Ohio | Department of Education

STUDENT READINESS ASSESSMENT ITEM RELEASE GUIDE TEACHER EDITION GRADE 6 MATHEMATICS

Introduction

The state-mandated school closures through the end of the 2019-2020 school year not only changed the way schools delivered instruction but impacted how students were expected to learn grade-level and course content. As districts prepare for the 2020-2021 school year, the Ohio Department of Education is providing a series School Readiness Toolkits to help educators reflect on their instructional practices and support them in determining where their students are in their acquisition and retention of knowledge and skills.

Background

The items contained in the Student Readiness Assessment Item Release Guides have been selected from the pool of released items from previous spring administrations of Ohio's State Tests. The items are grouped together by Reporting Category and Critical Area of Focus. The collection of items as a whole is not representative of a single test form. The items presented are selected to offer a range of opportunity to work with each reporting category but do not comprise an actual test statistically. They are chosen to offer a range of experience with items of varying levels of difficulty or complexity. Items contained in Student Readiness Assessment Item Release Guides are reflective of the 2017 Ohio's Learning Standards for Mathematics. All items satisfy the criteria set forth by the grade-level/course Test Specifications and Content Elaborations and Expectations for Learning established by the grade-level/course Model Curriculum.

How These Items Can Be Used

The Student Readiness Assessment Item Release Guides documents can be used to support instruction in a variety of ways. Districts can choose to administer the:

- Previous grade-level Student Readiness Assessment Item Release Guides to acquire data and gather information on student understanding of previous grade-level content to begin the new school year;
- Current grade level Student Readiness Assessment Item Release Guides items in sections as pre-assessments based on the grade level/course Critical Areas of Focus or local unit of study;
- Current grade-level Student Readiness Assessment Item Release Guides in their entirety;
- Problems may be individually selected for use during local instruction; or
- Problems may be selected for use on local assessments.

How to Identify Released Items

At the bottom of the page for each released item, there is a page number and year. For example: 3 (2018), identifies the item can be found on page 3 of the 2018 Released Item document for the grade level or course. Released Item Scoring Guides for Mathematics are available in the Test Portal in the Student Practice Resources for Mathematics folder under the Student Practice Resources.

The released item Release Scoring Guides sample responses and scoring rationales can help educators plan and deliver instruction by providing example responses for each question along with scoring rationales for each response.

- 2017 Item Release Scoring Guide Grade 6
- 2018 Item Release Scoring Guide Grade 6
- 2019 Item Release Scoring Guide Grade 6

Using Released Test Items to Plan Instruction after COVID-19

The following questions can be answered individually or as a teacher team in the review of the state-released items and subsequent reflection on the local curriculum, instructional practices and assessments (both formative and summative), along with the previous learning opportunities for students.

- What are the math concepts evident in the release item(s)?
    - What is the math a student needs to know in this item?
    - Specifically, what previous grade-level standards impact the ability to answer this item?

- What math strategies can a student use to answer the item?
    - Identify examples of how these can be included in your instruction.

- Does the item focus on procedural fluency or conceptual understanding?
    - Procedural fluency follow-up:
        - What are the procedures and/or skills a student needs to know?
        - What experiences do students have to be prepared to demonstrate this learning?
        - What experiences can be used to move toward the desired outcome(s)?

- Conceptual understanding follow-up:
    - What mathematical understanding is evident in the item?
    - What tasks can be used to develop that mathematical understanding?

- Does the item require the student to make connections across standards? If so, what are they?
    - What previous grade-level expectations are evident in the item?
    - What experiences can improve a student's ability to demonstrate these learning expectations?

- Which Standards for Mathematical Practice are most evident in the item?
    - What types of experiences will improve student success?

Preparing for Instruction

Identify a grade-level Critical Area of Focus or a mathematical topic of related standards. Think about what your typical instruction for this critical area of focus looks like. Determine whether changes are needed to grow all students mathematically.

- What was present in past instruction that helped students perform well?
    - Using the Gap Analysis, Critical Area of Focus, Learning Progressions and Model Curriculum documents, what previous learning is likely absent or weak?
    - What experiences would support bridging the gap(s)?
    - How could you strengthen the Standards for Mathematical Practice to help support or enhance learning?
    - Specifically, what tasks would be used?

- What does typical instruction include?
    - Models/representations? What models or representations need introduction?
    - One-step, two-step or multi-step problems? Is more experience needed? What?
    - Routine and non-routine problems? Is more experience needed? What?
    - Mathematical and real-world contexts? Is more experience needed? What rich tasks could incorporate multiple standards?

- Did the mathematical contexts use numbers and operations appropriate for the grade level?
    - How could those numbers be modified to highlight the mathematical understanding needed and increase access for all students?

- Were the real-world contexts familiar or unfamiliar to the students?
    - How do you know?
    - What is needed now?

- Did the instruction allow opportunities for student reasoning and communication?
    - Productive struggle?
    - Student analysis of individual work, thinking and reasoning of others?
    - Descriptions, explanations and justifications?
    - Error analysis and reasonableness of answers?
    - What changes are needed to strengthen the Standards for Mathematical Practice?

- From this analysis, what overall changes are needed in instruction?
    - What instructional strategies should be maintained?
    - What instructional strategies require modification?
    - What needs to happen next to increase learning for all students?
        - Resources
        - Instructional strategies
        - Professional development
            - Do I need to seek out professional learning opportunities? What opportunities do I have for growing my own learning? What supports do I have to make these changes?

Grade 6
Reporting Category:

Ratio and Proportions

CRITICAL AREA OF FOCUS #1
Connecting ratio and rate to whole number multiplication and division and using concepts of ratio and rate to solve problems

Question 21

Farrah has 150 dimes, 250 nickels, and 400 pennies.

Complete the table to show the ratio of the number of pennies to the total number of coins.

	:	

Points Possible: 1

Content Cluster: Understand ratio concepts and use ratio reasoning to solve problems.

Content Standard: Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. For example, “The ratio of wings to beaks in the bird house at the zoo was 2:1, because for every 2 wings there was 1 beak.” “For every vote candidate A received, candidate C received nearly three votes.” *(6.RP.1)*

Depth of Knowledge: Level 2
d. Solve a routine problem requiring multiple steps/decision points, or the application of multiple concepts

Calculator Designation: Calculator Neutral

Question 16

Jason makes a fruit salad using only strawberries and blueberries.

The ratio of strawberries to blueberries in Jason's fruit salad is 4 cups to 5 cups.

Which statement describes the contents of Jason's fruit salad?

Ⓐ Strawberries make up $\frac{4}{5}$ of the fruit salad.

Ⓑ Blueberries make up $\frac{5}{9}$ of the fruit salad.

Ⓒ There are 5 strawberries for every 4 blueberries.

Ⓓ There is always 1 more cup of blueberries than strawberries.

Points Possible: 1

Content Cluster: Understand ratio concepts and use ratio reasoning to solve problems.

Content Standard: Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. *For example, "The ratio of wings to beaks in the bird house at the zoo was 2:1, because for every 2 wings there was 1 beak." "For every vote candidate A received, candidate C received nearly three votes." (6.RP.1)*

Calculator Designation: Calculator neutral

Question 2

Hannah planted flowers next to the school playground. She planted 2 daisies, 3 sunflowers and 4 tulips.

What is the ratio of the number of daisies she planted to the total number of flowers she planted?

Ⓐ 2:3

Ⓑ 2:4

Ⓒ 2:7

Ⓓ 2:9

Points Possible: 1

Content Cluster: Understand ratio concepts and use ratio reasoning to solve problems.

Content Standard: Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. For example, “The ratio of wings to beaks in the bird house at the zoo was 2:1, because for every 2 wings there was 1 beak.” “For every vote candidate A received, candidate C received nearly three votes.” *(6.RP.1)*

Calculator Designation: Calculator neutral

Question 4

Which statement describes a unit rate?

Ⓐ Alex eats 3 apples.

Ⓑ Kyle runs 3 miles over 2 days.

Ⓒ Zack reads 3 pages of his book per minute.

Ⓓ Michael adds 3 cups of sugar for every 2 cups of flour.

Points Possible: 1

Content Cluster: Understand ratio concepts and use ratio reasoning to solve problems.

Content Standard: Understand the concept of a unit rate a/b associated with a ratio a:b with b not equal to 0, and use rate language in the context of a ratio relationship. For example, “This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is 3/4 cup of flour for each cup of sugar.” “We paid $75 for 15 hamburgers, which is a rate of $5 per hamburger.” *(6.RP.2)*

Depth of Knowledge: Level 1
a. Recall, observe, or recognize a fact, definition, term, or property
n. Represent math relationships in words, pictures, or symbols

Calculator Designation: Calculator Neutral

Question 16

A cell phone plan offers 250 minutes each month for $15.00 per month.

What is the cost per minute when a person uses all 250 minutes in a month?

(A) $ 0.06

(B) $ 0.60

(C) $ 3.60

(D) $16.67

Points Possible: 1

Content Cluster: Understand ratio concepts and use ratio reasoning to solve problems.

