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 Toolkits 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 Toolkits 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 Toolkits documents can be used to support instruction in a variety of ways. Districts can choose to administer the:
- Previous grade-level Student Readiness Toolkits 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 Toolkits 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 Toolkits 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 7
- 2018 Item Release Scoring Guide Grade 7
- 2019 Item Release Scoring Guide Grade 7
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 7
Reporting Category:

Ratio and Proportions

CRITICAL AREA OF FOCUS #1
Developing understanding of and applying proportional relationships
**Question 14**

At a grocery store, a bag of 12 red apples costs $10.80 and a bag of 6 green apples costs $6.90.

Which statement is true about the cost of the apples?

A. The cost per green apple is less than the cost per red apple because 6 is less than 12.

B. The cost per green apple is less than the cost per red apple because $6.90 ÷ 12 = 0.575 is less than $10.80 ÷ 12.

C. The cost per green apple is greater than the cost per red apple because $6.90 ÷ 6 is greater than $10.80 ÷ 12.

D. The cost per green apple is greater than the cost per red apple because $6.90 ÷ 10.80 is greater than $6 ÷ 12.

**Points Possible: 1**

**Content Cluster:** Analyze proportional relationships and use them to solve real-world and mathematical problems.

**Content Standard:** Compute unit rates associated with ratios of fractions, including ratios of lengths, areas, and other quantities measured in like or different units. For example, if a person walks \( \frac{1}{2} \) mile in each \( \frac{1}{4} \) hour, compute the unit rate as the complex fraction \( \frac{1/2}{1/4} \) miles per hour, equivalently 2 miles per hour. (7.RP.1)

**Depth of Knowledge:** Level 2

d. Solve a routine problem requiring multiple steps/decision points, or the application of multiple concepts

e. Compare and/or contrast figures or statements

k. Make direct translations between problem situations and symbolic notation

**Calculator Designation:** Calculator Neutral
Question 11

A faucet drips $\frac{2}{3}$ gallon of water in 10 hours.

Which rate is the unit rate of water dripped per day?

A. $\frac{1}{15}$ gallon per day
B. $\frac{5}{18}$ gallon per day
C. $1 \frac{3}{5}$ gallons per day
D. $6 \frac{2}{3}$ gallons per day

Points Possible: 1

**Content Cluster:** Analyze proportional relationships and use them to solve real-world and mathematical problems.

**Content Standard:** Compute unit rates associated with ratios of fractions, including ratios of lengths, areas, and other quantities measured in like or different units. For example, if a person walks $\frac{1}{2}$ mile in each $\frac{1}{4}$ hour, compute the unit rate as the complex fraction $(\frac{1}{2})/(\frac{1}{4})$ miles per hour, equivalently 2 miles per hour. (7.RP.1)

**Calculator Designation:** Calculator
Question 40

A baker mixes $8 \frac{3}{4}$ cups of white flour with $2 \frac{1}{2}$ cups of rye flour for a bread recipe.

How many cups of white flour does the baker mix for every 1 cup of rye flour?

Points Possible: 1

Content Cluster: Analyze proportional relationships and use them to solve real-world and mathematical problems.

Content Standard: Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. For example, if a person walks $\frac{1}{2}$ mile in each $\frac{1}{4}$ hour, compute the unit rate as the complex fraction ($\frac{1}{2}$)/($\frac{1}{4}$) miles per hour, equivalently 2 miles per hour. (7.RP.1)

Calculator Designation: Calculator
At Olivia's Burger House, each burger costs the same price. John buys 5 burgers for $7.50.

Place the point at the location on the graph that represents the unit price for 1 burger.

**Question 12**

Points Possible: 1

**Content Cluster:** Analyze proportional relationships and use them to solve real-world and mathematical problems.

**Content Standard:** Recognize and represent proportional relationships between quantities. (7.RP.2)

d. Explain what a point \((x, y)\) on the graph of a proportional relationship means in terms of the situation, with special attention to the points \((0, 0)\) and \((1, r)\) where \(r\) is the unit rate.

