



MASSACHUSETTS

Department of Elementary
and Secondary Education

*Release of Spring 2026
MCAS Test Items from the
Grade 10 Mathematics
Paper-Based Test*

Spring 2026

**Massachusetts Department of
Elementary and Secondary Education**



MASSACHUSETTS

Department of Elementary
and Secondary Education

This document was prepared by the
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Commissioner

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Overview of Grade 10 Mathematics Test

The spring 2026 grade 10 Mathematics test was administered in two formats: a computer-based version and a paper-based version. Most students took the computer-based test. The paper-based test was offered as an accommodation for eligible students who were unable to use a computer. More information can be found on the MCAS Test Administration Resources page www.doe.mass.edu/mcas/admin.html.

Most of the operational items on the grade 10 Mathematics test were the same, regardless of whether a student took the computer-based version or the paper-based version. In places where a technology-enhanced item was used on the computer-based test, an adapted version of the item was created for use on the paper test. These adapted paper items were multiple-choice, multiple-select, or short-answer items that tested the same Mathematics content and assessed the same standard as the technology-enhanced item.

This document displays released items from the paper-based test. Released items from the computer-based test are available on the MCAS Resource Center website at mcas.onlinehelp.cognia.org/released-items.

Test Sessions and Content Overview

The grade 10 Mathematics test was made up of two separate test sessions. Each session included selected-response, short-answer, and constructed-response questions. On the paper-based test, the selected-response questions were multiple-choice items and multiple-select items, in which students select the correct answer(s) from among several answer options.

Standards and Reporting Categories

The grade 10 Mathematics test was based on high school standards in the *Massachusetts Curriculum Framework for Mathematics* (2017). The standards in the 2017 framework are organized under the five major conceptual categories listed below.

- Number and Quantity
- Algebra
- Functions
- Geometry
- Statistics and Probability

The grade 10 test assessed standards that overlap between the Model Algebra I/Model Geometry and Model Mathematics I/Model Mathematics II courses. The *Massachusetts Curriculum Framework for Mathematics* is available on the Department website at www.doe.mass.edu/frameworks/current.html.

Mathematics test results for grade 10 are reported under four MCAS reporting categories, which are based on the five framework conceptual categories listed above.

The table at the conclusion of this document provides the following information about each released operational item: reporting category, standard covered, item type, and item description. The correct answers for selected-response and short-answer questions are also displayed in the table.

Reference Materials and Tools

Each student taking the grade 10 Mathematics test was provided with a grade 10 Mathematics Reference Sheet. A copy of the reference sheet follows the final question in this document.

During Session 2, each student had sole access to a calculator. Calculator use was not allowed during Session 1.

During both Mathematics test sessions, the use of authorized bilingual word-to-word dictionaries and glossaries was allowed for students who are currently or were ever reported as English learners. No other reference tools or materials were allowed.

Grade 10 Mathematics

SESSION 1

This session contains 21 questions.

You may use your reference sheet during this session.
*You may **not** use a calculator during this session.*



Directions

Read each question carefully and then answer it as well as you can. You must record all answers in this Test & Answer Booklet.

For some questions, you will mark your answers by filling in the circles in your Test & Answer Booklet. Make sure you darken the circles completely. Do not make any marks outside of the circles. If you need to change an answer, be sure to erase your first answer completely.

For other questions, you will need to fill in an answer grid. Directions for completing questions with answer grids are provided on the next page.

If a question asks you to show or explain your work, you must do so to receive full credit. Write your response in the space provided. Only responses written within the provided space will be scored.

Directions for Completing Questions with Answer Grids

- 1. Work the question and find an answer.
- 2. Enter your answer in the answer boxes at the top of the answer grid.
- 3. Print only one number or symbol in each box. Do not leave a blank box in the middle of an answer.
- 4. Under each answer box, fill in the circle that matches the number or symbol you wrote above. Make a solid mark that completely fills the circle.
- 5. Do not fill in a circle under an unused answer box.
- 6. Fractions cannot be entered into an answer grid and will not be scored. Enter fractions as decimals.
- 7. If you need to change an answer, be sure to erase your first answer completely.
- 8. See below for examples of how to correctly complete an answer grid.

Examples

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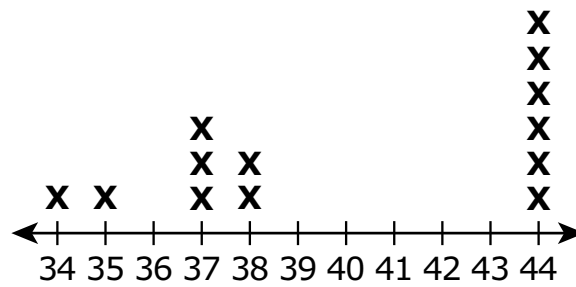
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- 1 This line plot shows the number of sit-ups completed by each of 13 athletes during a workout.

Number of Sit-Ups Completed



Based on the line plot, what is the median number of sit-ups completed by the athletes during the workout?

- Ⓐ 38
- Ⓑ 39
- Ⓒ 40
- Ⓓ 44

- 2** This equation shows E , the kinetic energy of an object in terms of m , its mass, and v , its velocity.

$$E = \frac{mv^2}{2}$$

Which of the following equations has been correctly rearranged to solve for m , the mass of the object?

- Ⓐ $m = \frac{2E}{v^2}$
- Ⓑ $m = \frac{2\sqrt{E}}{v^2}$
- Ⓒ $m = \frac{Ev^2}{2}$
- Ⓓ $m = \frac{\sqrt{Ev^2}}{2}$

- 3** Which of the following is the solution of this inequality?

$$0 \leq x - 10 \leq 20$$

- Ⓐ $-10 \leq x \leq 10$
- Ⓑ $-10 \leq x \leq 30$
- Ⓒ $10 \leq x \leq 20$
- Ⓓ $10 \leq x \leq 30$

- 4 This table shows the lengths, in miles, of three interstate highways in the United States.

Interstate Highway Lengths

Interstate Highway	I-10	I-80	I-90
Length (in miles)	2,460.34	2,899.54	3,020.54

Which of the following estimates is closest to the total length, in miles, of the three interstate highways?

- Ⓐ 7,000
 - Ⓑ 7,500
 - Ⓒ 8,500
 - Ⓓ 9,000
- 5 A circle graphed on a coordinate plane is represented by this equation.

$$(x + 4)^2 + (y - 2)^2 = 9$$

Based on the equation, which of the following statements are true?