Content Standard: Understand the concept of a unit rate a/b associated with a ratio a:b with b ≠ 0 and use rate language in the context of a ratio relationship. For example, "This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is $^3/_4$ cup of flour for each cup of sugar." "We paid $75 for 15 hamburgers, which is a rate of $5 per hamburger." *(6.RP.2)*

Calculator Designation: Calculator

Question 33

Evelyn borrowed $30 from her mother to buy a sweater. After 3 weeks of babysitting, she pays her mother back $24.

What percent of the debt has Evelyn paid her mother back?

%

1	2	3
4	5	6
7	8	9
	0	
.	-	$\frac{\square}{\square}$

Points Possible: 1

Content Cluster: Understand ratio concepts and use ratio reasoning to solve problems.

Content Standard: Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations. *(6.RP.3)*
c. Find a percent of a quantity as a rate per 100, e.g., 30% of a quantity means 30/100 times the quantity; solve problems involving finding the whole, given a part and the percent.

Depth of Knowledge: Level 2
Solve a routine problem requiring multiple steps/decision points, or the application of multiple concepts

Calculator Designation: Calculator

Question 39

A bakery has three types of pie: apple, cherry, and peach. There are 4 times as many apple pies as peach pies.

What is a possible percentage for each type of pie?

Apple: _____ %

Cherry: _____ %

Peach: _____ %

1	2	3
4	5	6
7	8	9
	0	
.	-	$\frac{\square}{\square}$

Points Possible: 1

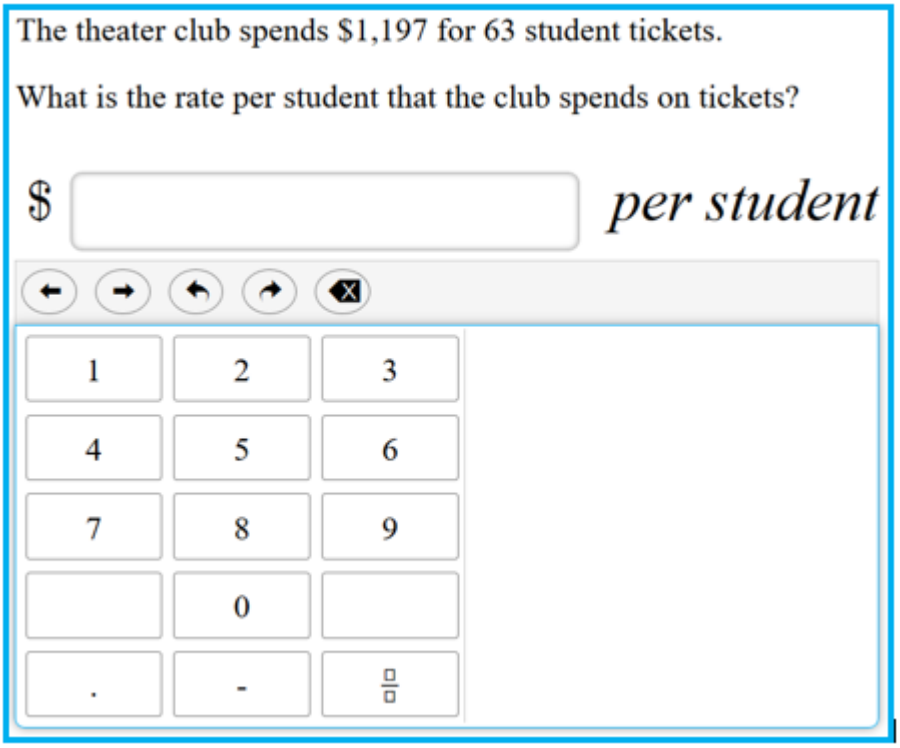
Content Cluster: Understand ratio concepts and use ratio reasoning to solve problems.

Content Standard: Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations. *(6.RP.3)*
c. Find a percent of a quantity as a rate per 100, e.g., 30% of a quantity means 30/100 times the quantity; solve problems involving finding the whole, given a part and the percent.

Depth of Knowledge: Level 3
a. Interpret information from a complex graph
e. Use concepts to solve non-routine problems
f. Perform procedure with multiple steps and multiple decision points
m. Translate between a problem situation and symbolic notation that is not a direct translation
p. Draw conclusions from observations or data, citing evidence

Calculator Designation: Calculator

Question 37



Points Possible: 1

Content Cluster: Understand ratio concepts and use ratio reasoning to solve problems.

Content Standard: Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations. *(6.RP.3)*
b. Solve unit rate problems including those involving unit pricing and constant speed. For example, if it took 7 hours to mow 4 lawns, then at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed?

Depth of Knowledge: Level 2
d. Solve a routine problem requiring multiple steps/decision points, or the application of multiple concepts

Calculator Designation: Calculator

Question 41

This item has three parts.

Rosa and Peng both start walking at the beginning of a 1.5-mile trail.

Part A. What is the length, in yards, of the trail?

yards

Part B. Rosa and Peng measure the distance they walk in 3 minutes. Rosa walks 396 yards, and Peng walks 330 yards. They will continue to walk at these speeds along the trail.

Complete the table to show how far, in yards, each person would walk.

Number of Minutes	Distance Rosa Walks (yards)	Distance Peng Walks (yards)
3	396	330
8		
13		

Part C. Rosa finishes the trail first. How long, in minutes (min), does she have to wait for Peng to finish?

min

Points Possible: 3

Content Cluster: Understand ratio concepts and use ratio reasoning to solve problems.

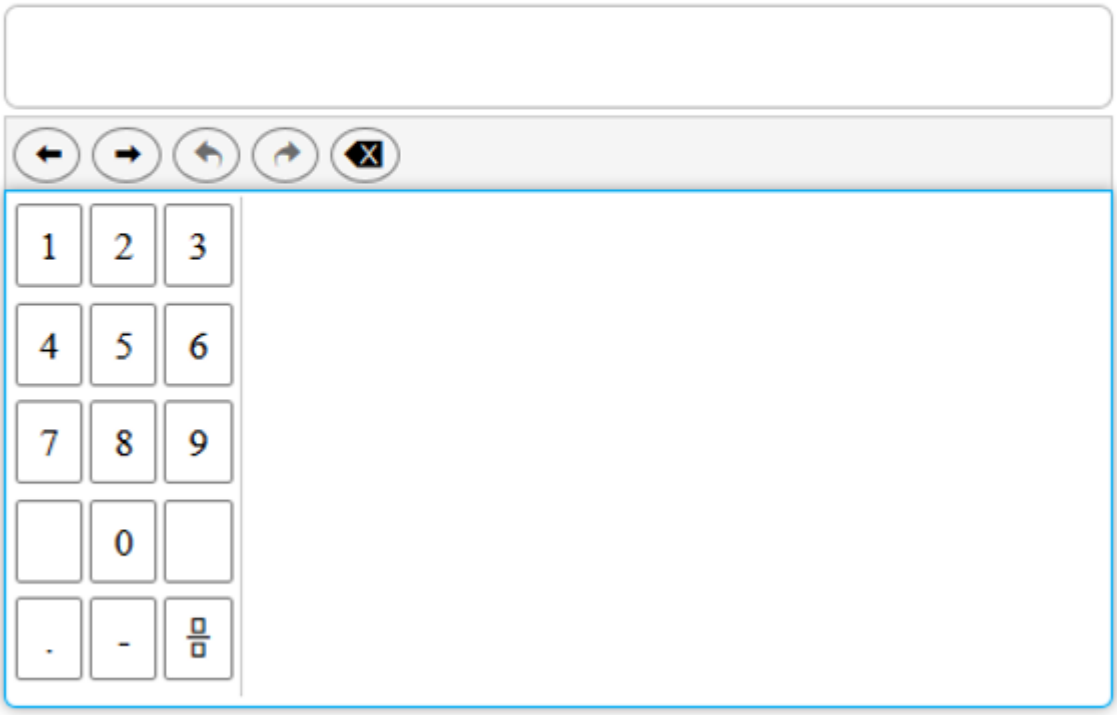
Content Standard: Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations. *(6.RP.3)*

Calculator Destination: Calculator

Question 11

A printer prints 75 pages in 5 minutes.

At the same rate, how many pages does the printer print in 7 minutes?



Points Possible: 1

Content Cluster: Understand ratio concepts and use ratio reasoning to solve problems.

Content Standard: Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations. *(6.RP.3b)*
b. Solve unit rate problems including those involving unit pricing and constant speed*. For example, if it took 7 hours to mow 4 lawns, then at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed?*

Calculator Designation: Calculator

Question 14

In a town there are 1,050 people who can vote. There were two candidates in the election for the town's mayor. The results of the election are shown in the table.

Candidate	Votes
Ms. Smith	462
Mr. Jones	378

What percentage of the 1,050 people actually did vote in the election?

Ⓐ 20% of people who can vote

Ⓑ 45% of people who can vote

Ⓒ 55% of people who can vote

Ⓓ 80% of people who can vote

Points Possible: 1

Content Cluster: Understand ratio concepts and use ratio reasoning to solve problems.

Content Standard: Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations. *(6.RP.3c)*
c. Find a percent of a quantity as a rate per 100, e.g., 30% of a quantity means $^{30}/_{100}$ times the quantity; solve problems involving finding the whole, given a part and the percent.

