Rhode Island RICAS 2022 Grade 7 Math

Overview of Grade 7 Mathematics Test

The spring 2022 grade 7 Mathematics test was a next-generation assessment that was administered in two primary formats: a computer-based version and a paper-based version. The vast majority of students took the computer-based test. The paper-based test was offered as an accommodation for students with disabilities who are unable to use a computer, as well as for English learners who are new to the country and are unfamiliar with technology.

Most of the operational items on the grade 7 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 RICAS Resource Center website at ricas.pearsonsupport.com/released-items.

The Scoring Guides can be found at www.doe.mass.edu/mcas/student/. They provide the released constructed-response questions, a unique scoring guide for each question, and samples of student work at each score point.

Test Sessions and Content Overview

The grade 7 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 7 Mathematics test was based on standards in the five domains for grade 7 in the *Massachusetts Curriculum Framework for Mathematics* (2017). The five domains are listed below.

- Ratios and Proportional Relationships
- The Number System
- Expressions and Equations
- Geometry
- Statistics and Probability

The *Massachusetts Curriculum Framework* is strongly aligned with Rhode Island's Mathematics standards: the Common Core State Standards (CCSS). The RICAS Mathematics assessment tables articulate this alignment and are available on the RIDE website at www.ride.ri.gov/ricas. The *Massachusetts Curriculum Framework for Mathematics* is available on the Department website at www.doe.mass.edu/frameworks/current.html.

Mathematics test results are reported under five MCAS reporting categories, which are identical to the five framework domains listed above.

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

Reference Materials and Tools

Each student taking the paper-based version of the grade 7 Mathematics test was provided with a plastic ruler and a grade 7 Mathematics Reference Sheet. A copy of the reference sheet follows the final question in this document. An image of the ruler is not reproduced in the 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 bilingual word-to-word dictionaries was allowed for current and former English learner students only. No other reference tools or materials were allowed.

RIDE Rhode Island Department of Education

Rhode Island Comprehensive Assessment System
Grade 7 Mathematics Reference Sheet

CONVERSIONS

1 cup = 8 fluid ounces
1 pint = 2 cups
1 quart = 2 pints
1 gallon = 4 quarts
1 gallon ≈ 3.785 liters
1 liter ≈ 0.264 gallon
1 liter = 1000 cubic centimeters

1 inch = 2.54 centimeters
1 meter ≈ 39.37 inches
1 mile = 5280 feet
1 mile = 1760 yards
1 mile ≈ 1.609 kilometers
1 kilometer ≈ 0.62 mile

1 pound = 16 ounces
1 pound ≈ 0.454 kilogram
1 kilogram ≈ 2.2 pounds
1 ton = 2000 pounds

AREA (*A*) FORMULAS

square . . . . . $A = s^2$

rectangle . . . . . $A = bh$
OR
$A = lw$

parallelogram . . $A = bh$

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

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

circle . . . . . $A = \pi r^2$

VOLUME (*V*) FORMULAS

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

right prism . . . . . $V = Bh$

TOTAL SURFACE AREA (*SA*) FORMULAS

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

CIRCLE FORMULAS

area . . . . . $A = \pi r^2$

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

RIDE Rhode Island Department of Education

Release of Spring 2022 RICAS Test Items

from the

Grade 7 Mathematics Paper-Based Test

June 2022
Rhode Island Department of Education

Grade 7 Mathematics

SESSION 1

This session contains 10 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.

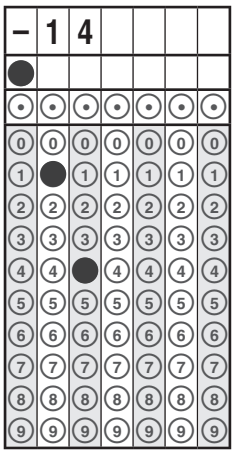
For other questions, you will need to fill in an answer grid. Directions for completing questions with answer grids are provided on the next page.