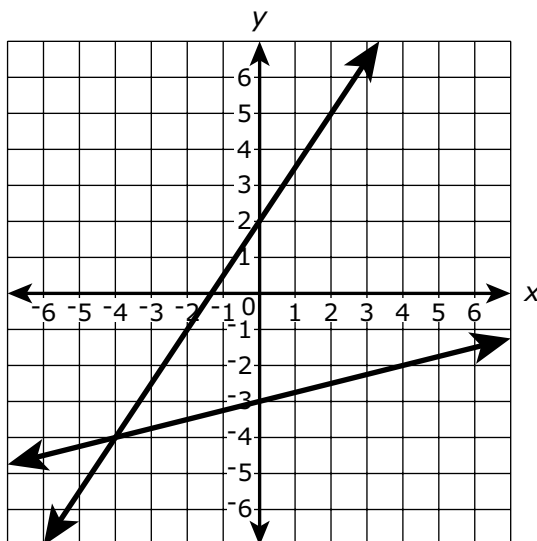
Select the **two** correct answers.

- Ⓐ The center of the circle has coordinates (2, -4).
- Ⓑ The center of the circle has coordinates (-4, 2).
- Ⓒ The radius of the circle is 3 units.
- Ⓓ The radius of the circle is 6 units.
- Ⓔ The radius of the circle is 9 units.

This question has four parts. Be sure to label each part of your response.

- 6** Four students each created a system of linear equations.

A. Addison created a system of equations and graphed the equations on a coordinate plane, as shown.



What is the solution, (x, y) , of Addison's system of equations? Show or explain how you got your answer.

B. Blair created this system of equations.

$$\begin{aligned}x &= 5 \\ y &= -1\end{aligned}$$

What is the solution, (x, y) , of Blair's system of equations? Show or explain how you got your answer.

C. Cooper created this system of equations.

$$\begin{aligned}y &= -x \\ y &= 8x\end{aligned}$$

Which of the following is the solution of Cooper's system of equations?

Mark your answer by filling in the appropriate circle on the next page.

A $(-1, 8)$

B $(0, 0)$

C $(0, 8)$

D $(-8, 0)$

D. Drew created this system of equations.

$$\begin{aligned}x + y &= 7 \\ -3x + y &= -9\end{aligned}$$

What is the solution, (x, y) , of Drew's system of equations? Show or explain how you got your answer.

Write your answers on the next page.

6

C. Ⓐ $(-1, 8)$

Ⓒ $(0, 8)$

Ⓑ $(0, 0)$

Ⓓ $(-8, 0)$

- 7 A circle is dilated by a scale factor of 2 to create its image.

How does the circumference of the **image** compare to the circumference of the circle?

- Ⓐ The circumference of the image must be 2 times the circumference of the circle.
- Ⓑ The circumference of the image must be π times the circumference of the circle.
- Ⓒ The circumference of the image must be 4 times the circumference of the circle.
- Ⓓ The circumference of the image must be 2π times the circumference of the circle.

- 8 Which of the following equivalent expressions, which define the same quadratic function, **best** reveals the **x-intercepts** of the graph of the function?

- Ⓐ $(x - 1)^2 - 4$
- Ⓑ $x^2 + 2x - 3$
- Ⓒ $(x + 3)(x - 1)$
- Ⓓ $(x^2 + 3x) - (x + 3)$

- 9 A high school principal surveyed students in three grades to determine what time they prefer to eat lunch. This table shows the results of the survey.

Lunchtime Survey

	11:30 a.m.	12:15 p.m.	Total
Sophomores	130	100	230
Juniors	95	125	220
Seniors	75	150	225
Total	300	375	675

Based on the table, what fraction of the students who prefer to eat lunch at 12:15 p.m. are **seniors**?

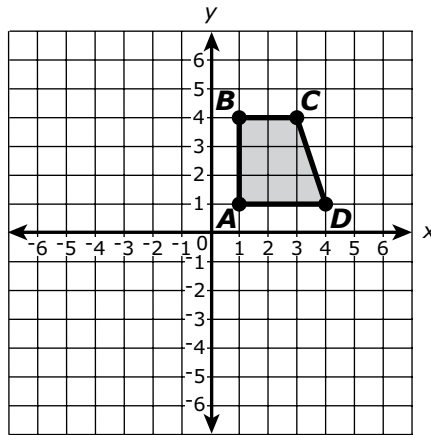
- Ⓐ $\frac{150}{225}$
- Ⓑ $\frac{150}{375}$
- Ⓒ $\frac{225}{375}$
- Ⓓ $\frac{375}{675}$
- 10 Which of the following is equivalent to this expression?

$$x^2 - x - 12$$

- Ⓐ $(x - 1)(x + 12)$
- Ⓑ $(x + 1)(x - 12)$
- Ⓒ $(x - 3)(x + 4)$
- Ⓓ $(x + 3)(x - 4)$

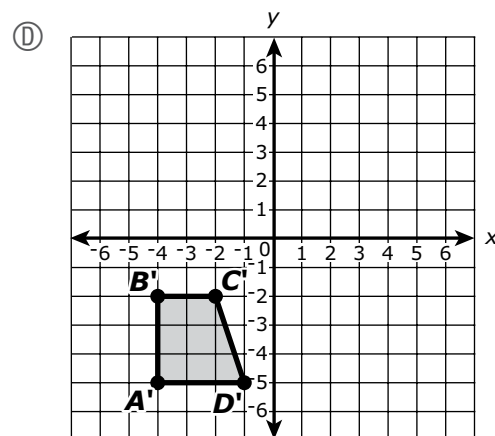
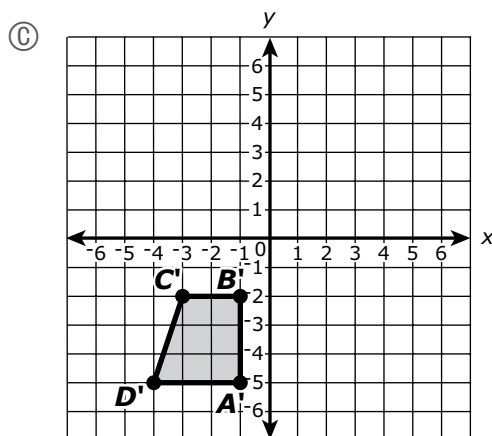
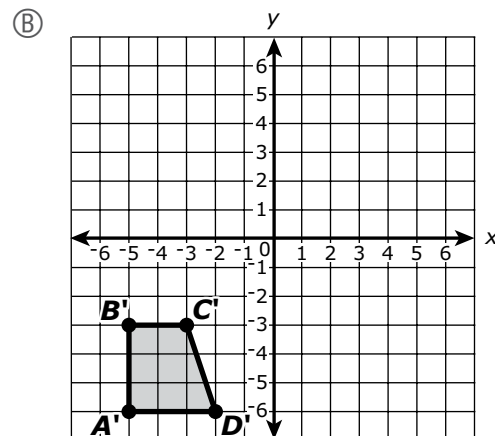
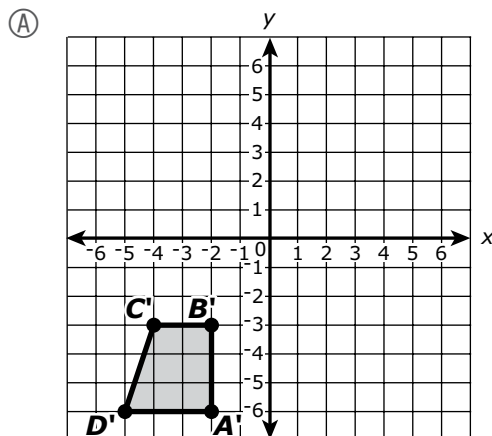
This question has two parts.