Calculator Designation: Calculator

Question 17

The ratio of the weight of cement to the weight of sand in a concrete mixture is 1:3.

Complete the table to show different weights of cement or sand in the concrete mixture.

Pounds of Cement	Pounds of Sand
1	3
2	
	12
9	

Points Possible: 1

Content Cluster: Understand ratio concepts and use ratio reasoning to solve problems.

Content Standard: Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations. *(6.RP.3)*
a. Make tables of equivalent ratios relating quantities with whole- number measurements; find missing values in the tables; and plot the pairs of values on the coordinate plane. Use tables to compare ratios.

Calculator Designation: Calculator

Grade 6
Reporting Category:

Expressions and Equations

CRITICAL AREA OF FOCUS #2
Completing understanding of division of fractions and extending the notion of number to the system of rational numbers, which includes negative numbers

Question 1

An expression is shown.

$95 - 3^4$

What is the value of the expression?

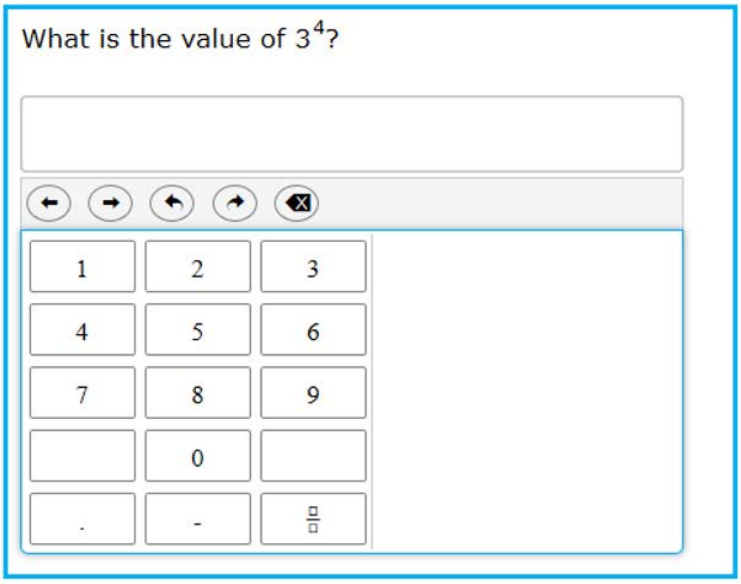
Points Possible: 1

Content Cluster: Apply and extend previous understandings of arithmetic to algebraic expressions.

Content Standard: Write and evaluate numerical expressions involving whole-number exponents. *(6.EE.1)*

Calculator Designation: No calculator

Question 5



Points Possible: 1

Content Cluster: Apply and extend previous understandings of arithmetic to algebraic expressions.

Content Standard: Write and evaluate numerical expressions involving whole-number exponents. *(6.EE.1)*

Calculator Destination: No calculator

Question 25

An expression is given.

$5(x - 1)$

What is the value of the expression when $x = 5$?

1	2	3
4	5	6
7	8	9
	0	
.	-	$\frac{\square}{\square}$

Points Possible: 1

Content Cluster: Apply and extend previous understandings of arithmetic to algebraic expressions.

Content Standard: Write, read, and evaluate expressions in which letters stand for numbers. *(6.EE.2)*
Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole- number exponents, using the algebraic order of operations when there are no parentheses to specify a particular order. For example, use the formulas $V = s^3$ and $A = 6s^2$ to find the volume and surface area of a cube with sides of length $s = 1/2$.

Depth of Knowledge: Level 2
Solve a routine problem requiring multiple steps/decision points, or the application of multiple concepts

Calculator Designation: No Calculator

Question 5

Which expression represents "one-half of x"?

(A) $x \bullet 2$

(B) $x \div 2$

(C) $x - \frac{1}{2}$

(D) $x + \frac{1}{2}$

Points Possible: 1

Content Cluster: Apply and extend previous understandings of arithmetic to algebraic expressions.

Content Standard: Write, read, and evaluate expressions in which letters stand for numbers. *(6.EE.2)*
a. Write expressions that record operations with numbers and with letters standing for numbers. *For example, express the calculation "Subtract y from 5" as 5 − y.*

Calculator Designation: Calculator neutral

Question 17

The expression $c(16x + 14)$ is equivalent to $32x + d$.

What are the values of c and d?

$c =$

$d =$

1	2	3
4	5	6
7	8	9
	0	
.	-	$\frac{\square}{\square}$

Points Possible: 1

Content Cluster: Apply and extend previous understandings of arithmetic to algebraic expressions.

Content Standard: Apply the properties of operations to generate equivalent expressions. For example, apply the distributive property to the expression 3 (2 + x) to produce the equivalent expression 6 + 3x; apply the distributive property to the expression 24x + 18y to produce the equivalent expression 6 (4x + 3y); apply properties of operations to y + y + y to produce the equivalent expression 3y. *(6.EE.3)*

Depth of Knowledge: Level 3
Use concepts to solve non-routine problems
Perform procedure with multiple steps and multiple decision points

Calculator Designation: Calculator Neutral

Question 19

Which expression is equivalent to $\frac{1}{3}(9x + 12) + 4x + 6$?

Ⓐ $7x + 18$

Ⓑ $7x + 10$

Ⓒ $\frac{13}{3}x + 6$

Ⓓ $13x + 18$

Points Possible: 1

Content Cluster: Apply and extend previous understandings of arithmetic to algebraic expressions.

Content Standard: Apply the properties of operations to generate equivalent expressions. For example, apply the distributive property to the expression 3(2 + *x*) to produce the equivalent expression 6 + 3*x*; apply the distributive property to the expression 24*x* + 18*y* to produce the equivalent expression 6(4*x* + 3*y*); apply properties of operations to *y* + *y* + *y* to produce the equivalent expression 3*y*. *(6.EE.3)*

Calculator Designation: Calculator

Question 10

Select the **three** inequalities that have $n = 3$ in the solution set.

- [ ] $n + 5 < 9$
- [ ] $\frac{1}{3}n < 1$
- [ ] $3n + 1 > 7$
- [ ] $3n > 9.5$
- [ ] $n - 2 < 5$
- [ ] $6n + 3 > 21$

Points Possible: 1

Content Cluster: Reason about and solve one-variable equations and inequalities.

Content Standard: Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true. *(6.EE.5)*

Calculator Designation: Calculator neutral

Question 38

Julie is using the set {7, 8, 9, 10, 11} to solve the inequality shown.

$2h - 3 > 15$

Select all of the solutions to the inequality.

- [ ] 7
- [ ] 8
- [ ] 9
- [ ] 10
- [ ] 11

Points Possible: 1

Content Cluster: Reason about and solve one-variable equations and inequalities.

Content Standard: Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true. *(6.EE.5)*

Depth of Knowledge: Level 2
b. Interpret information from a simple graph
d. Solve a routine problem requiring multiple steps/decision points, or the application of multiple concepts
e. Compare and/or contrast figures or statements

Calculator Designation: Calculator

Question 17

An equation is given.

$2x = 26$

Which calculation would need to be done to solve the equation?

Ⓐ divide both sides by 2

Ⓑ divide both sides by 26

Ⓒ multiply both sides by 2

Ⓓ multiply both sides by 26

Points Possible: 1

Content Cluster: Reason about and solve one-variable equations and inequalities.

Content Standard: Solve real-world and mathematical problems by writing and solving equations of the form $x + p = q$ and $px = q$ for cases in which p, q and x are all non-negative rational numbers. *(6.EE.7)*

Calculator Destination: Calculator neutral

Question 1

An equation is shown.

$x + 3 = 8.5$

What is the solution to the equation?

$x =$

Points Possible: 1

Content Cluster: Reason about and solve one-variable equations and inequalities.

Content Standard: Solve real-world and mathematical problems by writing and solving equations of the form $x + p = q$ and $px = q$ for cases in which p, q and x are all nonnegative rational numbers. *(6.EE.7)*

Calculator Destination: Calculator neutral

Question 41

Brian has 14 bins and 70 books. He places the same number of books, x, in each bin.

Which equation could be used to find the number of books in each bin, x?

(A) $14 = \frac{x}{70}$

(B) $70 = 14x$

(C) $14 = 70 - x$

(D) $70 = 14 + x$

Points Possible: 1

Content Cluster: Reason about and solve one-variable equations and inequalities.

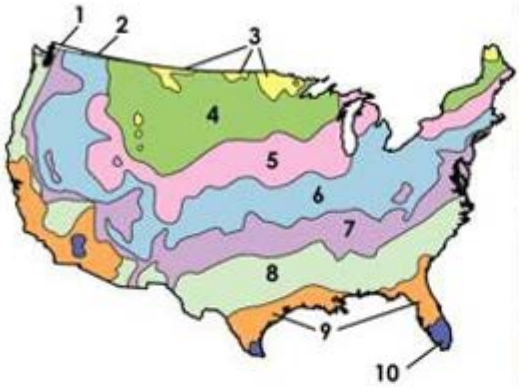
Content Standard: Solve real-world and mathematical problems by writing and solving equations of the form x + p = q and px = q for cases in which p, q and x are all nonnegative rational numbers. *(6.EE.7)*

Depth of Knowledge: Level 2
d. Solve a routine problem requiring multiple steps/decision points, or the application of multiple concepts
j. Translate between tables, graphs, words and symbolic notation

Calculator Designation: Calculator Neutral

Question 18

The map and table shown are used to identify planting zones required for plants in the United States.