**Calculator Designation:** Calculator
Question 17

Michael knows that 2 cans of paint is the exact amount he needs to paint a 10-foot by 12-foot wall.

Use the Add Arrow tool to show the relationship between the total square feet of the walls and the number of paint cans necessary to paint them.

Points Possible: 1

Content Cluster: Analyze proportional relationships and use them to solve real-world and mathematical problems.

Content Standard: Recognize and represent proportional relationships between quantities. (7.RP.2)

d. Explain what a point \((x, y)\) on the graph of a proportional relationship means in terms of the situation, with special attention to the points \((0, 0)\) and \((1, r)\) where \(r\) is the unit rate.

Depth of Knowledge: Level 3

e. Use concepts to solve a non-routine problem

f. Perform a procedure with multiple steps and multiple decision points

m. Translate between a problem situation and symbolic notation that is not a direct translation

Calculator Designation: Calculator Neutral
Question 10

A scientist records the number of deer observed in three areas of a forest. The table shows her observations.

<table>
<thead>
<tr>
<th>Area</th>
<th>Square Miles</th>
<th>Number of Deer</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>18</td>
<td>162</td>
</tr>
<tr>
<td>B</td>
<td>17</td>
<td>153</td>
</tr>
<tr>
<td>C</td>
<td>26</td>
<td>234</td>
</tr>
</tbody>
</table>

How many deer per square mile did the scientist observe in the forest?

Points Possible: 1

Content Cluster: Analyze proportional relationships and use them to solve real-world and mathematical problems.

Content Standard: Recognize and represent proportional relationships between quantities. (7.RP.2)
b. Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.

Calculator Designation: Calculator
Question 19

A grocery store sells an 8-ounce bottle of juice for $1.76.

What is the cost of the juice per ounce?

Points Possible: 1

Content Cluster: Analyze proportional relationships and use them to solve real-world and mathematical problems.

Content Standard: Recognize and represent proportional relationships between quantities. (7.RP.2)
b. Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.

Calculator Designation: Calculator
Question 13

Which table shows a proportional relationship?

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>x</td>
<td>y</td>
<td>x</td>
<td>y</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>9</td>
<td>3</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>16</td>
<td>4</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>25</td>
<td>5</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Points Possible: 1

Content Cluster: Analyze proportional relationships and use them to solve real-world and mathematical problems.

Content Standard: Recognize and represent proportional relationships between quantities. (7.RP.2)

a. Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.

Calculator Designation: Calculator
Question 22

Kaya’s family spends $105 to rent a boat for 7 days. The total cost, $c$, of the boat rental is proportional to the number of days, $d$, the family rents the boat.

A. How much does it cost, in dollars, to rent the boat for one day?
B. Create an equation using $c$ and $d$ to represent the proportional relationship.

A. 

B. 

Points Possible: 2

Content Cluster: Analyze proportional relationships and use them to solve real-world and mathematical problems.

Content Standard: Recognize and represent proportional relationships between quantities. (7.RP.2)

$c$. Represent proportional relationships by equations. For example, if total cost $t$ is proportional to the number $n$ of items purchased at a constant price $p$, the relationship between the total cost and the number of items can be expressed as $t = pn$.

Calculator Destination: Calculator
Question 1

An energy company graphs the average number of rotations that a windmill makes each minute for 4 minutes.

Which statement describes what the point (1, 12) means in terms of rotations and minutes?

A. 1 rotation occurs every 12 minutes.
B. $\frac{1}{12}$ of a rotation occurs every minute.
C. The windmill rotates 12 times in 1 minute.
D. The windmill rotates 12 times in 12 minutes.

Points Possible: 1

Content Cluster: Analyze proportional relationships and use them to solve real-world and mathematical problems.

Content Standard: Recognize and represent proportional relationships between quantities. (7.RP.2)

d. Explain what a point $(x, y)$ on the graph of a proportional relationship means in terms of the situation, with special attention to the points $(0, 0)$ and $(1, r)$ where $r$ is the unit rate.