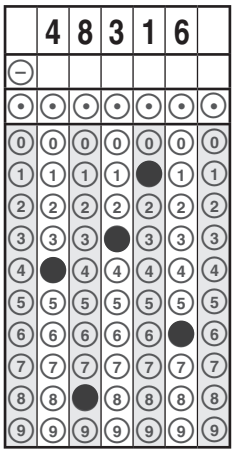
If a question asks you to show or explain your work, you must do so to receive full credit. Write your response in the space provided. Only responses written within the provided space will be scored.

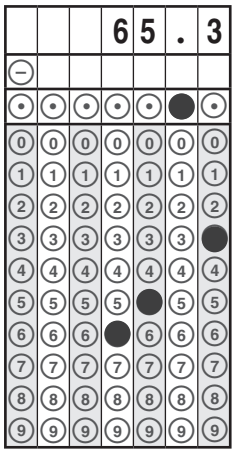
Directions for Completing Questions with Answer Grids

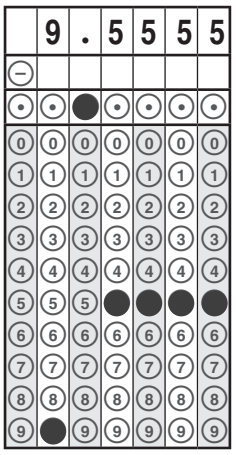
1. Work the question and find an answer.
2. Enter your answer in the answer boxes at the top of the answer grid.
3. Print only one number or symbol in each box. Do not leave a blank box in the middle of an answer.
4. Under each answer box, fill in the circle that matches the number or symbol you wrote 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









1 What value of x makes this equation true?

$$2x - 1 = 9$$

Ⓐ $x = 3\frac{1}{2}$

Ⓑ $x = 4$

Ⓒ $x = 5$

Ⓓ $x = 5\frac{1}{2}$

2 Which of the following expressions have a positive value?

Select the **two** correct answers.

Ⓐ $-2 \times (-4)$

Ⓑ $8 \div (-2)$

Ⓒ -9×7

Ⓓ $-12 \div 6$

Ⓔ $5 \times (-3)$

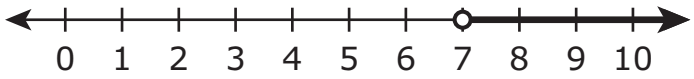
Ⓕ $-14 \div (-2)$

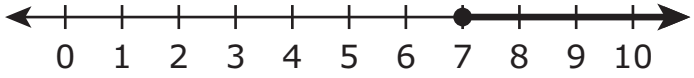
3 Amelia is saving money to buy a new skateboard. She needs at least $85 to buy the skateboard. Amelia has $15 saved and will save an additional $10 per week to buy the new skateboard.

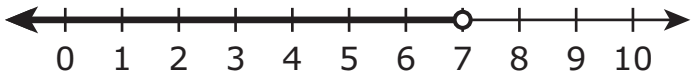
The following inequality can be used to determine x, the number of weeks Amelia will have to save money before she will have enough money to buy the skateboard.

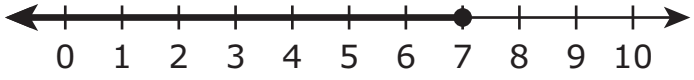
$$15 + 10x \geq 85$$

Which of the following number lines shows the solution set of the inequality?

Ⓐ 

Ⓑ 

Ⓒ 

Ⓓ 

4 Consider this expression.

$$(7x + 8) - (3x + 5)$$

Which of the following is equivalent to the expression?

Ⓐ $10x + 3$

Ⓑ $10x + 13$

Ⓒ $4x + 3$

Ⓓ $4x + 13$

5 A teacher runs each morning before school.

- Last week, he ran a total of $5\frac{3}{4}$ miles.
- This week, he ran $\frac{4}{5}$ of the total number of miles he ran last week.

What is the total number of miles that the teacher ran last week **and** this week?