Planting Zone	Average Annual Low (°F)
1	−54°
2	−43°
3	−37°
4	−26°
5	−16°
6	−7°
7	1°
8	13°
9	21°
10	33°

In any planting zone, plants require a temperature warmer than the average annual low.

Create an inequality for the temperature, t, in degrees Fahrenheit, required for plants in zone 6.

Points Possible: 1

Content Cluster: Reason about and solve one-variable equations and inequalities.

Content Standard: Write an inequality of the form $x > c$ or $x < c$ to represent a constraint or condition in a real-world or mathematical problem. Recognize that inequalities of the form $x > c$ or $x < c$ have infinitely many solutions; represent solutions of such inequalities on number line diagrams. *(6.EE.8)*

Calculator Designation: Calculator neutral

Question 12

Nikki and Dave both work as cleaners. The equation shown models the total amount, n, in dollars that Nikki charges to clean carpets in r rooms.

$n = 20r$

The table shows the total amount, d, in dollars that Dave charges to clean windows in r rooms. He charges the same amount per room to clean windows.

Complete the table to show the amount that each person charges to clean r rooms.

Number of Rooms (r)	Nikki's Charges (n)	Dave's Charges (d)
1		12.50
2		
3		
4		50

Points Possible: 2

Content Cluster: Represent and analyze quantitative relationships between dependent and independent variables.

Content Standard: Use variables to represent two quantities in a real- world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. *For example, in a problem involving motion at constant speed, list and graph ordered pairs of distances and times, and write the equation d = 65t to represent the relationship between distance and time. (6.EE.9)*

Calculator Designation: Calculator

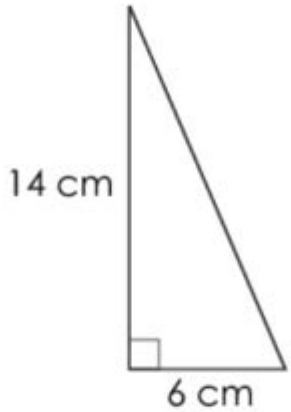
Grade 6
Reporting Category:

Geometry and Statistics

CRITICAL AREA OF FOCUS #3
Writing, interpreting, and using expressions and equations

Question 30

A right triangle is shown.



What is the area, in square centimeters (cm^2), of the right triangle?

cm^2

1	2	3
4	5	6
7	8	9
	0	
.	-	$\frac{\square}{\square}$

Points Possible: 1

Content Cluster: Solve real-world and mathematical problems involving area, surface area, and volume.

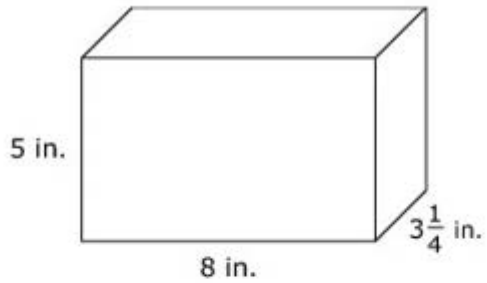
Content Standard: Through composition into rectangles or decomposition into triangles, find the area of right triangles, other triangles, special quadrilaterals, and polygons; apply these techniques in the context of solving real-world and mathematical problems. *(6.G.1)*

Depth of Knowledge: Level 2
d. Solve a routine problem requiring multiple steps/decision points, or the application of multiple concepts
i. Retrieve information from a table, graph, or figure and use it to solve a problem requiring multiple steps

Calculator Designation: Calculator

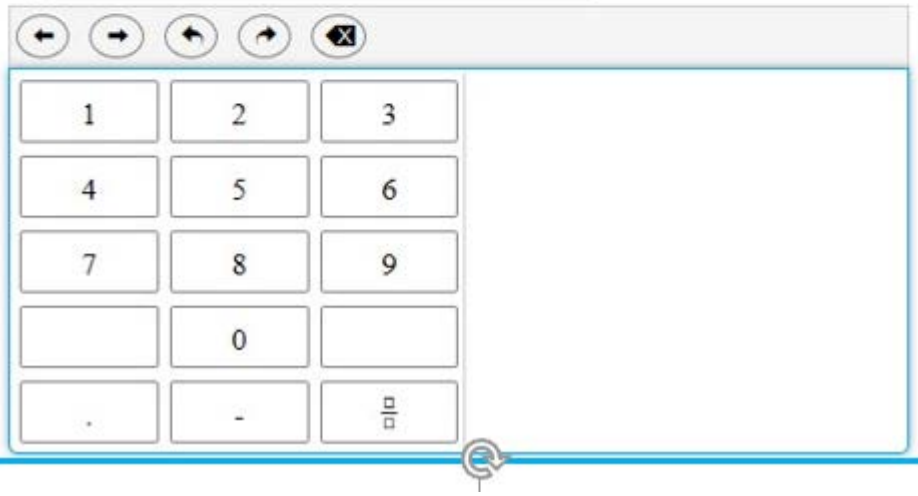
Question 32

A right rectangular prism is shown.



What is the volume, in cubic inches, of the prism?

cubic inches



Points Possible: 1

Content Cluster: Solve real-world and mathematical problems involving area, surface area, and volume.

Content Standard: Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas $V = l\,w\,h$ and $V = b\,h$ to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems. *(6.G.2)*

Calculator Designation: Calculator

Question 13

A figure has vertices at (−2, 2), (−2, 6), (6, 6), and (6, 2).

Which shape best describes the figure?

Ⓐ a rectangle

Ⓑ a trapezoid

Ⓒ a rhombus

Ⓓ a square

Points Possible: 1

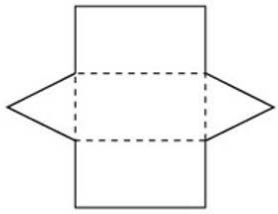
Content Cluster: Solve real-world and mathematical problems involving area, surface area, and volume.

Content Standard: Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real- world and mathematical problems. *(6.G.3)*

Calculator Designation: Calculator neutral

Question 2

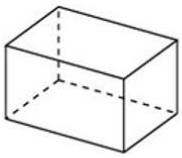
A net is shown.



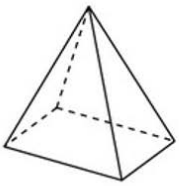
Which three-dimensional figure is represented by the net?

Ⓐ

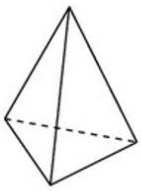
Ⓒ



Ⓑ



Ⓓ



Points Possible: 1

Content Cluster: Solve real-world and mathematical problems involving area, surface area, and volume.

Content Standard: Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems. *(6.G.4)*

Calculator Designation: Calculator neutral

Question 15

Gary surveys all of his classmates for a project.

Select the **two** statistical questions that Gary could ask.

- [ ] How old is your school?
- [ ] How many pets do you have?
- [ ] What is your favorite flavor of ice cream?
- [ ] How many states are in the United States?
- [ ] In what year was the Declaration of Independence signed?

Points Possible: 1

Content Cluster: Develop understanding of statistical variability.

Content Standard: Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers*. For example, "How old am I?" is not a statistical question, but "How old are the students in my school?" is a statistical question because one anticipates variability in students' ages. (6.SP.1)*

Calculator Designation: Calculator neutral

Question 48

Farrah collects data on the number of letters in the names of several of her classmates. Her data are shown.

9, 5, 7, 6, 6, 9, 5, 5, 8, 8

What does the median tell Farrah about her data?

Ⓐ The data have a symmetrical shape.

Ⓑ A typical name has more than 9 letters.

Ⓒ Half of the names have fewer than 7 letters.

Ⓓ There is a variation of 4 letters in the names.

Points Possible: 1

Content Cluster: Develop understanding of statistical problem solving.

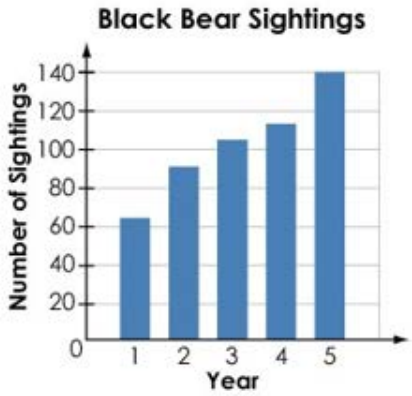
Content Standard: Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape. *(6.SP.2)*

Depth of Knowledge: Level 2
d. Solve a routine problem requiring multiple steps/decision points, or the application of multiple concepts
n. Compare, classify, organize, estimate, or order data

Calculator Designation: Calculator

Question 4

Scientists record the number of black bear sightings in an area over 5 years. Their data are shown on the graph.



What does the mean of this data set describe?

Ⓐ the average number of sightings each year over the 5-year period

Ⓑ the difference between the number of sightings each year

Ⓒ the total number of sightings over the 5-year period

Ⓓ the actual number of sightings each year

Points Possible: 1

Content Cluster: Develop understanding of statistical problem solving.