Calculator Destination: Calculator neutral
Question 42

An online music store sells songs on its website. Each song is the same price. The cost to purchase 8 songs is $10.

A. Create an equation to represent the relationship between the total cost, $c$, and number of songs, $s$, purchased.

B. At this rate, how many songs can be purchased for $25?

\[ A. \quad \]

\[ B. \quad \]
Points Possible: 2

Content Cluster: Analyze proportional relationships and use them to solve real-world and mathematical problems.

Content Standard: Recognize and represent proportional relationships between quantities. (7.RP.2)
  c. Represent proportional relationships by equations. For example, if total cost $t$ is proportional to the number $n$ of items purchased at a constant price $p$, the relationship between the total cost and the number of items can be expressed as $t = pn$.

Depth of Knowledge: Level 2
  d. Solve a routine problem requiring multiple steps/decision points, or the application of multiple concepts
  k. Make direct translations between problem situations and symbolic notation

Calculator Designation: Calculator
Question 36

Pete and Teagan each put the same amount of money in a new bank account. Teagan’s account earns 2.75% simple interest, and she earned $2.20 in interest after one year. Pete’s account earns 5% simple interest.

How much interest did Pete earn in his account after one year?

Points Possible: 1

Content Cluster: Analyze proportional relationships and use them to solve real-world and mathematical problems.

Content Standard: Use proportional relationships to solve multistep ratio and percent problems. Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error. (7.RP.3)

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 44

An experiment for a chemical reaction involves mixing 1 teaspoon of yeast with $\frac{1}{4}$ cup of hydrogen peroxide.

Delray wants to do the same experiment with larger amounts of the two ingredients. He uses $1 \frac{1}{2}$ cups of hydrogen peroxide and needs to keep the same ratio of yeast to hydrogen peroxide. Note that there are 48 teaspoons in 1 cup.

How much yeast, in cups, should Delray mix with this amount of hydrogen peroxide?

Points Possible: 1

Content Cluster: Analyze proportional relationships and use them to solve real-world and mathematical problems.

Content Standard: Use proportional relationships to solve multistep ratio and percent problems. Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error. (7.RP.3)

Calculator Destination: Calculator
Grade 7
Reporting Category: The Number System

CRITICAL AREA OF FOCUS #2
Developing understanding of operations with rational numbers and working with expressions and linear equations
**Question 3**

Select the three expressions that are equivalent to $-2(4 - 3x) + (5x - 2)$.

- $2x - 10$
- $11x - 10$
- $-8 + 11x - 2$
- $-8 - 11x - 2$
- $-8 + 6x + 5x - 2$
- $-8 - 3x + 5x - 2$

**Points Possible:** 1

**Content Strand:** Use properties of operations to generate equivalent expressions.

**Content Standard:** Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients. *(7.EE.1)*

**Calculator Designation:** Calculator neutral
Question 29

Two identical square tables are combined to create a rectangular table, as shown.

A third identical square table will be added to create a longer rectangular table.

Which expression reveals the number of chairs along each side of the longer rectangular table?

A 2 (4) + 2 (2)
B 2 (6) + 2 (2)
C 3 (2) + 3 (2)
D 4 (2) + 4 (2)
Points Possible: 1

Content Cluster: Use properties of operations to generate equivalent expressions.

Content Standard: In a problem context, understand that rewriting an expression in an equivalent form can reveal and explain properties of the quantities represented by the expression and can reveal how those quantities are related. For example, a discount of 15% (represented by p – 0.15p) is equivalent to (1 – 0.15)p, which is equivalent to 0.85p or finding 85% of the original price. (7.EE.2)

Depth of Knowledge: Level 2
h. Extend a pattern
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
k. Make direct translations between problem situations and symbolic notation

Calculator Designation: Calculator
Question 28

The distance of one lap around a school track is $\frac{1}{4}$ mile. Sherrie walks 5 laps around the track.