Ⓐ $6\frac{11}{20}$ miles

Ⓑ $10\frac{7}{20}$ miles

Ⓒ $11\frac{7}{20}$ miles

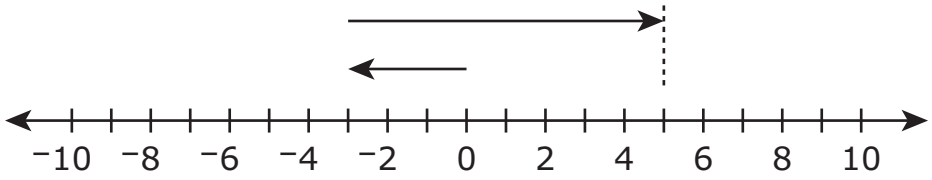
Ⓓ $12\frac{15}{16}$ miles

6 Consider this expression.

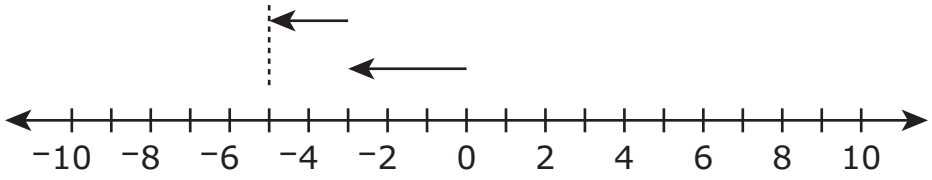
$$-3 - 5$$

Which of the following number lines represents the expression?

Ⓐ



Ⓑ



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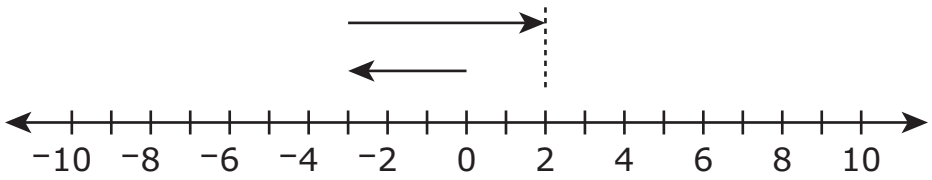
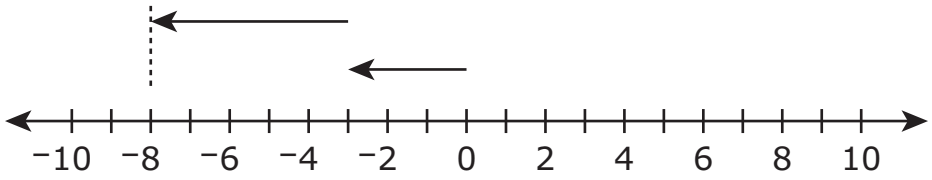


Ⓓ



7 A student bought a computer game that cost q dollars. The student paid 6% sales tax on the cost of the computer game.

Which of the following expressions can be used to represent the total amount, in dollars, the student paid for the computer game?

Select the **two** correct answers.

Ⓐ $0.94q$

Ⓑ $1.06q$

Ⓒ $q + 0.06$

Ⓓ $q - 0.06$

Ⓔ $q + 0.06q$

Ⓕ $q - 0.06q$

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

8 Students are playing a game. They roll a number cube once and then spin the arrow on a spinner once.

- The number cube has faces numbered 1 through 6.
- The spinner has 3 equal-sized sections. One section is colored blue, one red, and one green.

A. What is the probability that, on a student's turn, the number cube will land with a 5 on the top face? Show or explain how you got your answer.

B. What is the probability that, on a student's turn, the number cube will land with an odd number on the top face? Show or explain how you got your answer.

C. What is the probability that, on a student's turn, the number cube will land with a 2 on the top face **and** the arrow on the spinner will land on the section that is green? Show or explain how you got your answer.

D. What is the probability that, on a student's turn, the number cube will land with an even number on the top face **and** the arrow on the spinner will land on a section that is **not** blue? Show or explain how you got your answer.