- 11 Trapezoid $ABCD$ is shown on this coordinate plane.



Part A

Which graph shows trapezoid $A'B'C'D'$, the image of trapezoid $ABCD$ after it has been translated 5 units left and 6 units down?



Part B

Which transformation, when performed on trapezoid $ABCD$, will **not** result in a congruent figure?

- Ⓐ a dilation by a scale factor of 2 with respect to the origin
- Ⓑ a 45° counterclockwise rotation about the origin
- Ⓒ a translation 3 units right and 4 units down
- Ⓓ a reflection over $y = -10$

- 12** An equation was solved incorrectly. The equation and the steps used to solve it are shown in this table.

Equation	$-2x + 7 = 3(x - 1)$
Step 1	$-2x + 7 = 3x - 3$
Step 2	$-5x + 7 = -3$
Step 3	$-5x = -10$
Step 4	$x = -2$

In which step in the table does the error first appear?

- Ⓐ step 1
- Ⓑ step 2
- Ⓒ step 3
- Ⓓ step 4

This question has four parts. Be sure to label each part of your response.

- 13** Consider this list of numbers.

$$-5, \frac{1}{2}, 1.8, 2\sqrt{2}, 6, \sqrt{10}$$

- A. Which numbers from the list are irrational?

Select the **two** correct answers. Mark your answers by filling in the appropriate circles on the next page.

A -5

B $\frac{1}{2}$

C 1.8

D $2\sqrt{2}$

E 6

F $\sqrt{10}$

- B. Identify two **rational** numbers from the list **and** find their sum. Is the sum rational or irrational? Explain your reasoning.
- C. Consider this expression, which represents the product of two numbers from the list.

$$(-5)(2\sqrt{2})$$

Is the value of the expression rational or irrational? Explain your reasoning.

- D. A student claims that the product of any two **rational** numbers is **not** always rational. Is the student's claim true? Explain your reasoning.

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

This question has two parts.

- 14** A company charges a fee of \$32 to rent a car for one day. There is an additional charge of \$0.25 per mile for every mile over 100 miles the car is driven.

Part A

What is the cost, in dollars, to rent a car for one day and drive it a total of 64 miles?

Enter your answer in the answer boxes at the top of the answer grid **and** completely fill the matching circles.

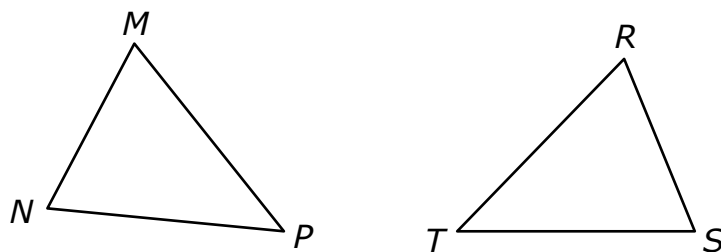
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Part B

Which of the following equations represents T , the total cost, in dollars, to rent a car for one day and drive it a total of m miles, where $m > 100$?

- Ⓐ $T = 32 + 0.25m$
- Ⓑ $T = 100 + 0.25(32m)$
- Ⓒ $T = 32 + 0.25(m - 100)$
- Ⓓ $T = 100 + 0.25(m - 32)$

- 15 In this diagram, $\triangle MNP \cong \triangle RST$.

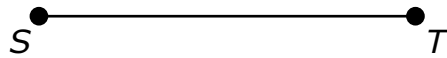


Which of the following **must** be true?

Select the **two** correct answers.

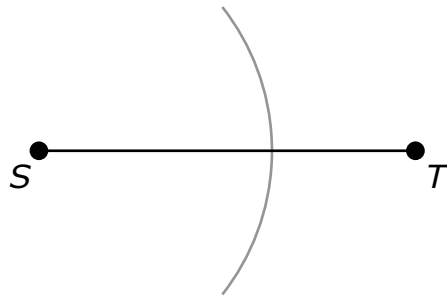
- Ⓐ $\angle N \cong \angle S$
- Ⓑ $\angle P \cong \angle S$
- Ⓒ $\overline{MN} \cong \overline{RT}$
- Ⓓ $\overline{RS} \cong \overline{MN}$
- Ⓔ $\overline{MP} \cong \overline{RS}$

- 16 Consider $\overline{ST}$.



A compass and a straightedge were used to perform the construction of a perpendicular bisector of $\overline{ST}$.

For the first step of the construction, an arc was drawn from point S, as shown.



For the third step of the construction, the straightedge was used to draw a line through points of intersection of two arcs.

Which of the following describes the **second** step of the construction?

- Ⓐ With the same compass setting, an arc was drawn from point T.
 - Ⓑ With the same compass setting, an arc was drawn from point S.
 - Ⓒ With a different compass setting, an arc was drawn from point T.
 - Ⓓ With a different compass setting, an arc was drawn from point S.
- 17 The point $(x, 4)$ lies on the graph of this equation.

$$3x - 5y = 1$$

What is the value of x ?

- Ⓐ 2
- Ⓑ 3
- Ⓒ 5
- Ⓓ 7

This question has two parts.

- 18** A teacher surveyed some students about the number of hours they studied for an art test and the scores they received on the test. This equation models the teacher's data.

$$T = 65 + 5h$$

In the equation,

- T represents the score received on the test, and
- h represents the number of hours spent studying for the test.

Part A

Based on the equation, which of the following statements are true?

Select the **two** correct answers.

- Ⓐ A student's test score increased by 5 for each hour the student spent studying for the art test.
- Ⓑ A student's test score increased by 65 for each hour the student spent studying for the art test.
- Ⓒ A student's test score decreased by 5 for each hour the student spent studying for the art test.
- Ⓓ A student's test score decreased by 65 for each hour the student spent studying for the art test.
- Ⓔ A student who did not study for the art test could expect to receive a score of 65.
- Ⓕ A student who did not study for the art test could expect to receive a score of 70.

Part B

A student received a score of 85 on the test. Based on the equation, what is the total number of hours the student most likely studied for the test?

Enter your answer in the answer boxes at the top of the answer grid **and** completely fill the matching circles.