How many more laps must Sherrie walk to reach a total distance of 3.5 miles?

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Points Possible: 1

Content Cluster: Solve real-life and mathematical problems using numerical and algebraic expressions and equations.

Content Standard: Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. For example: if a woman making $25 an hour gets a 10% raise, she will make an additional $\frac{1}{10}$ of her salary an hour, or $2.50, for a new salary of $27.50. If you want to place a towel bar 9 $\frac{3}{4}$ inches long in the center of a door that is 27 $\frac{1}{2}$ inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation. (7.EE.3)

Calculator Destination: Calculator
**Question 38**

Chris wrote an equation and the first step of his solution process, as shown.

\[
16 = 12 - 6x \\
4 = -6x
\]

Which math operation did Chris apply in his first step?

(A) He divided 16 by 4.

(B) He added 12 to each side of the equation.

(C) He divided each side of the equation by 4.

(D) He subtracted 12 from each side of the equation.
Points Possible: 1

Content Cluster: Solve real-life and mathematical problems using numerical and algebraic expressions and equations.

Content Standard: Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. For example: If a woman making $25 an hour gets a 10% raise, she will make an additional 1/10 of her salary an hour, or $2.50, for a new salary of $27.50. If you want to place a towel bar 9 3/4 inches long in the center of a door that is 27 1/2 inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation. (7.EE.3)

Depth of Knowledge: Level 1
m. Solve linear equations

Calculator Designation: Calculator Neutral
Question 15

Michael has $317.89 in his bank account. He uses the money in his account to purchase new clothes for $48.73, lunch for $10.13, and a bike tire for $32.46. How much money does Michael have left in his bank account after making the purchases?

$ 

Points Possible: 1

Content Cluster: Solve real-life and mathematical problems using numerical and algebraic expressions and equations.

Content Standard: Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. For example, if a woman making $25 an hour gets a 10% raise, she will make an additional $2.50, for a new salary of $27.50. If you want to place a towel bar 9 3/4 inches long in the center of a door that is 27 1/2 inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation. (7.EE.3)

Calculator Destination: Calculator
Question 35

Keith purchases a cell phone plan, which includes a cell phone and cell phone service. He makes a deposit of $100 for the cell phone and then pays $45 per month for the cell phone service.

A. Create an equation to model the total amount of money, $y$, in dollars, Keith spends on the cell phone and plan after $x$ months.

B. How much money does Keith spend per year for cell phone service?

A. $y = \underline{ }$

B. $\$ \underline{ }$

Points Possible: 2

Content Cluster: Solve real-life and mathematical problems using numerical and algebraic expressions and equations.

Content Standard: Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities. (7.EE.4)

a. Solve word problems leading to equations of the form $px + q = r$ and $p(x + q) = r$, where $p$, $q$, and $r$ are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach. For example, the perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?

Calculator Destination: Calculator
Question 4

The perimeter of a regular 6-sided figure is 30 units, and the length of each side is \( x + 1 \) units.

What is the value of \( x \)?

Points Possible: 1

Content Cluster: Solve real-life and mathematical problems using numerical and algebraic expressions and equations.

Content Standard: Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities. (7.EE.4)

a. Solve word problems leading to equations of the form \( px + q = r \) and \( p(x + q) = r \), where \( p, q, \) and \( r \) are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach. For example, the perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?

Calculator Designation: Calculator neutral
Question 31

Mary goes to the bakery with $35. She purchases 2 loaves of bread for $3 each and a cake for $15. She plans to spend the remainder of her money on cookies that cost $1.25 each.

What is the greatest number of cookies that Mary can buy?

Points Possible: 1

Content Cluster: Solve real-life and mathematical problems using numerical and algebraic expressions and equations.

Content Standard: Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities. (7.EE.4)

b. Solve word problems leading to inequalities of the form px + q > r or px + q < r, where p, q, and r are specific rational numbers. Graph the solution set of the inequality and interpret it in the context of the problem. For example, as a salesperson, you are paid $50 per week plus $3 per sale. This week you want your pay to be at least $100. Write an inequality for the number of sales you need to make, and describe the solutions.