8

9 In Fairbanks, Alaska, the average temperature in February is −3.6°F, and the average temperature in March is 11°F.

What is the difference in the average temperatures for February and March in Fairbanks, Alaska?

Ⓐ 7.4°F

Ⓑ 8.6°F

Ⓒ 13.4°F

Ⓓ 14.6°F

10 Consider this expression.

$$-4(-3x + 1)$$

Which of the following is equivalent to the expression?

Ⓐ $-12x + (-3)$

Ⓑ $-7x + (-4)$

Ⓒ $7x + (-3)$

Ⓓ $12x + (-4)$

Grade 7 Mathematics

SESSION 2

This session contains 10 questions.

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

Directions

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11 The length of a building is 60 feet. The length of the building on a scale drawing is 4 inches.

Which ratio describes the scale of the drawing?

Ⓐ 1 inch : 4 feet

Ⓑ 1 inch : 15 feet

Ⓒ 1 inch : 30 feet

Ⓓ 1 inch : 60 feet

12 An athlete did sit-ups each day for 3 days. She did a total of 325 sit-ups.

- On the first day, she did 124 sit-ups.
- On the second day, she did $\frac{3}{4}$ the number of sit-ups she did on the first day.

Which of the following statements about the number of sit-ups the athlete did on the second and the third days is true?

Ⓐ The athlete did 93 sit-ups on the second day and 108 sit-ups on the third day.

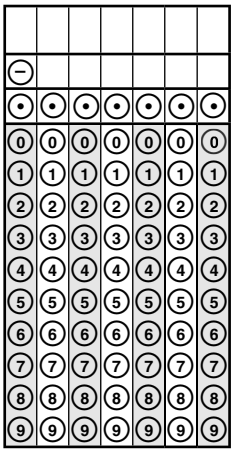
Ⓑ The athlete did 93 sit-ups on the second day and 217 sit-ups on the third day.

Ⓒ The athlete did 108 sit-ups on the second day and 93 sit-ups on the third day.

Ⓓ The athlete did 108 sit-ups on the second day and 217 sit-ups on the third day.

13 A large sprinkler is watering a circular area of 1600π square meters. What is the radius, in meters, of the circular area being watered by the sprinkler?

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



14 A babysitter bought 6 cans of juice for a total of \$4.50. Each can of juice cost the same amount. Which of the following proportions can be used to find c, the cost, in dollars, of 4 cans of juice?

Ⓐ $\frac{6}{4.50} = \frac{4}{c}$

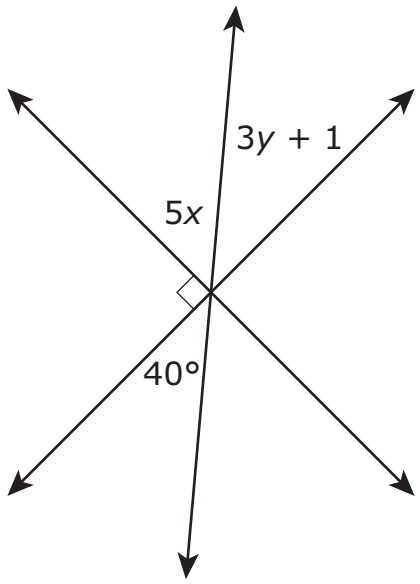
Ⓑ $\frac{6}{4.50} = \frac{c}{4}$

Ⓒ $\frac{6+4}{c} = \frac{1}{4.50}$

Ⓓ $\frac{6+4}{c} = \frac{6}{4.50}$

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

15 Three lines intersect to form six angles. The measures, in degrees, of some of the angles are represented by expressions, as shown in this diagram.



A. Based on the diagram, write an algebraic equation that can be used to find the value of x. Show or explain how you got your answer.