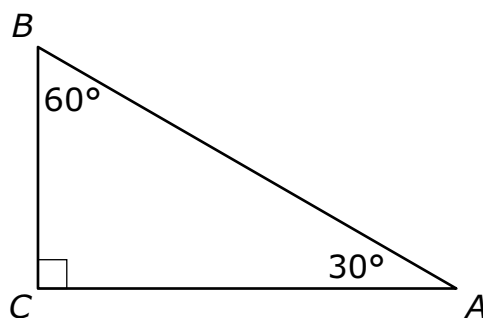
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- 19** Which of the following is equivalent to this expression?

$$(2x - 5)(3x + 1)$$

- Ⓐ $6x^2 + 5$
- Ⓑ $6x^2 - 5$
- Ⓒ $6x^2 - 13x - 5$
- Ⓓ $6x^2 - 17x - 5$

- 20** Right triangle ABC and its angle measures are shown in this diagram.



Based on the diagram, which of the following equations is true?

- Ⓐ $\sin A = \frac{1}{\sqrt{3}}$
 - Ⓑ $\cos A = \frac{2}{\sqrt{3}}$
 - Ⓒ $\sin B = \frac{\sqrt{3}}{2}$
 - Ⓓ $\cos B = \frac{\sqrt{2}}{\sqrt{3}}$
- 21** Quadratic function $q(x)$ is represented by this equation.

$$q(x) = -(x - 2)^2 - 5$$

Which of the following ordered pairs represents the vertex of the graph of the function?

- Ⓐ $(2, -5)$
- Ⓑ $(4, -9)$
- Ⓒ $(-2, -5)$
- Ⓓ $(-4, -9)$

Grade 10 Mathematics

SESSION 2

This session contains 21 questions.

*You may use your reference sheet during this session.
You may use a calculator during this session.*



Directions

Read each question carefully and then answer it as well as you can. You must record all answers in this Test & Answer Booklet.

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- 4. Under each answer box, fill in the circle that matches the number or symbol you wrote above. Make a solid mark that completely fills the circle.
- 5. Do not fill in a circle under an unused answer box.
- 6. Fractions cannot be entered into an answer grid and will not be scored. Enter fractions as decimals.
- 7. If you need to change an answer, be sure to erase your first answer completely.
- 8. See below for examples of how to correctly complete an answer grid.

Examples

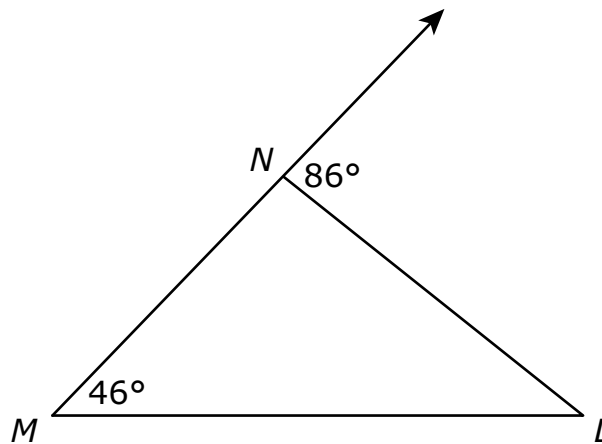
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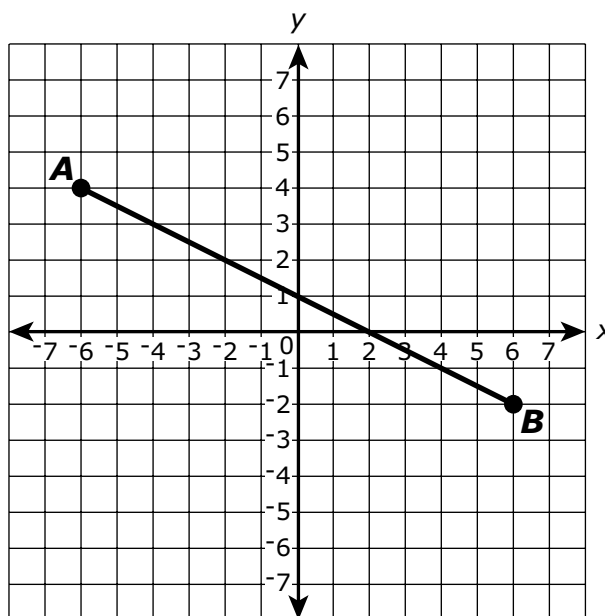
- 22** This diagram shows $\triangle LMN$ with an exterior angle.



Based on the measurements in the diagram, what is the measure of $\angle L$?

- Ⓐ 40°
- Ⓑ 43°
- Ⓒ 47°
- Ⓓ 48°

- 23 Segment AB is graphed on this coordinate plane.



Point C will be plotted on segment AB such that the distance from point C to point A is exactly twice the distance from point C to point B .

Which of the following will be the coordinates of point C ?

- Ⓐ $(4, -1)$
- Ⓑ $(2, 0)$
- Ⓒ $(0, 1)$
- Ⓓ $(-2, 2)$

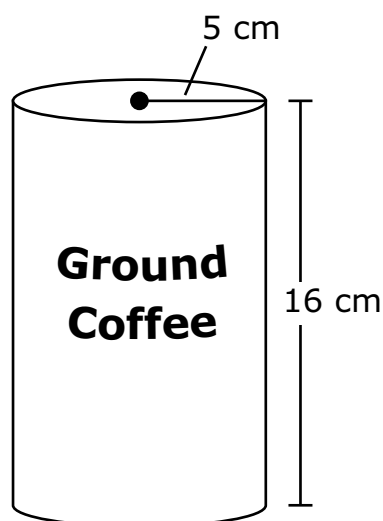
- 24 While plowing a field, a tractor used a total of 12 gallons of diesel fuel at an average rate of 10 fluid ounces per minute. There are 128 fluid ounces in 1 gallon.

Which of the following is the best estimate of the total number of **hours** the tractor plowed the field?

- Ⓐ 0.9 hour
- Ⓑ 1.2 hours
- Ⓒ 2.6 hours
- Ⓓ 4.7 hours

This question has four parts. Be sure to label each part of your response.

- 27 A can completely filled with ground coffee is in the shape of a circular cylinder. The can of ground coffee and some of its dimensions are shown in this diagram.



- A. Based on the diagram, what is the volume, in cubic centimeters, of the can of ground coffee? Show or explain how you got your answer.
- B. A scoop in the shape of a **cone** is used to remove the ground coffee from the can and place it into a coffee maker.
- The radius of the scoop is 2.5 cm.
 - The height of the scoop is 4 cm.

What is the volume, in cubic centimeters, of the scoop? Show or explain how you got your answer.

- C. One full scoop of ground coffee is needed to make one cup of coffee. What is the total number of cups of coffee that can be made from the ground coffee in the can? Show or explain how you got your answer.
- D. The ground coffee is also available in a package that is in the shape of a prism.
- The volume of the package is approximately twice the volume of the can.
 - The area of the base of the package is 144 square centimeters.