Calculator Destination: Calculator
Question 6

A number line is shown.

Select all of the points that are 7 units from point P on the number line.

Points Possible: 1

**Content Cluster:** Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.

**Content Standard:** Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram. (7.NS.1)

c. Understand subtraction of rational numbers as adding the additive inverse, \( p - q = p + (-q) \). Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts.

**Calculator Designation:** Calculator neutral
**Question 23**

A teacher selects two different numbers, $p$ and $q$, and states that $p + q = 0$.

Which statement could be true about these two numbers?

- **A** Both numbers are positive.
- **B** Both numbers are negative.
- **C** One number is zero and the other is positive.
- **D** One number is positive and the other is negative.

**Points Possible: 1**

**Content Cluster:** Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.

**Content Standard:** Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram. *(7.NS.1)*

*b.* Understand $p + q$ as the number located a distance $|q|$ from $p$, in the positive or negative direction depending on whether $q$ is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts.

**Calculator Destination:** Calculator neutral
Question 18

Gerard adds weight to the end of a hanging spring as shown.

The spring stretches to a length of $p$ centimeters. Gerard removes some weight and the spring moves up by $q$ centimeters.

Which expression represents the length of the spring after Gerard removes some weight?

A. $p - (-q)$
B. $(-p) - q$
C. $p + (-q)$
D. $-q + (-p)$
Points Possible: 1

Content Cluster: Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.

Content Standard: Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram. \((7.NS.1)\)
c. Understand subtraction of rational numbers as adding the additive inverse, \(p - q = p + (-q)\). Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts.

Depth of Knowledge: Level 3
e. Use concepts to solve a non-routine problem
i. Formulate a mathematical model for a complex situation
m. Translate between a problem situation and symbolic notation that is not a direct translation

Calculator Designation: Calculator Neutral
Question 24

The temperature yesterday in Perrysburg, Ohio, was $-6^\circ F$.

The temperature today in Perrysburg is $6^\circ F$ warmer.

What is the temperature today?

- A $-12^\circ F$
- B $12^\circ F$
- C $6^\circ F$
- D $0^\circ F$

Points Possible: 1

Content Cluster: Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.

Content Standard: Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram. (7.NS.1)

a. Describe situations in which opposite quantities combine to make 0. For example, a hydrogen atom has 0 charge because its two constituents are oppositely charged.

Depth of Knowledge: Level 1

a. Recall, observe, or recognize a fact, definition, term, or property

I. Locate numbers on a numberline, or points on a coordinate grid

Calculator Designation: No Calculator
Question 16

Three numbers are plotted on a number line, as shown.

\[ p \quad m \quad 0 \quad n \]

This item has three parts.

**Part A.** Which expression is equivalent to \( m - n \)?

(A) \( -m + n \)
(B) \( -m + (-n) \)
(C) \( m + n \)
(D) \( m + (-n) \)

**Part B.** For each expression, select a box to identify whether the value of the expression is to the left or to the right of \( m \) on the number line.

<table>
<thead>
<tr>
<th>Expression</th>
<th>To the left of ( m )</th>
<th>To the right of ( m )</th>
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<tbody>
<tr>
<td>( m + n )</td>
<td>[ ]</td>
<td>[ ]</td>
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<tr>
<td>( m - n )</td>
<td>[ ]</td>
<td>[ ]</td>
</tr>
<tr>
<td>( m + p )</td>
<td>[ ]</td>
<td>[ ]</td>
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<tr>
<td>( m - p )</td>
<td>[ ]</td>
<td>[ ]</td>
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</table>

**Part C.** Create an expression that represents the distance on the number line between \( m \) and \( p \).

[Blank space for input]
Points Possible: 3

Content Cluster: Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.

Content Standard: Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram. (7.NS.1)

Calculator Destination: Calculator neutral
Question 2

Which number is equivalent to $\frac{8}{11}$?