Content Standard: Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number. *(6.SP.3)*

Calculator Designation: Calculator neutral

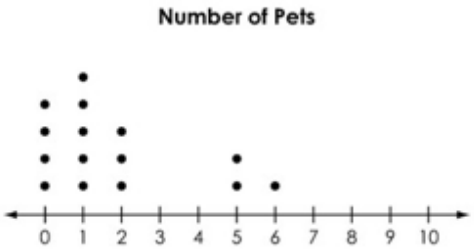
Question 36

The results of a class survey of how many pets each student has are shown.

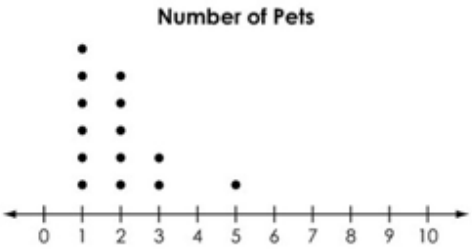
1	0	3	2	2	0
1	1	1	2	0	5
1	2	1	0	3	2

Which dot plot represents the results?

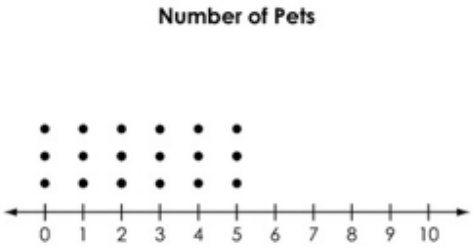
Ⓐ



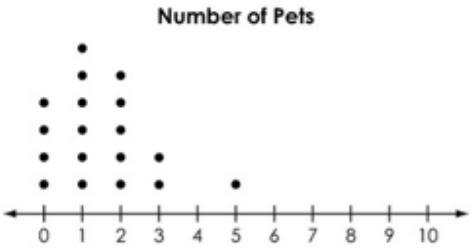
Ⓒ



Ⓑ



Ⓓ



Points Possible: 1

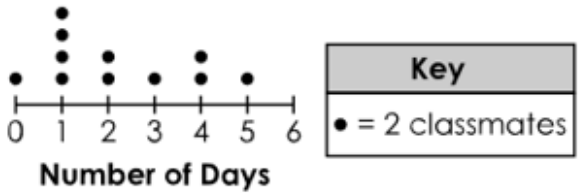
Content Cluster: Summarize and describe distributions.

Content Standard: Display numerical data in plots on a number line, including dot plots, histograms, and box plots. *(6.SP.4)*

Calculator Designation: Calculator neutral

Question 1

Zoe surveys her classmates on the number of days they went to a park the previous week. She records all of her results on the dot plot shown.



How many classmates did Zoe survey?

Points Possible: 1

Content Cluster: Summarize and describe distributions.

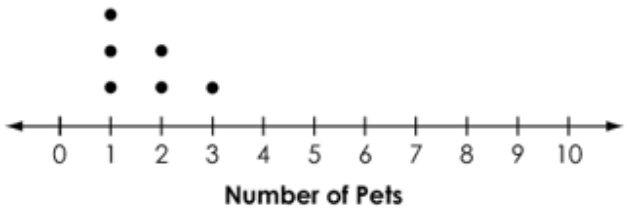
Content Standard: Summarize numerical data sets in relation to their context. *(6.SP.5)*
Reporting the number of observations.

Depth of Knowledge: Level 2
Interpret information from a simple graph

Calculator Designation: Calculator Neutral

Question 15

Andrea collects data from her classmates about the number of pets they have. Then, she creates the dot plot shown.



She is missing one value and knows that the range for the data is 5.

What is the missing value?

Points Possible: 1

Content Cluster: Summarize and describe distributions.

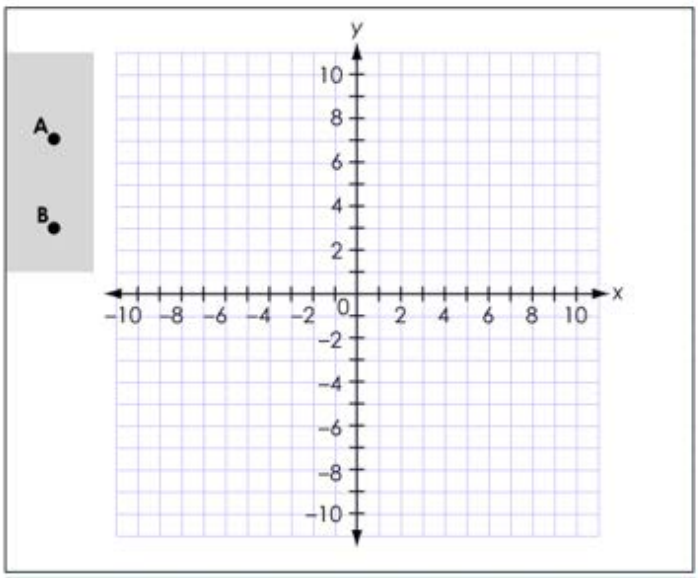
Content Standard: Summarize numerical data sets in relation to their context. *(6.SP.5)*
c. Find the quantitative measures of center (median and/or mean) for a numerical data set and recognize that this value summarizes the data set with a single number. Interpret mean as an equal or fair share. Find measures of variability (range and interquartile range) as well as informally describe the shape and the presence of clusters, gaps, peaks, and outliers in a distribution.

Calculator Designation: Calculator neutral

Question 9

Point A is located at (x, y), where $x \neq 0$ and $y \neq 0$. Point B is located at $(-x, y)$.

Place points A and B at possible locations on the coordinate grid.



Points Possible: 1

Content Cluster: Apply and extend previous understandings of numbers to the system of rational numbers.

Content Standard: Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane.
Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate. *(6.NS.8)*

Calculator Designation: Calculator neutral

Grade 6
Reporting Category:

The Number System

CRITICAL AREA OF FOCUS #4
Developing understanding of statistical problem solving

Question 11

Nadya has $19\frac{1}{4}$ yards of ribbon. She cuts the ribbon into pieces that each measure $1\frac{3}{4}$ yards.

How many pieces of ribbon does Nadya have?

1	2	3
4	5	6
7	8	9
	0	
.	-	$\frac{\square}{\square}$

Points Possible: 1

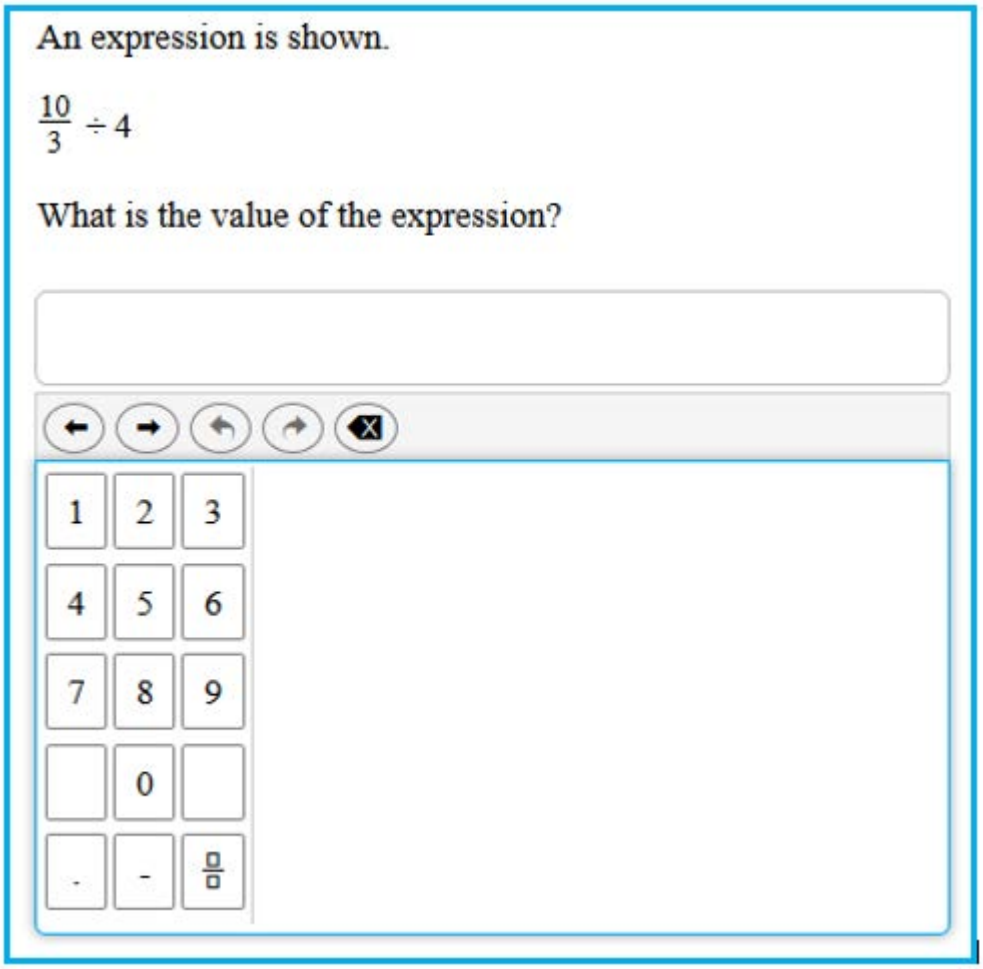
Content Cluster: Apply and extend previous understandings of multiplication and division to divide fractions by fractions.