What is the **height**, in centimeters, of the package of ground coffee? Show or explain how you got your answer.

27

- 28** Which of the following situations can be modeled by a linear function?
- Ⓐ The population of a city doubles every 20 years.
 - Ⓑ The value of a car decreases at a rate of 5% per year.
 - Ⓒ The enrollment at a gym increases at a constant rate over time.
 - Ⓓ The thickness of a piece of paper increases each time it is folded in half.

- 29** Event A and event B are independent events.

- $P(A) = 0.2$
- $P(B) = 0.7$

The Addition Rule of Probability is shown.

$$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$$

Based on the Addition Rule, which of the following is equal to $P(A \text{ or } B)$?

- Ⓐ 0.14
- Ⓑ 0.50
- Ⓒ 0.76
- Ⓓ 0.90

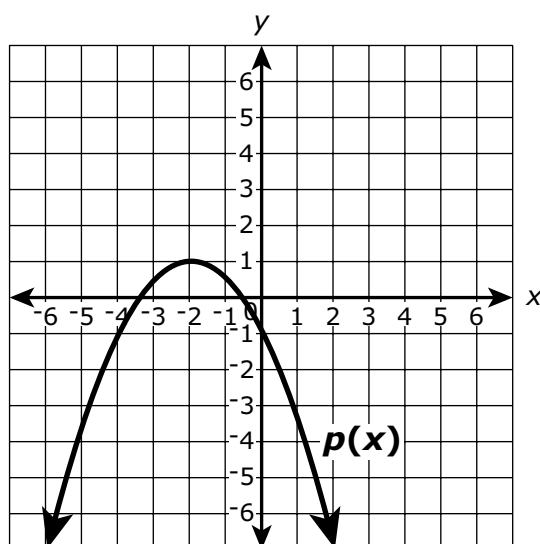
30 Consider triangle FGH and triangle RST .

- Angle F is congruent to angle R .
- Angle G is congruent to angle S .

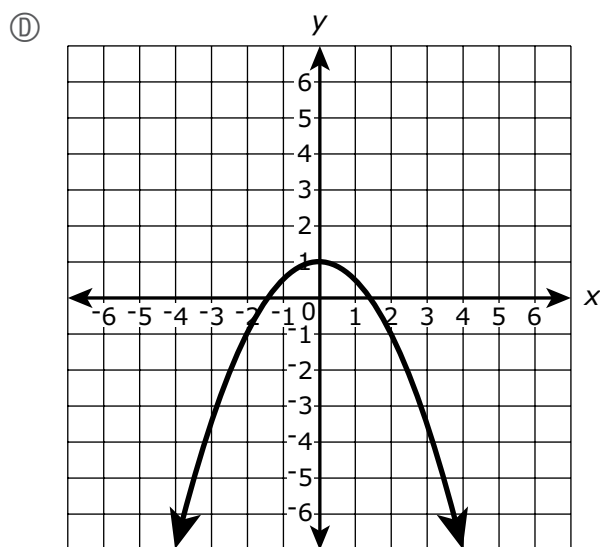
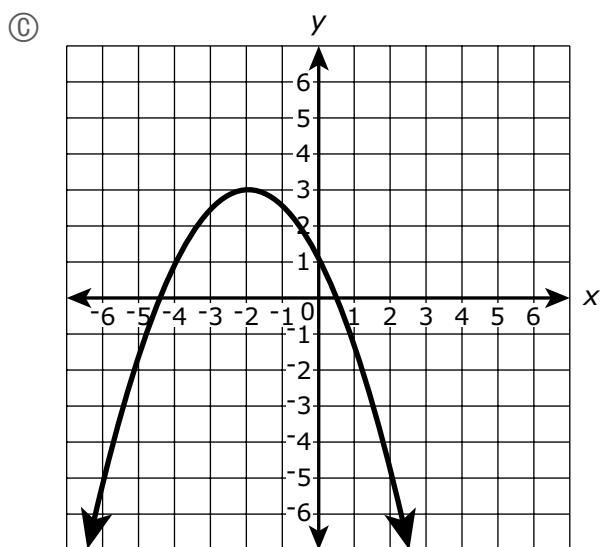
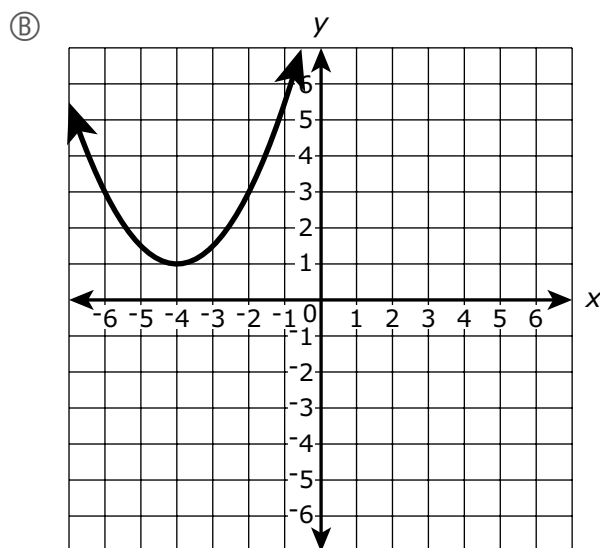
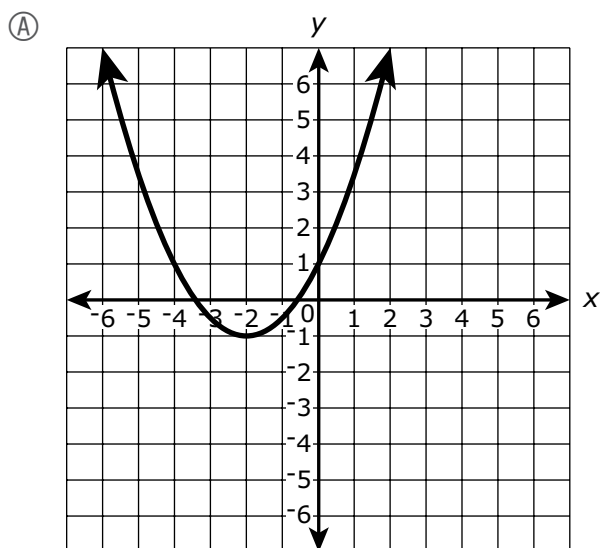
Which of the following **must** be true?

- Ⓐ Triangle FGH is similar to triangle RST .
- Ⓑ Side $\overline{FG}$ is congruent to side $\overline{RS}$.
- Ⓒ Triangle FGH is a right triangle.
- Ⓓ Side $\overline{FG}$ is parallel to side $\overline{GH}$.

- 31 The graph of $p(x)$ is shown on this coordinate plane.



