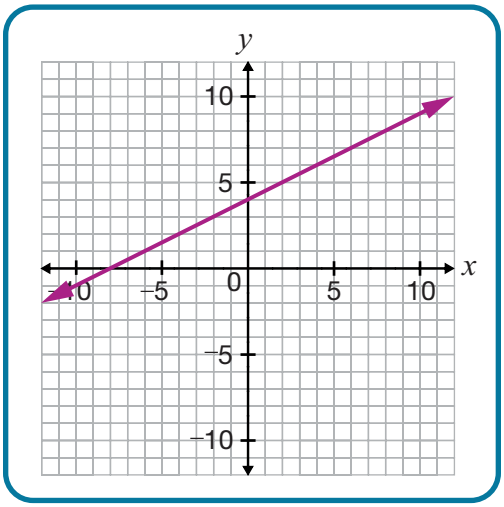
The line represented by $y = \frac{1}{2}x$ is translated up 4 units.

Which graph represents the **new** line?

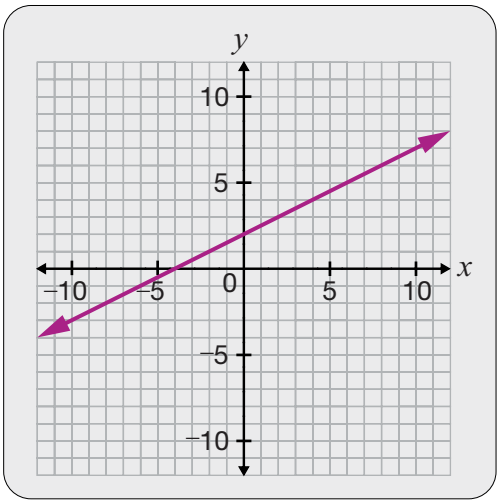
A



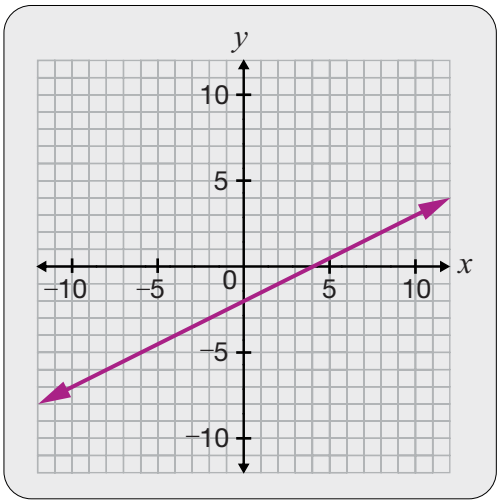
B



C



D



English-Language Schools

	No Response	A	B	C	D
Level 1	1	14	31	27	28
Level 2	0	7	53	23	16
Level 3	0	3	81	11	6
Level 4	ND	ND	ND	ND	ND

French-Language Schools

	No Response	A	B	C	D
Level 1	0	13	34	25	29
Level 2	0	7	50	22	21
Level 3	0	10	81	7	1
Level 4	ND	ND	ND	ND	ND

C4. Characteristics of Relations (continued)

15 Three of these tables of values show information about linear relations.

AP

Select the table of values that shows information about a relation that is not linear.

A

Time (h)	Cost ($)
0	45
1	35
2	25
3	15

B

Time (h)	Cost ($)
0	60
40	120
80	180
120	240

C

Time (h)	Cost ($)
20	100
30	200
45	300
50	400

D

Time (h)	Cost ($)
100	500
150	400
200	300
250	200

English-Language Schools

	No Response	A	B	C	D
Level 1	0	22	30	29	19
Level 2	0	12	14	64	10
Level 3	0	3	4	89	4
Level 4	ND	ND	ND	ND	ND

French-Language Schools

	No Response	A	B	C	D
Level 1	1	16	28	41	14
Level 2	0	12	12	66	10
Level 3	0	2	6	85	7
Level 4	ND	ND	ND	ND	ND

C4. Characteristics of Relations (continued)

16 TH

There are 24 graphic novels in a collection.