Content Standard: Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem. For example, create a story context for (2/3) ÷ (3/4) and use a visual fraction model to show the quotient; use the relationship between multiplication and division to explain that (2/3) ÷ (3/4) = 8/9
because 3/4 of 8/9 is 2/3. (In general, (a/b) ÷ (c/d) = (ad)/(bc).) How much chocolate will each person get if 3 people share 1/2 lb of chocolate equally? How many 3/4-cup servings are in 2/3 of a cup of yogurt? How wide is a rectangular strip of land with length 3/4 mi and area 1/2 square mi? *(6.NS.1)*

Depth of Knowledge: Level 2
d. Solve a routine problem requiring multiple steps/decision points, or the application of multiple concepts

Calculator Designation: No Calculator

Question 8



Points Possible: 1

Content Cluster: Apply and extend previous understandings of multiplication and division to divide fractions by fractions.

Content Standard: Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem. For example, create a story context for $(^2/_3) \div (^3/_4)$ and use a visual fraction model to show the quotient; use the relationship between multiplication and division to explain that $(^2/_3) \div (^3/_4) = {}^8/_9$ because $^3/_4$ of $^8/_9$ is $^2/_3$. (In general, $(^a/_b) \div (^c/_d) = {}^{ad}/_{bc}$.) How much chocolate will each person get if 3 people share $^1/_2$ pound of chocolate equally? How many $^3/_4$ cup servings are in $^2/_3$ of a cup of yogurt? How wide is a rectangular strip of land with length $^3/_4$ mi and area $^1/_2$ square mi? *(6.NS.1)*

Calculator Designation: No calculator

Question 9

A container has $17\frac{1}{2}$ cups of lemonade. Asher gives each of his classmates $\frac{5}{6}$ of a cup of lemonade. He gives away all of the lemonade.

How many classmates does Asher give lemonade to?

1	2	3
4	5	6
7	8	9
	0	
.	-	$\frac{a}{b}$

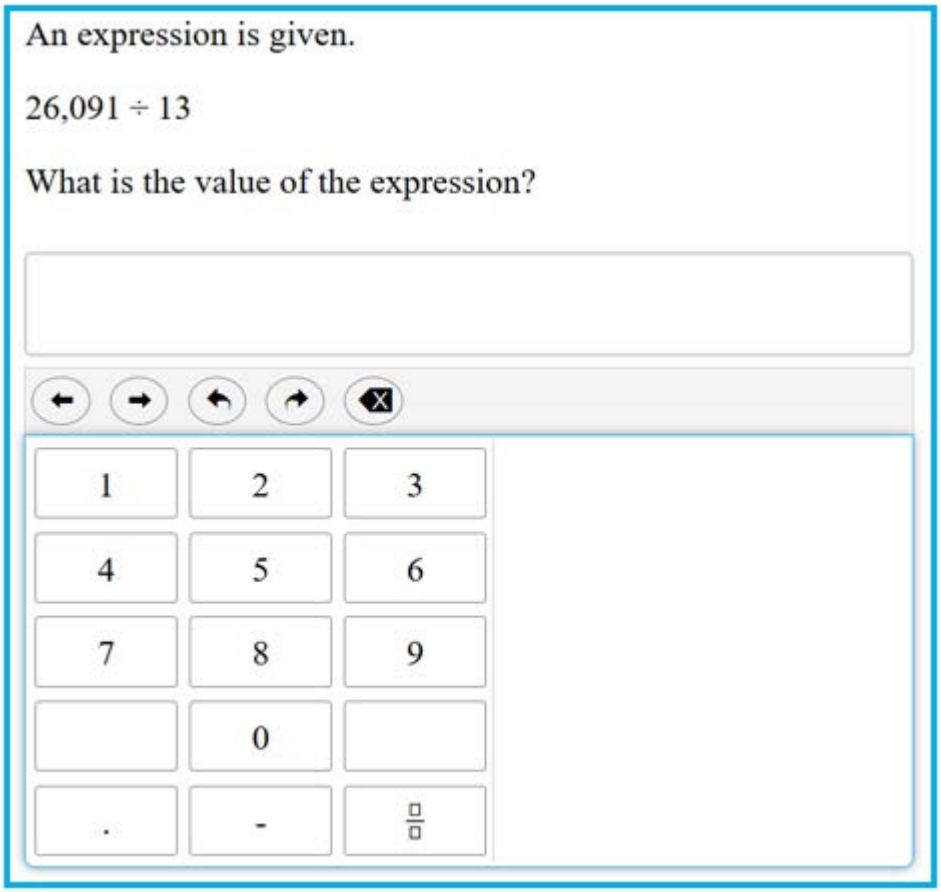
Points Possible: 1

Content Cluster: Apply and extend previous understandings of multiplication and division to divide fractions by fractions.

Content Standard: Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem. *For example, create a story context for (2/3) ÷ (3/4) and use a visual fraction model to show the quotient; use the relationship between multiplication and division to explain that (2/3) ÷ (3/4) = 8/9 because 3/4 of 8/9 is 2/3. (In general, (a/b) ÷ (c/d) = (ad)/(bc).) How much chocolate will each person get if 3 people share 1/2 lb of chocolate equally? How many 3/4-cup servings are in 2/3 of a cup of yogurt? How wide is a rectangular strip of land with length 3/4 mi and area 1/2 square mi? (6.NS.1)*

Calculator Destination: No calculator

Question 20



Points Possible: 1

Content Cluster: Compute fluently with multi-digit numbers and find common factors and multiples.

Content Standard: Fluently divide multi-digit numbers using a standard algorithm. *(6.NS.2)*

Depth of Knowledge: Level 1
b. Apply/compute a well-known algorithm (e.g., sum, quotient)
h. Evaluate an expression

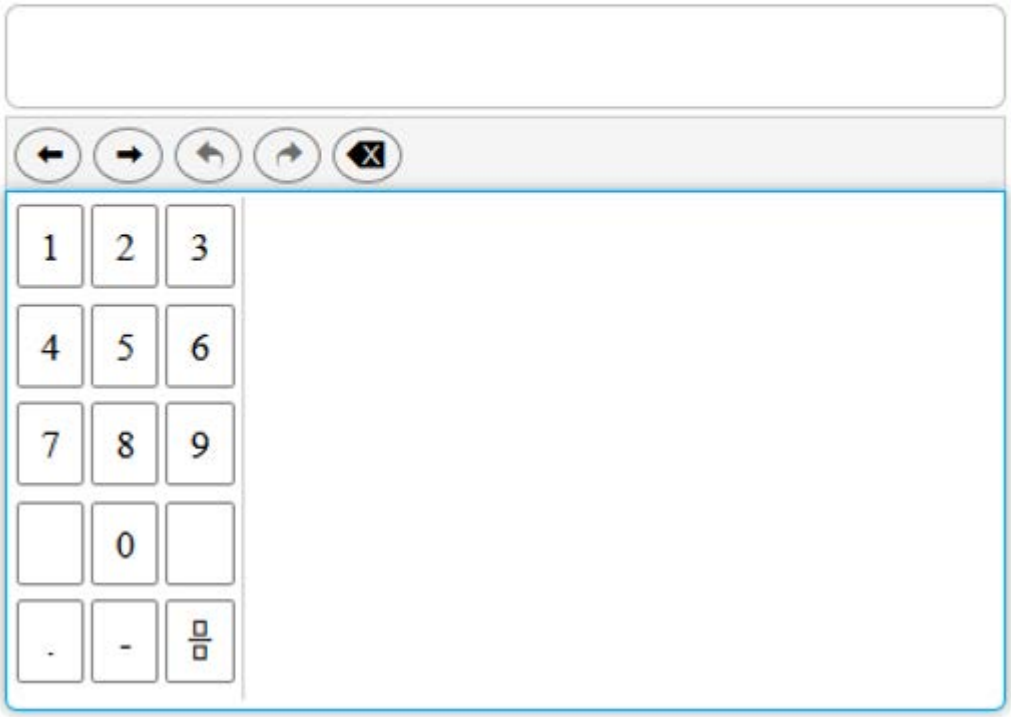
Calculator Designation: No Calculator

Question 6

An expression is shown.

$4.8 \bullet 2 + 3.2$

What is the value of the expression?



Points Possible: 1

Content Cluster: Compute fluently with multi-digit numbers and find common factors and multiples.