Which of the following is the graph of $p(x - 2)$?



This question has two parts.

32 Part A

Consider this expression.

$$\frac{4x^8}{x^2}$$

Which of the following is equivalent to the expression for all positive values of x ?

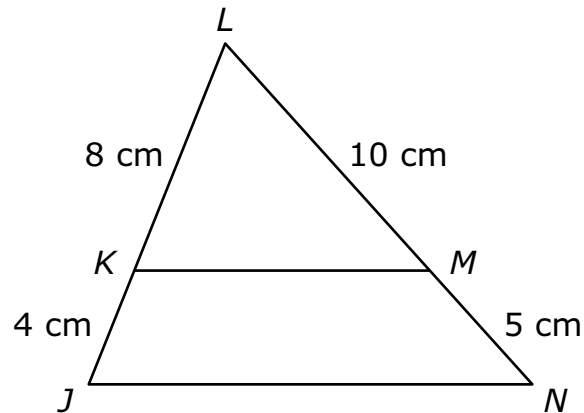
- Ⓐ $2x^4$
- Ⓑ $2x^8$
- Ⓒ $4x^2$
- Ⓓ $4x^6$

Part B

Which of the following equations is true for all positive values of x ?

- Ⓐ $\frac{x^2}{x^{-2}} = x^4$
- Ⓑ $(x^{-2})^2 = x$
- Ⓒ $x^2 + x^{-2} = 1$
- Ⓓ $x^2 \cdot x^{-2} = x^{-4}$

- 33** Triangle JLN , triangle KLM , and some of their measurements are shown in this diagram.



In the diagram,

- point K lies on $\overline{JL}$, and
- point M lies on $\overline{LN}$.

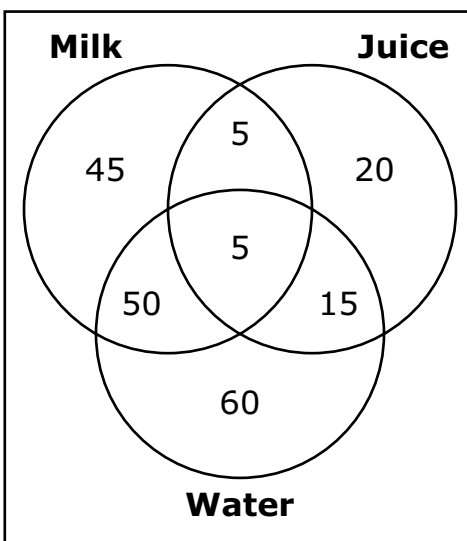
Based on the diagram, which of the following statements is **true**?

- Ⓐ $\angle J \cong \angle N$
- Ⓑ $\overline{KM} \parallel \overline{JN}$
- Ⓒ $KM = \frac{1}{2}JN$
- Ⓓ $KM = \frac{3}{2}JN$

This question has four parts. Be sure to label each part of your response.

- 34 A principal surveyed 200 tenth-grade students about the types of beverages they prefer with their meals. The options were milk, juice, and water, and students were asked to make one or more selections.

The results of the survey are shown in this Venn diagram.



- A. Based on the Venn diagram, which of the following is the total number of students who selected milk as a preference?

Mark your answer by filling in the appropriate circle on the next page.

- | | |
|--------------|--------------|
| A 95 | B 105 |
| C 165 | D 170 |
- B. What is the total number of students who did **not** select milk? Show or explain how you got your answer.
- C. What is the total number of students who selected **both** water and juice? Show or explain how you got your answer.
- D. What is the total number of students who selected juice, but **not** water? Show or explain how you got your answer.

This question has two parts.

- 35** A new car washing business opened. The total expenses of the business include a fixed monthly rental fee plus the cost of supplies for each car washed every month.

Function $C(x)$ can be used to calculate the total expenses of the business, in dollars, for washing x cars in a month.

$$C(x) = 1700 + 2.50x$$

Part A

What does the number 1700 represent in the function?

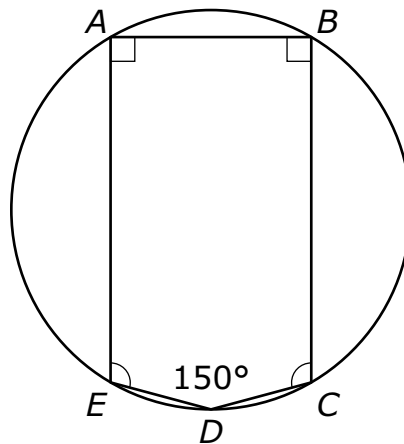
- Ⓐ the tax charged for each car washed
- Ⓑ the cost of supplies for each car washed
- Ⓒ the profit earned from the car washing business
- Ⓓ the monthly rental fee for the car washing business

Part B

The business washed 800 cars in October. Based on the function, which of the following statements is true?

- Ⓐ The total expenses for the month of October were \$1700. The rate of change of the function indicates that the total expenses increase by \$2.50 for each car washed.
- Ⓑ The total expenses for the month of October were \$1700. The rate of change of the function indicates that the total expenses increase by \$8.00 for each car washed.
- Ⓒ The total expenses for the month of October were \$3700. The rate of change of the function indicates that the total expenses increase by \$2.50 for each car washed.
- Ⓓ The total expenses for the month of October were \$3700. The rate of change of the function indicates that the total expenses increase by \$10.50 for each car washed.

- 36 This diagram shows pentagon $ABCDE$ inscribed in a circle.



In the diagram,

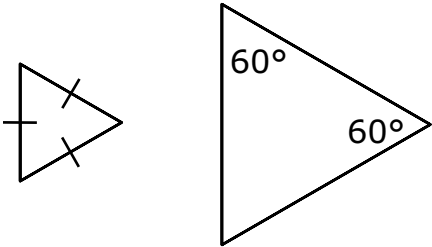
- $\angle A$ and $\angle B$ are right angles,
- $m\angle D = 150^\circ$, and
- $m\angle C = m\angle E$.

Based on the diagram, which of the following is the measure, in degrees, of $\angle E$?