Every month, a constant number of graphic novels are added to the collection.

After 8 months, 56 graphic novels have been added to the initial collection.

Which equation represents the relationship between the number of graphic novels in the collection, N, and time, t, in months?

A $N = 24 + 7t$

B $N = 24 + 56t$

C $N = 7 + 24t$

D $N = 56 + 8t$

English-Language Schools

	No Response	A	B	C	D
Level 1	0	15	34	9	42
Level 2	0	24	22	6	48
Level 3	0	72	10	3	15
Level 4	0	99	0	0	1

French-Language Schools

	No Response	A	B	C	D
Level 1	0	20	32	8	39
Level 2	0	25	23	6	45
Level 3	0	74	9	5	12
Level 4	0	98	1	1	0

D. DATA

D1. Collection, Representation, and Analysis of Data

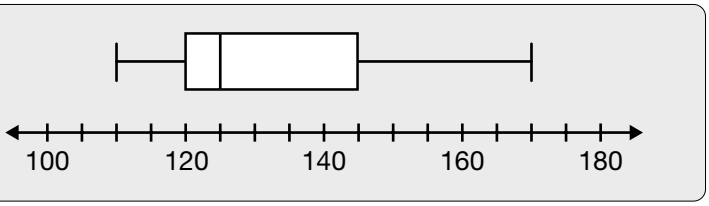
describe the collection and use of data, and represent and analyse data involving one and two variables

17 KU This table contains data on the amount of apple juice produced, in litres, in a week.

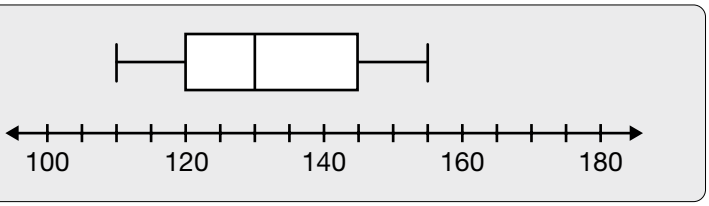
Measure	Amount of apple juice (L)
Minimum	110
Maximum	170
Mean	125
Median	130
Quartile 1	120
Quartile 3	145

Which box plot displays this data?

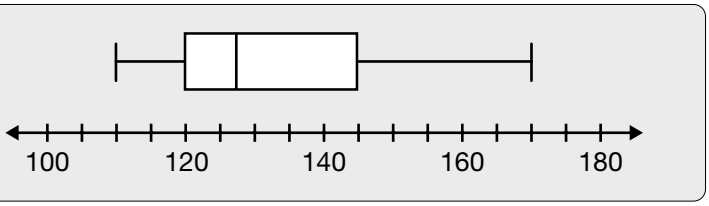
A



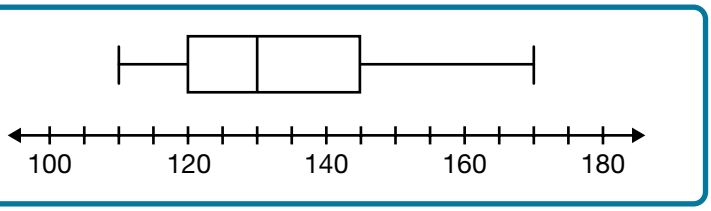
B



C



D



English-Language Schools

	No Response	A	B	C	D
Level 1	0	28	27	19	25
Level 2	0	29	13	10	48
Level 3	0	19	5	6	70
Level 4	ND	ND	ND	ND	ND

French-Language Schools

	No Response	A	B	C	D
Level 1	0	33	34	18	15
Level 2	0	36	13	15	36
Level 3	0	29	6	6	58
Level 4	ND	ND	ND	ND	ND