A. 0.72
B. 0.72
C. 0.7
D. 1.375

Points Possible: 1

Content Cluster: Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.

Content Standard: Apply and extend previous understandings of multiplication and division of fractions to multiply and divide rational numbers. (7.NS.2)

d. Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats.

Depth of Knowledge: Level 1

b. Apply/compute a well-known algorithm (e.g., sum, quotient)

Calculator Designation: No Calculator
Question 2

An expression is shown.

2(−5.25)

What is the value of the expression?

Points Possible: 1

Content Cluster: Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.

Content Standard: Apply and extend previous understandings of multiplication and division of fractions to multiply and divide rational numbers. (7.NS.2) c. Apply properties of operations as strategies to multiply and divide rational numbers.

Calculator Designation: No calculator
Question 22

What is the value of \( \frac{2}{3}( - 9 + 3 ) \)?

Points Possible: 1

Content Cluster: Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.

Content Standard: Solve real-world and mathematical problems involving the four operations with rational numbers. Computations with rational numbers extend the rules for manipulating fractions to complex fractions. (7.NS.3)

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
Grade 7
Reporting Category:

Geometry

CRITICAL AREA OF FOCUS #3
Solving problems involving scale drawings and informal geometric constructions, angles, and working with two- and three-dimensional shapes to solve problems involving area, surface area, and volume
Question 25

Micah has a garden. He constructs a scale model of the garden using the scale 1 inch : 2 feet. The garden has a length of 6 feet.

What is the length of the garden in Micah’s model?

- A 3 inches
- B 4 inches
- C 6 inches
- D 12 inches

Points Possible: 1

Content Cluster: Draw, construct, and describe geometrical figures and describe the relationships between them.

Content Standard: Solve problems involving similar figures with right triangles, other triangles, and special quadrilaterals. (7.G.1)
a. Compute actual lengths and areas from a scale drawing and reproduce a scale drawing at a different scale.

Depth of Knowledge: Level 1
a. Recall, observe, or recognize a fact, definition, term, or property
i. Solve a one-step word problem

Calculator Designation: Calculator Neutral
Question 20

Magdalena creates the scale drawing shown of a rectangular field.

What is the area, in square meters ($m^2$), of the actual field?

Points Possible: 1

Content Cluster: Draw, construct, and describe geometrical figures and describe the relationships between them.

Content Standard: Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale. ($7.G.1$)

Calculator Designation: Calculator
Question 32

The figure on the left represents a scale drawing of the figure on the right.

What is the scale?

1 inch : [ ] yards

Points Possible: 1

Content Cluster: Draw, construct, and describe geometrical figures and describe the relationships between them.

Content Standard: Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale. (7.G.1)

Calculator Destination: Calculator
Question 14

An architect makes a scale drawing of a building. She uses the scale shown. 1 centimeter = 3 meters

The length of the building in the drawing is 11 centimeters.

What is the actual length, in meters, of the building?

Points Possible: 1

Content Cluster: Draw, construct, and describe geometrical figures and describe the relationships between them.

Content Standard: Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale. (7.G.1)

Calculator Designation: Calculator
Question 9

A triangle has two equal side lengths and a third side that is shorter than the other two lengths.

Use the Connect Line tool to create a possible triangle.

**Points Possible:** 1

**Content Cluster:** Draw, construct, and describe geometrical figures and describe the relationships between them.

**Content Standard:** Draw (freehand, with ruler and protractor, and with technology) geometric figures with given conditions. (7.G.2)

**Depth of Knowledge:** Level 2
- a. Classify plane and three-dimensional figures
- d. Solve a routine problem requiring multiple steps/decision points, or the application of multiple concepts
- l. Select a procedure according to criteria and perform it

**Calculator Designation:** Calculator Neutral
**Question 17**

Select all of the solids that could be sliced horizontally or vertically to create a triangular cross section.