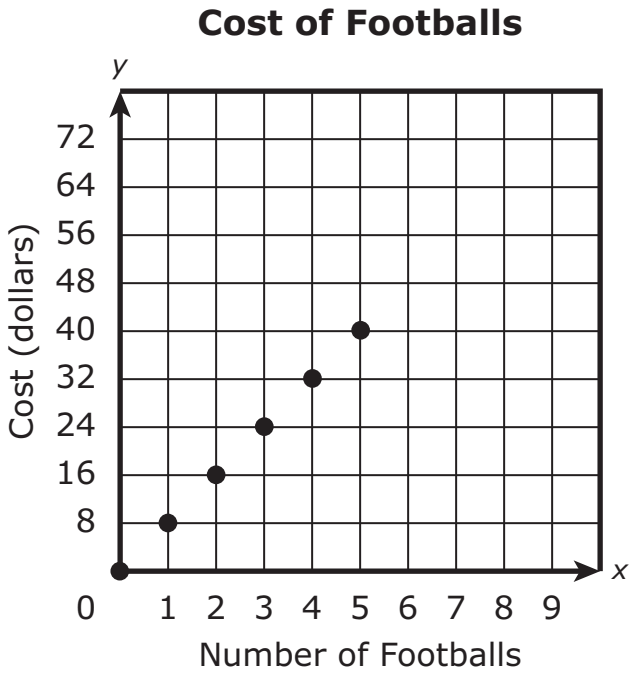
B. Use your equation from Part A to determine the value of x. Show or explain how you got your answer.

C. Based on the diagram, write an algebraic equation that can be used to find the value of y. Show or explain how you got your answer.

D. Use your equation from Part C to determine the value of y. Show or explain how you got your answer.

15

16 This graph shows the relationship between x, the number of footballs a team orders, and y, the total cost in dollars of the footballs.



Based on the graph, which of the following statements about the cost of footballs is correct?

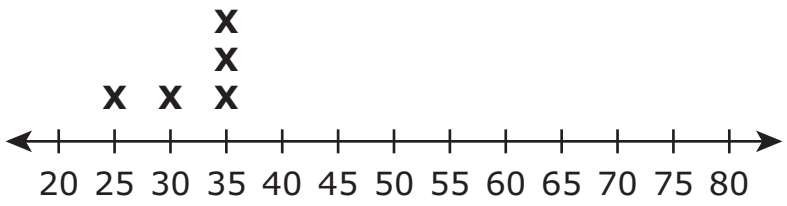
Ⓐ The cost of 4 footballs is $4. The unit rate per football is $1.

Ⓑ The cost of 4 footballs is $24. The unit rate per football is $6.

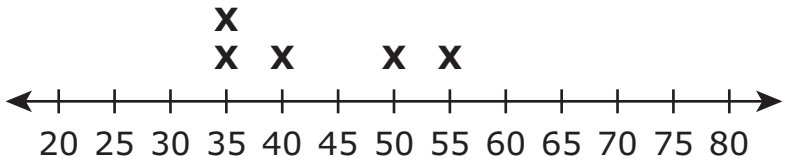
Ⓒ The cost of 4 footballs is $32. The unit rate per football is $8.

Ⓓ The cost of 4 footballs is $40. The unit rate per football is $10.

17 These line plots show the numbers of points scored by the individual players from two different teams during a game.



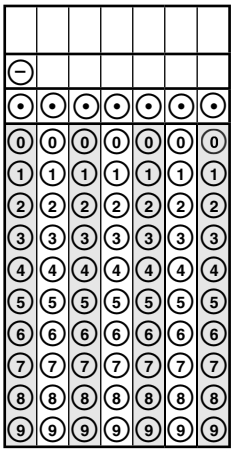
Points Scored by Players from Home Team



Points Scored by Players from Visiting Team

What is the total number of players from the two teams whose points scored falls between the means of the two line plots?