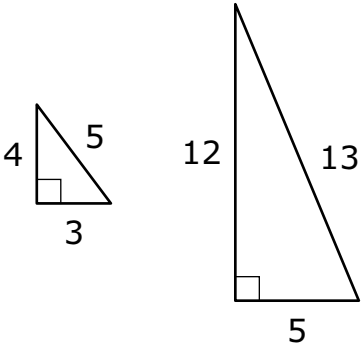
- Ⓐ 105°
- Ⓑ 120°
- Ⓒ 135°
- Ⓓ 150°

37 Which of the following pairs of triangles are **not** similar?

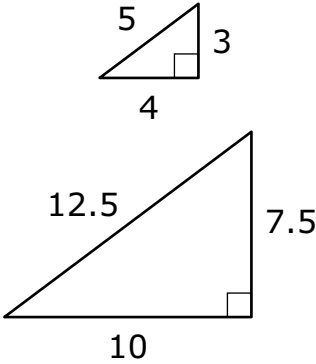
(A)



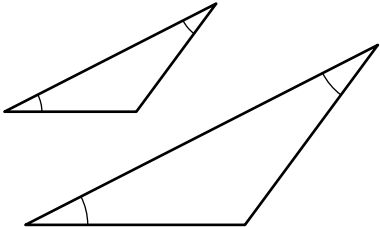
(B)



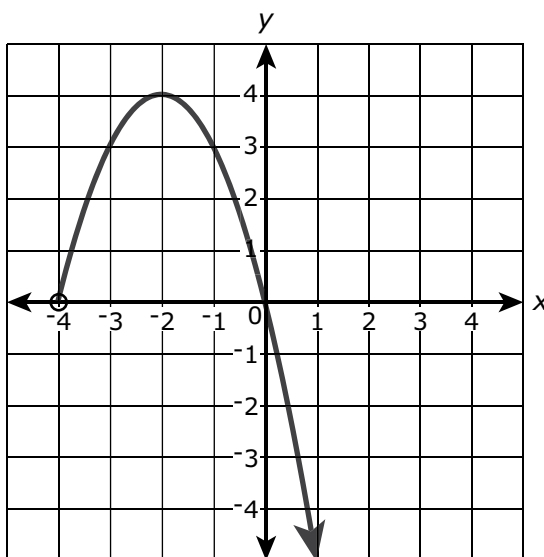
(C)



(D)



- 38 A function is graphed on this coordinate plane.



Which of the following best describes the **range** of the function?

- Ⓐ all real numbers
- Ⓑ all real numbers less than -2
- Ⓒ all real numbers greater than -4
- Ⓓ all real numbers less than or equal to 4

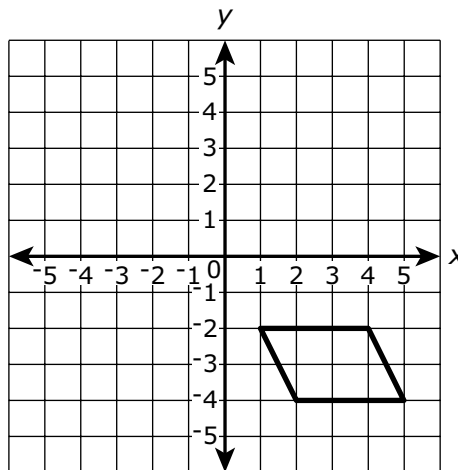
- 40** Exponential function $b(t)$ is used to calculate the balance, in dollars, in a bank account at the end of t years.

- The account had an initial deposit of \$500.
- The account earns interest at a rate of 1.5%, compounded yearly.

Which of the following functions represents $b(t)$?

- Ⓐ $b(t) = 500(0.015)^t$ Ⓑ $b(t) = 500(0.15)^t$
Ⓒ $b(t) = 500(1.015)^t$ Ⓓ $b(t) = 500(1.5)^t$

- 41** A parallelogram is graphed on this coordinate plane.



Which of the following rotations would map the parallelogram onto itself?

Select the **two** correct answers.

- Ⓐ a 360° clockwise rotation about the origin
Ⓑ a 180° clockwise rotation about the origin
Ⓒ a 90° counterclockwise rotation about the point $(3, -3)$
Ⓓ a 180° counterclockwise rotation about the point $(3, -3)$
Ⓔ a 270° counterclockwise rotation about the point $(3, -3)$

- 42 The total number of hours, h , that it takes a commuter to travel from her home to her office is a function of a , the average speed, in miles per hour, of her car.

- Her office is located 11 miles from her home.
- The average speed of her car never exceeds 35 miles per hour when she drives to her office.

Which of the following is the **domain** of the function that represents this situation?

- Ⓐ $-11 \leq a \leq 11$
- Ⓑ $0 < h \leq 11$
- Ⓒ $0 < a \leq 35$
- Ⓓ $11 \leq h \leq 35$

CONVERSIONS

1 cup = 8 fluid ounces

1 pint = 2 cups

1 quart = 2 pints

1 gallon = 4 quarts

1 gallon $\approx$ 3.785 liters

1 liter $\approx$ 0.264 gallon

1 liter = 1000 cubic centimeters

1 inch = 2.54 centimeters

1 meter $\approx$ 39.37 inches

1 mile = 5280 feet

1 mile = 1760 yards

1 mile $\approx$ 1.609 kilometers

1 kilometer $\approx$ 0.62 mile

1 pound = 16 ounces

1 pound $\approx$ 0.454 kilogram

1 kilogram $\approx$ 2.2 pounds

1 ton = 2000 pounds

AREA (A) FORMULAS

square $A = s^2$

rectangle $A = lw$

parallelogram $A = bh$

triangle $A = \frac{1}{2}bh$

trapezoid $A = \frac{1}{2}h(b_1 + b_2)$

circle $A = \pi r^2$

TOTAL SURFACE AREA (SA) FORMULAS

cube $SA = 6s^2$

right square pyramid $SA = s^2 + 2s\ell$
(ℓ = slant height)

right rectangular prism . . $SA = 2(lw) + 2(hw) + 2(lh)$

VOLUME (V) FORMULAS

cube $V = s^3$
(s = length of an edge)

prism $V = Bh$

cylinder $V = \pi r^2 h$

cone $V = \frac{1}{3}\pi r^2 h$

pyramid $V = \frac{1}{3}Bh$

sphere $V = \frac{4}{3}\pi r^3$

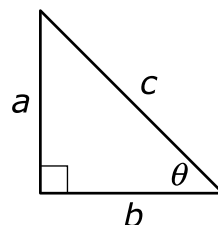
CIRCLE FORMULAS

pi $\pi \approx 3.14$

circumference $C = 2\pi r$ OR $C = \pi d$

area $A = \pi r^2$

RIGHT TRIANGLES



Pythagorean Theorem

$$a^2 + b^2 = c^2$$

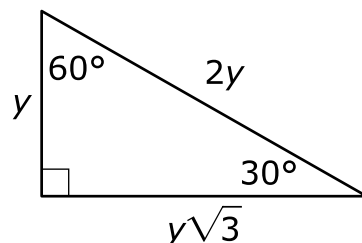
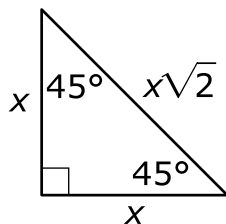
Trigonometric Ratios