Content Standard: Fluently add, subtract, multiply, and divide multi- digit decimals using a standard algorithm for each operation. *(6.NS.3)*

Calculator Designation: No calculator

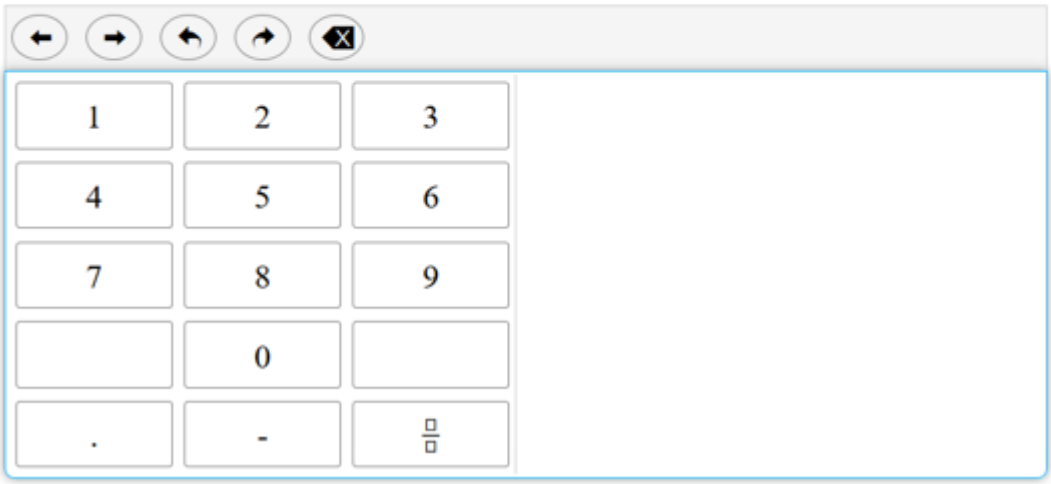
Question 28

On Monday, the temperature was −7 degrees Fahrenheit in Akron, Ohio.

On Tuesday, the temperature was colder than on Monday.

What is a possible temperature, in degrees Fahrenheit, for Tuesday?

degrees Fahrenheit



Points Possible: 1

Content Cluster: Apply and extend previous understandings of numbers to the system of rational numbers.

Content Standard: Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation. *(6.NS.5)*

Depth of Knowledge: Level 1
a. Recall, observe, or recognize a fact, definition, term, or property
l. Locate numbers on a number line, or points on a coordinate grid

Calculator Designation: Calculator Neutral

Question 18

Luis and Erin are playing a game. They each start with 0 points. At the end of the game, Luis has 250 points, and Erin has -250 points.

Which statement about the game is true?

Ⓐ Erin has lost 250 points.

Ⓑ Luis has 250 more points than Erin.

Ⓒ Erin and Luis have a total of 500 points.

Ⓓ Erin and Luis have an equal number of points.

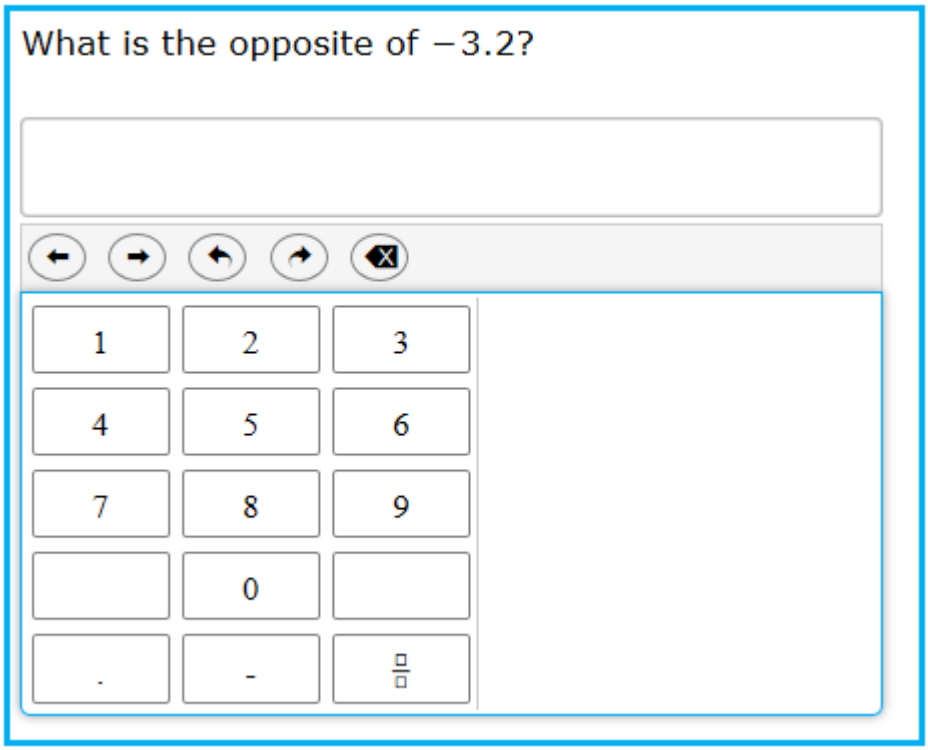
Points Possible: 1

Content Cluster: Apply and extend previous understandings of numbers to the system of rational numbers.

Content Standard: Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation. *(6.NS.5)*

Calculator Designation: No calculator

Question 26



Points Possible: 1

Content Cluster: Apply and extend previous understandings of numbers to the system of rational numbers.

Content Standard: Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates. *(6.NS.6)*
a. Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself, e.g., -(-3) = 3, and that 0 is its own opposite.

Calculator Designation: Calculator neutral

Question 7

Which number is the farthest from -2 on the number line?

(A) 6

(B) 0

(C) -1

(D) -9

Points Possible: 1

Content Cluster: Apply and extend previous understandings of numbers to the system of rational numbers.

Content Standard: Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates. *(6.NS.6)*
c. Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane.

Calculator Designation: Calculator neutral

Question 45

Which point is in the same quadrant as the point (−1, 4)?

Ⓐ (2, 3)

Ⓑ (−2, 3)

Ⓒ (2, −3)

Ⓓ (−2, −3)

Points Possible: 1

Content Cluster: Apply and extend previous understandings of numbers to the system of rational numbers.

Content Standard: Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates. *(6.NS.6)*
b. Understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane; recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes.

Depth of Knowledge: Level 1
a. Recall, observe, or recognize a fact, definition, term, or property
l. Locate numbers on a number line, or points on a coordinate grid

Calculator Designation: Calculator Neutral

Question 8

The three inequalities shown relate rational numbers a, b, and c.

- $a < b$
- $b < c$
- $|b| > |c|$

What are possible values of a, b, and c?

$a =$

$b =$

$c =$

1	2	3
4	5	6
7	8	9
	0	
.	-	$\frac{\square}{\square}$

Points Possible: 1

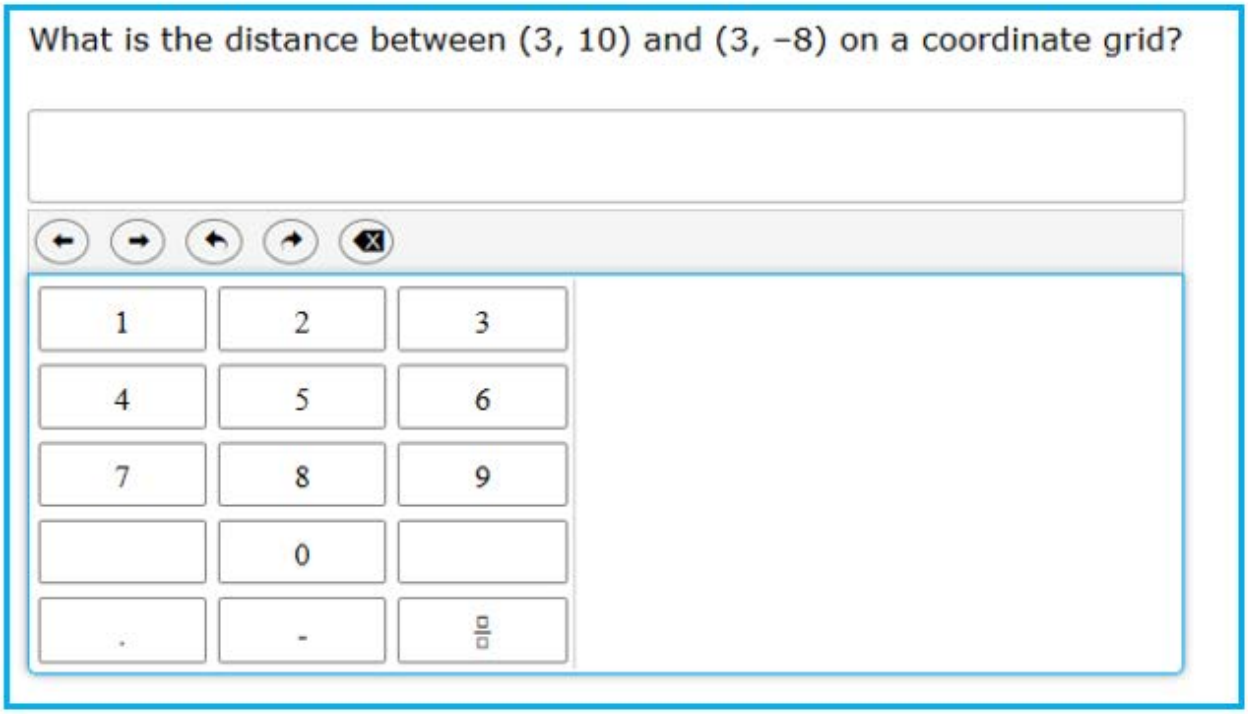
Content Cluster: Apply and extend previous understandings of numbers to the system of rational numbers.