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



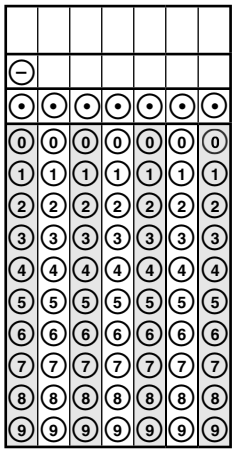
This question has two parts.

18 **Part A**

The price of a hammer at a local hardware store is $20. The store is offering a 15% discount off the price of the hammer. There is a 6% sales tax, applied after any discounts, on all purchases.

What will be the final cost, in dollars, of the hammer, including the discount and the sales tax?

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



Part B

The same hammer is available from an online retailer. If a customer uses a discount code that offers a 25% discount and free shipping, the hammer will cost $17.25. There is no sales tax if the customer buys the hammer online.

What is the original price of the hammer from the online retailer?

Ⓐ $12.94

Ⓑ $19.75

Ⓒ $21.56

Ⓓ $23.00

19 Kites and spools of kite string are sold at a toy store.

- Each kite costs $5, including tax.
- Each spool of kite string costs $3, including tax.

Which of the following equations represents c, the total cost in dollars of k kites and 2 spools of kite string at the toy store?

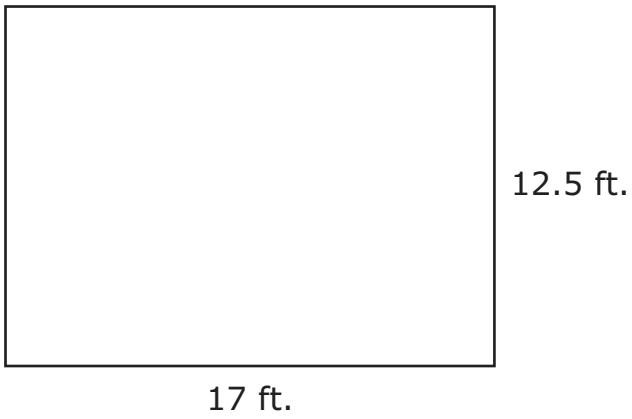
Ⓐ $c = 5k + 6$

Ⓑ $c = 5k + 3$

Ⓒ $c = 6k + 5$

Ⓓ $c = 3k + 5$

20 A carpenter is going to install square tiles on a living room floor. The living room floor is in the shape of a rectangle, as shown.



The side length of each square tile is 6 **inches**. What is the **minimum** number of tiles the carpenter needs to completely cover the living room floor?

Ⓐ 213

Ⓑ 425

Ⓒ 850

Ⓓ 1,275

Grade 7 Mathematics
Spring 2022 Released Operational Items

PBT Item No.	Page No.	Reporting Category	Standard	Item Type*	Item Description	Correct Answer**
1	4	*Expressions and Equations*	7.EE.B.3	SR	Solve a multi-step problem using properties of operations.	C
2	4	*The Number System*	7.NS.A.2	SR	Determine whether the values of given expressions are negative or positive.	A,F
3	5	*Expressions and Equations*	7.EE.B.4	SR	Determine which number line is the solution set of an inequality that represents a real-world problem.	B
4	6	*Expressions and Equations*	7.EE.A.1	SR	Determine which expression is equivalent to a given linear expression by applying properties of operations.	C
5	6	*The Number System*	7.NS.A.3	SR	Solve a real-world problem that involves fractions and mixed numbers using operations.	B
6	7	*The Number System*	7.NS.A.1	SR	Represent subtraction of integers on a number line.	D
7	8	*Expressions and Equations*	7.EE.A.2	SR	Determine which expressions can be used to represent a real-world situation.	B,E
8	9–10	*Statistics and Probability*	7.SP.C.8	CR	Find probabilities of compound events involving a spinner and a number cube.	
9	11	*The Number System*	7.NS.A.1	SR	Use subtraction of integers to solve a problem.	D
10	11	*Expressions and Equations*	7.EE.A.1	SR	Determine which expression represents an expansion of a linear expression with a rational coefficient.	D
11	14	*Ratios and Proportional Relationships*	7.RP.A.1	SR	Determine the unit rate in a real-world problem.	B
12	14	*The Number System*	7.NS.A.3	SR	Apply the four operations to solve a real-world problem involving rational numbers.	A
13	15	*Geometry*	7.G.B.4	SA	Determine the radius of a circle given its area.	40
14	15	*Ratios and Proportional Relationships*	7.RP.A.2	SR	Determine which proportion can be used to solve a real-world problem given in a verbal description.	A
15	16–17	*Geometry*	7.G.B.5	CR	Use facts about angles to write and solve equations that can be used to find the measures of unknown angles in a diagram.	
16	18	*Ratios and Proportional Relationships*	7.RP.A.2	SR	Determine and apply the unit rate of a given real-world context from a graph.	C
17	19	*Statistics and Probability*	7.SP.B.3	SA	Determine the number of data points that lie between the means of two data sets.	6
18	20	*Ratios and Proportional Relationships*	7.RP.A.3	SA	Solve multi-step percent problems involving markdowns.	18.02;D
19	21	*Expressions and Equations*	7.EE.B.4	SR	Determine which equation models a given written scenario based on a real-world context.	A
20	21	*Expressions and Equations*	7.EE.B.3	SR	Solve a real-world problem involving the area of a rectangle.	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.