$$\sin \theta = \frac{a}{c}$$

$$\cos \theta = \frac{b}{c}$$

$$\tan \theta = \frac{a}{b}$$

SPECIAL RIGHT TRIANGLES



Grade 10 Mathematics

Spring 2026 Released Operational Items

PBT Item No.	Page No.	Reporting Category	Standard	Item Type*	Item Description	Correct Answer**
1	5	<i>Statistics and Probability</i>	S-ID.A.1	SR	Determine the median of data displayed on a line plot.	A
2	6	<i>Algebra and Functions</i>	A-CED.A.4	SR	Rearrange a given formula to solve for a different variable of interest.	A
3	6	<i>Algebra and Functions</i>	A-REI.B.3	SR	Identify the solution set of a compound linear inequality.	D
4	7	<i>Number and Quantity</i>	N-Q.A.2	SR	Use conventional rounding methods to identify a reasonable estimate in a real-world situation.	C
5	7	<i>Geometry</i>	G-GPE.A.1	SR	Determine the coordinates of the center of a circle and its radius based on an equation of the circle.	B,C
6	8–10	<i>Algebra and Functions</i>	A-REI.C.6	CR	Solve given systems of linear equations and determine the solution of another system of linear equations from a graph.	
7	11	<i>Geometry</i>	G-GMD.A.1	SR	Compare the circumferences of a circle and its image after the circle has been dilated.	A
8	11	<i>Algebra and Functions</i>	A-SSE.B.3	SR	Identify properties of a quadratic function illustrated by different forms of the expression that defines it.	C
9	12	<i>Statistics and Probability</i>	S-ID.B.5	SR	Calculate a relative frequency from real-world data displayed in a two-way frequency table.	B
10	12	<i>Algebra and Functions</i>	A-SSE.A.2	SR	Identify the factors of a trinomial expression.	D
11	13–14	<i>Geometry</i>	G-CO.B.6	SR	Identify the graph of a trapezoid on a coordinate plane after a translation, and determine whether performing other transformations on the trapezoid will result in congruent figures.	D;A
12	14	<i>Algebra and Functions</i>	A-REI.A.1	SR	Determine which step in the incorrect solution of a linear equation contains the error.	D
13	15–16	<i>Number and Quantity</i>	N-RN.B.3	CR	Identify irrational numbers from a list, determine whether a sum and a product of numbers from the list are rational, and assess a claim about operations with rational numbers.	
14	17	<i>Algebra and Functions</i>	A-CED.A.2	SA	Interpret a real-world situation and identify a two-variable equation that represents it.	32;C
15	18	<i>Geometry</i>	G-CO.B.7	SR	Identify corresponding parts of congruent triangles.	A,D
16	19	<i>Geometry</i>	G-CO.D.12	SR	Describe the final steps in the construction of a perpendicular bisector of a line segment.	A
17	19	<i>Algebra and Functions</i>	A-REI.D.10	SR	Determine the x-coordinate of a point that lies on the graph of a linear equation.	D

PBT Item No.	Page No.	Reporting Category	Standard	Item Type*	Item Description	Correct Answer**
18	20–21	<i>Statistics and Probability</i>	S-ID.C.7	SA	Interpret the slope in a linear model based on a real-world situation and then make a prediction based on the model.	A,E;4
19	21	<i>Algebra and Functions</i>	A-APR.A.1	SR	Identify an expression which is equivalent to the product of binomials.	C
20	22	<i>Geometry</i>	G-SRT.C.6	SR	Identify an equation that correctly represents a trigonometric ratio in a right triangle diagram.	C
21	22	<i>Algebra and Functions</i>	F-IF.C.8	SR	Identify the vertex of a quadratic function presented in vertex form.	A
22	25	<i>Geometry</i>	G-CO.C.10	SR	Use triangle theorems to determine an angle measure in a triangle diagram.	A
23	26	<i>Geometry</i>	G-GPE.B.6	SR	Identify the point on a line segment that partitions the segment into a given ratio.	B
24	26	<i>Number and Quantity</i>	N-Q.A.1	SR	Use dimensional analysis and estimation skills to solve a real-world problem.	C
25	27	<i>Geometry</i>	G-C.B.5	SR	Determine the length of an arc based on a real-world situation.	B
26	27	<i>Number and Quantity</i>	N-Q.A.3	SR	Use conventional rounding methods to solve a real-world problem involving distance and time.	C
27	28–29	<i>Geometry</i>	G-GMD.A.3	CR	Calculate and compare the volumes of a cylinder and a cone, and equate the volume of the cylinder to that of a prism.	
28	30	<i>Algebra and Functions</i>	F-LE.A.1	SR	Determine whether given situations can be modeled by linear or by exponential functions.	C
29	30	<i>Statistics and Probability</i>	S-CP.B.7	SR	Calculate a compound probability by applying the Addition Rule.	C
30	31	<i>Geometry</i>	G-SRT.A.3	SR	Analyze the relationship between two triangles given the congruence of their corresponding angles.	A
31	32–33	<i>Algebra and Functions</i>	F-BF.B.3	SR	Identify the graph of a quadratic function over a translation.	D
32	34	<i>Number and Quantity</i>	N-RN.A.2	SR	Given different exponential expressions, use properties of exponents to identify equivalent expressions.	D;A
33	35	<i>Geometry</i>	G-SRT.B.4	SR	Use a proportional relationship to analyze a triangle diagram.	B
34	36–37	<i>Statistics and Probability</i>	S-CP.A.1	CR	Identify specific subsets of a sample space based on real-world data displayed in a Venn diagram.	
35	38	<i>Algebra and Functions</i>	F-LE.B.5	SR	Interpret the parameters of a linear function in terms of a real-world situation.	D;C
36	39	<i>Geometry</i>	G-C.A.3	SR	Determine an unknown angle measure in a pentagon inscribed in a circle based on given angle measures and relationships.	A
37	40	<i>Geometry</i>	G-SRT.A.2	SR	Given pairs of triangles and some of their measurements, identify the pair which is not a similar pair.	B

PBT Item No.	Page No.	Reporting Category	Standard	Item Type*	Item Description	Correct Answer**
38	41	<i>Algebra and Functions</i>	F-IF.A.1	SR	Identify the range of a quadratic function from its graph.	D
39	42	<i>Geometry</i>	G-SRT.C.8	SR	Determine an unknown length and an unknown angle measure in a right triangle based on a real-world situation.	C;B
40	43	<i>Algebra and Functions</i>	F-BF.A.1	SR	Create an exponential function based on a real-world situation.	C
41	43	<i>Geometry</i>	G-CO.A.3	SR	Identify rotations that will carry a parallelogram, graphed on a coordinate plane, onto itself.	A,D
42	44	<i>Algebra and Functions</i>	F-IF.B.5	SR	Identify the domain of a linear function based on its context.	C

* Mathematics item types are: selected-response (SR), short-answer (SA), and constructed-response (CR).

** Answers are provided here for selected-response and short-answer items only. Sample responses and scoring guidelines for any constructed-response items will be posted to the Department's website later this year.