Content Standard: Understand ordering and absolute value of rational numbers. *(6.NS.7)*
c. Understand the absolute value of a rational number as its distance from 0 on the number line; interpret absolute value as magnitude for a positive or negative quantity in a real-world situation. For example, for an account balance of -30 dollars, write |-30| = 30 to describe the size of the debt in dollars.

Depth of Knowledge: Level 3
b. Explain thinking when more than one response is possible
d. Use evidence to develop logical arguments for a concept
m. Translate between a problem situation and symbolic notation that is not a direct translation

Calculator Designation: Calculator Neutral

Question 6



Points Possible: 1

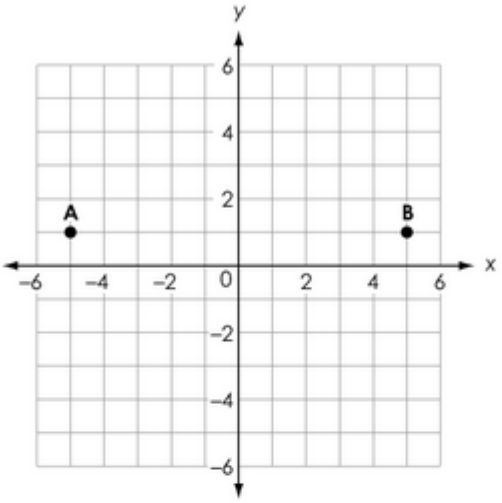
Content Cluster: Apply and extend previous understandings of numbers to the system of rational numbers.

Content Standard: Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane.
Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate. *(6.NS.8)*

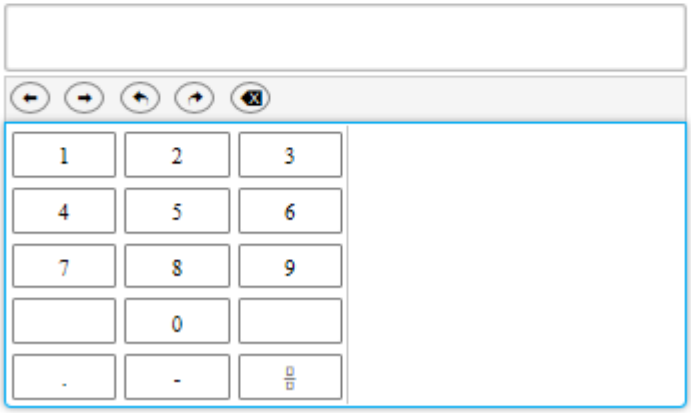
Calculator Designation: No calculator

Question 45

Points A and B are shown.



What is the distance, in units, between point A and point B?



Points Possible: 1

Content Cluster: Apply and extend previous understandings of numbers to the system of rational numbers.

Content Standard: Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane.
Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate. *(6.NS.8)*

Calculator Designation: Calculator Neutral

Question 40

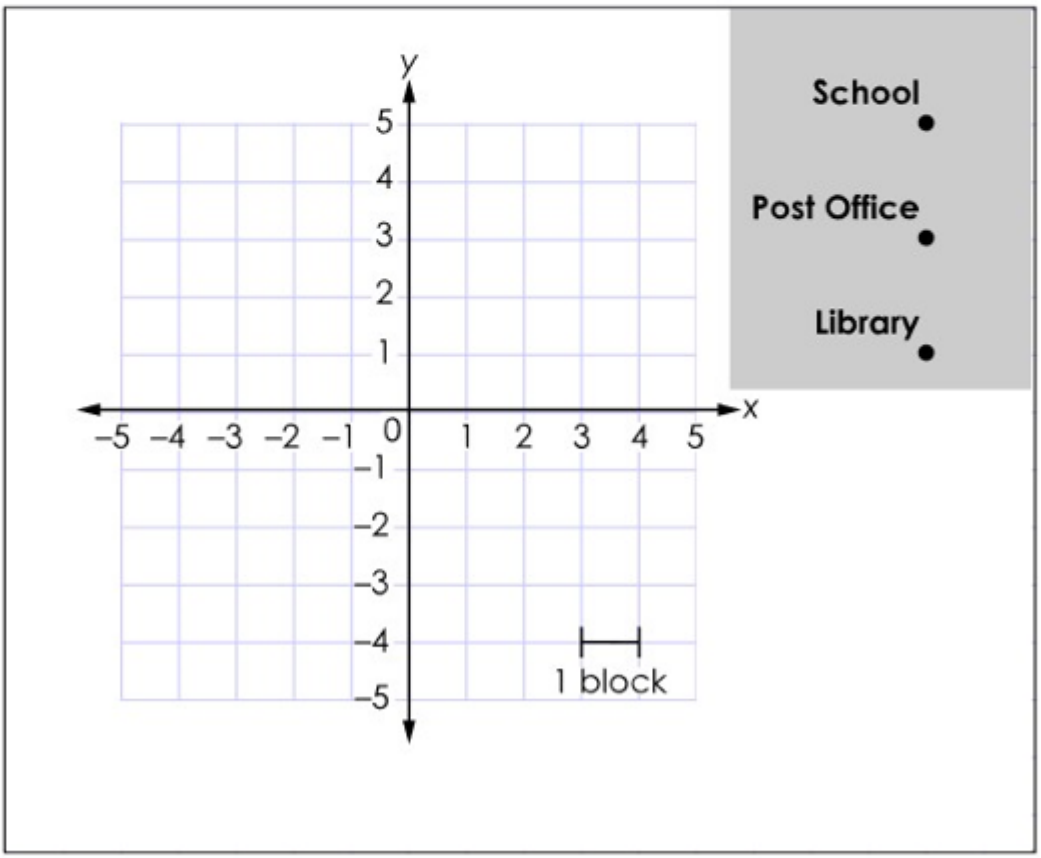
This item has two parts.

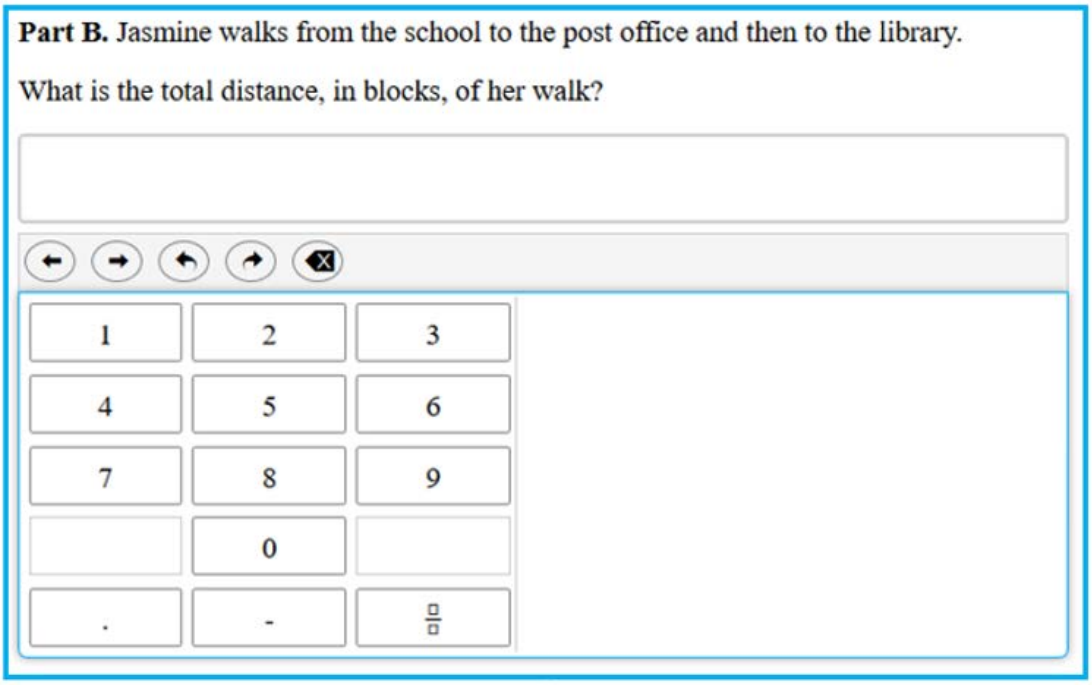
Part A. Jasmine creates a map of her town on the coordinate plane. The unit on the coordinate plane is one block.

The locations of the school, post office, and library are given.

- school (–4, 1)
- post office (2, 1)
- library (2, –4)

Move each building to its correct location on the coordinate plane.





Points Possible: 2

Content Cluster: Apply and extend previous understandings of numbers to the system of rational numbers.

Content Standard: Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate. *(6.NS.8)*

Depth of Knowledge: Level 2
b. Interpret information from a simple graph
d. Solve a routine problem requiring multiple steps/decision points, or the application of multiple concepts
i. Retrieve information from a table, graph, or figure and use it to solve a problem requiring multiple steps
j. Translate between tables, graphs, words and symbolic notation

Calculator Designation: Calculator Neutral