Grade 7 Mathematics
Spring 2022 Unreleased Operational Items

PBT Item No.	Reporting Category	Standard	Item Type*	Item Description
21	*Ratios and Proportional Relationships*	7.RP.A.3	SR	Solve a multi-step real-world ratio problem.
22	*Ratios and Proportional Relationships*	7.RP.A.2	CR	Recognize if data represented on a graph is proportional, solve a problem involving proportions on a graph, and write an equation that can be used to represent the relationship between quantities.
23	*The Number System*	7.NS.A.2	SR	Determine which expression is equivalent to a given expression.
24	*The Number System*	7.NS.A.3	SR	Determine which expression is equivalent to a given expression.
25	*Expressions and Equations*	7.EE.A.1	SR	Apply properties to add linear expressions in a real-world context.
26	*Expressions and Equations*	7.EE.A.2	SR	Determine which expressions can be used to represent a real-world problem involving price markups and markdowns.
27	*The Number System*	7.NS.A.3	SR	Determine which expression is equivalent to a given expression.
28	*Statistics and Probability*	7.SP.C.8	SR	Determine which tree diagram correctly models the probabilities of compound events.
29	*The Number System*	7.NS.A.2	SA	Determine the value of a variable that will make an algebraic expression positive and rational.
30	*The Number System*	7.NS.A.1	SR	Determine which number line shows the plotted value of a rational expression.
31	*Expressions and Equations*	7.EE.B.3	CR	Solve multi-step real-life problems using fractions, decimals, and whole numbers.
32	*Geometry*	7.G.A.2	SA	Determine the number of triangles that could be drawn using a given set of side lengths.
33	*Statistics and Probability*	7.SP.C.7	SR	Determine the probability of an event using a uniform probability model.
34	*Geometry*	7.G.A.3	SR	Determine which two-dimensional figure will be the result from slicing a given three-dimensional figure.
35	*Geometry*	7.G.A.1	SR	Determine dimensions of a scaled rectangle given the original rectangle and scale.
36	*Statistics and Probability*	7.SP.C.5	SR	Identify which set is most likely to produce an event that will match a given probability.
37	*Ratios and Proportional Relationships*	7.RP.A.3	SR	Solve a multi-step real-world percent problem.
38	*Statistics and Probability*	7.SP.C.8	SR	Determine the probability of a compound event using a tree diagram and a fair coin.
39	*Statistics and Probability*	7.SP.B.4	SR	Solve a problem that involves making comparisons between two population medians using data from two random samples.
40	*Statistics and Probability*	7.SP.A.1	SR	Determine which sampling strategy will produce a valid representative sample for a given population.

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