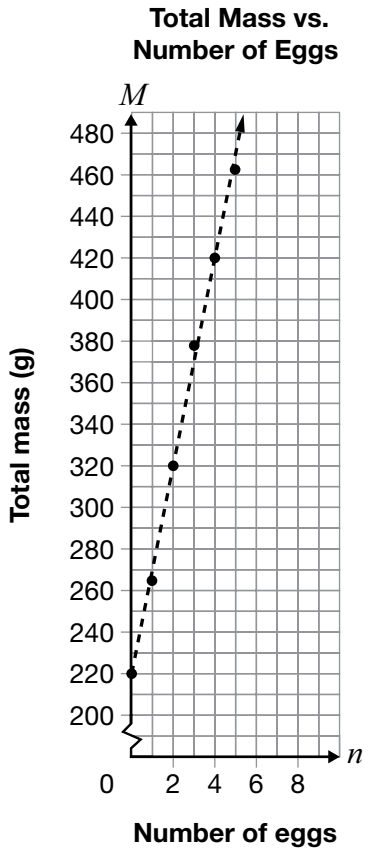
D1. Collection, Representation, and Analysis of Data (continued)

18 Hakim wants to know the average mass of one egg.

AP

He collects data on the total mass of a package of eggs and the number of eggs in the package.

This line of best fit represents the situation.



Which option is the best estimate of the mass of one egg?

A 50 g

B 160 g

C 220 g

D 265 g

English-Language Schools

	No Response	A	B	C	D
Level 1	0	21	20	35	23
Level 2	0	24	13	23	40
Level 3	0	27	9	8	56
Level 4	0	47	3	2	48

French-Language Schools

	No Response	A	B	C	D
Level 1	1	21	33	32	13
Level 2	0	25	17	24	33
Level 3	0	37	10	10	43
Level 4	0	66	4	1	29

QUESTIONS WITH ANSWERS AND PROVINCIAL DATA (continued)

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

19 AP Keisha wants to determine the relationship between the height of a student and the number of steps the student takes to walk a certain distance.

What information about her class would help Keisha the **most** in determining this relationship?

A a list of students in her class

B a box plot of the heights of the students in her class

C a scatter plot of the heights versus the foot lengths of the students in her class

D a scatter plot of the heights versus the lengths of one step for the students in her class

English-Language Schools

	No Response	A	B	C	D
Level 1	0	8	16	27	49
Level 2	0	1	6	15	78
Level 3	0	0	2	5	93
Level 4	0	0	0	1	99

French-Language Schools

	No Response	A	B	C	D
Level 1	0	6	39	26	29
Level 2	0	2	26	23	49
Level 3	0	1	9	11	79
Level 4	0	0	2	0	97

D2. Mathematical Modelling (continued)

20TH The table shows data about the population of Canada over time.

Year	Population of Canada (rounded to the nearest million)
1980	23
1990	28
2000	31
2010	34
2020	38

A teacher wants to use this data to predict the population of Canada in 2030.

Which option would help her determine the **best** prediction of the population of Canada in 2030?

A creating a box plot of the given data

B creating a scatter plot of the given data

C determining the mean of the given data

D creating a Venn diagram of the given data

English-Language Schools

	No Response	A	B	C	D
Level 1	0	27	36	22	14
Level 2	0	23	51	17	9
Level 3	0	13	71	12	4
Level 4	0	3	94	3	1

French-Language Schools

	No Response	A	B	C	D
Level 1	0	35	18	37	10
Level 2	0	31	25	32	12
Level 3	0	22	44	23	11
Level 4	0	7	79	9	5

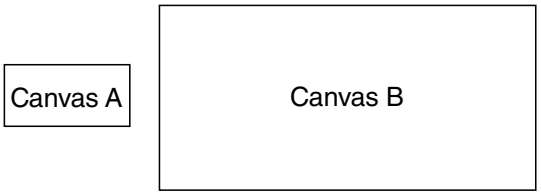
E. GEOMETRY AND MEASUREMENT

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

21 AP An artist paints on Canvas A, which has an area of 561 cm^2.

The painting is enlarged onto Canvas B, which has triple the length and triple the width of Canvas A.



What is the area of Canvas B?

A 187 cm^2

B 1683 cm^2

C 3366 cm^2

D 5049 cm^2

English-Language Schools

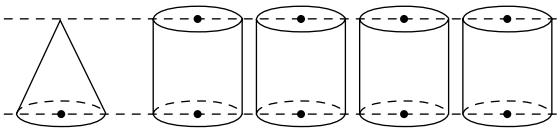
	No Response	A	B	C	D
Level 1	ND	ND	ND	ND	ND
Level 2	0	2	70	13	15
Level 3	0	1	46	14	40
Level 4	0	0	2	2	96

French-Language Schools

	No Response	A	B	C	D
Level 1	ND	ND	ND	ND	ND
Level 2	0	4	62	8	27
Level 3	0	1	39	15	46
Level 4	0	0	4	3	94

E1. Geometric and Measurement Relationships (continued)

22 This cone and these 4 cylinders each have the same height and the same radius.
AP



The volume of the cone is 300 cm^3.

What is the **total** volume of the 4 cylinders?

A 3600 cm^3

B 1200 cm^3

C 900 cm^3

D 400 cm^3

English-Language Schools

	No Response	A	B	C	D
Level 1	0	16	60	14	10
Level 2	0	25	61	11	4
Level 3	0	76	16	6	3
Level 4	0	99	0	0	0

French-Language Schools

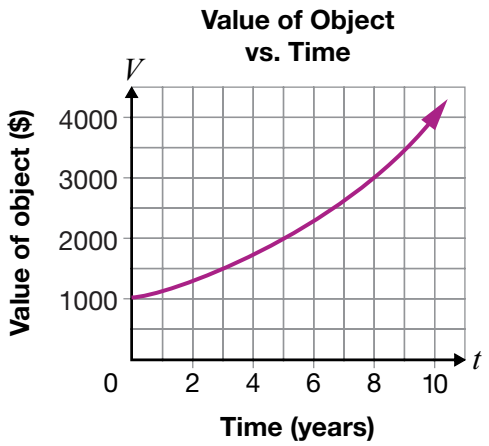
	No Response	A	B	C	D
Level 1	0	19	59	19	3
Level 2	0	31	55	10	4
Level 3	0	80	13	6	2
Level 4	0	99	1	0	0

F. FINANCIAL LITERACY

F1. Financial Decisions

demonstrate the knowledge and skills needed to make informed financial decisions

23 The graph represents the value of an object over time.
TH



How many years does it take for the value of the object to triple its initial value?

A 3 years

B 5 years

C 8 years

D 10 years

English-Language Schools

	No Response	A	B	C	D
Level 1	0	15	16	29	40
Level 2	0	6	5	77	12
Level 3	0	1	1	97	2
Level 4	0	0	0	100	0

French-Language Schools

	No Response	A	B	C	D
Level 1	0	24	17	29	30
Level 2	0	13	5	75	7
Level 3	0	1	1	97	1
Level 4	0	0	0	99	0

F1. Financial Decisions (continued)

24 TH Anita is currently living with roommates and is sharing expenses for rent and utilities. She is considering getting her own apartment and living alone.

Her current monthly expenses are given.

Transportation	$150
Food	$300
Personal expenses	$180
Rent	$530
Utilities	$50

If Anita moves, her new rent will be $940 per month and her utilities will be $110 per month.

By what amount will Anita's total monthly expenses increase if she moves and keeps her other expenses the same?

A $410

B $470

C $940

D $1050

English-Language Schools

	No Response	A	B	C	D
Level 1	0	13	19	11	56
Level 2	0	10	45	5	40
Level 3	0	4	80	2	14
Level 4	ND	ND	ND	ND	ND

French-Language Schools

	No Response	A	B	C	D
Level 1	0	12	22	9	57
Level 2	0	9	42	5	43
Level 3	0	2	73	2	22
Level 4	ND	ND	ND	ND	ND

Education Quality and Accountability Office
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