- □
- □
- □
- □
- □
- □

**Points Possible:** 1

**Content Cluster:** Draw, construct, and describe geometrical figures and describe the relationships between them.

**Content Standard:** Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids. (7.G.3)

**Calculator Destination:** Calculator neutral
Question 20

A two-dimensional cross section is created by slicing a pyramid parallel to its base.

Which statement best describes the cross section?

- A  the same shape as the base but a larger area
- B  the same shape as the base but a smaller area
- C  a different shape than the base and a larger area
- D  a different shape than the base and a smaller area

Points Possible: 1

Content Cluster: Draw, construct, and describe geometrical figures and describe the relationships between them.

Content Standard: Describe the two-dimensional figures (cross sections) that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids. (7.G.3)

Depth of Knowledge: Level 2
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 Neutral
Question 1

A right square pyramid is sliced through its apex and perpendicular to its base. What is the shape of the cross section that is the result of this action?

A   a square  
B   an isosceles triangle  
C   an isosceles trapezoid  
D   a non-isosceles trapezoid

Points Possible: 1

Content Cluster: Draw, construct, and describe geometrical figures and describe the relationships between them.

Content Standard: Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids. (7.G.3)

Calculator Designation: Calculator neutral
Question 4

Which expression represents the area of a circle with a radius of 7 units?

A. $7 \cdot 2 \cdot \pi$
B. $7 \cdot 7 \cdot \pi$
C. $7 \cdot \pi \cdot \pi$
D. $3.5 \cdot 3.5 \cdot \pi$

Points Possible: 1

Content Cluster: Solve real-life and mathematical problems involving angle measure, circles, area, surface area, and volume.

Content Standard: Work with circles. (7.G.4)
b. Know and use the formulas for the area and circumference of a circle and use them to solve real-world and mathematical problems.

Depth of Knowledge: Level 1
a. Recall, observe, or recognize a fact, definition, term, or property

Calculator Designation: Calculator Neutral
Question 17

A container in the shape of a rectangular prism holds 651.168 cubic inches when completely filled with water. The container has a length of 12.6 inches and a width of 15.2 inches.

What is the height, in inches, of the container?

Points Possible: 1

Content Cluster: Solve real-life and mathematical problems involving angle measure, circles, area, surface area, and volume.

Content Standard: Solve real-world and mathematical problems involving area, volume, and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms. (7.G.6)

Calculator Designation: Calculator
Grade 7
Reporting Category:
Statistics and Probability

CRITICAL AREA OF FOCUS #4
Drawing inferences about populations based on samples
Question 33

Chris wants to determine the most popular sport of the students at his school. Which sample should he survey?

A   a group of his friends
B   a group of students on the soccer team
C   a group of randomly selected students from each grade at his school
D   a group of randomly selected students from each sports team at his school

Points Possible: 1

Content Cluster: Use random sampling to draw inferences about a population.

Content Standard: Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences. (7.SP.1)

Calculator Destination: Calculator neutral
Question 11

There are 300 students in 7th grade. Paul takes a random sample to find out which fall sport the students in 7th grade prefer.

Which group of students represents the most valid sample?

A 10 of Paul’s closest friends
B 10 students from each grade
C 10 students from each 7th grade homeroom
D 10 students on the 7th grade basketball team

Points Possible: 1

Content Cluster: Use sampling to draw conclusions about a population.

Content Standard: Understand that statistics can be used to gain information about a population by examining a sample of the population. (7.SP.1)

b. Understand that conclusions and generalizations about a population are valid only if the sample is representative of that population. Develop an informal understanding of bias.

Depth of Knowledge: Level 1

a. Recall, observe, or recognize a fact, definition, term, or property

Calculator Designation: Calculator Neutral
Jerry grows two different types of oranges. He wants to know which type of orange weighs more. He takes a random sample of oranges from each type of tree and creates the dot plots shown with their weights, in ounces.

Based on these data, which statement is true?

A. It is certain that a Type B orange weighs more than a Type A orange.
B. There is evidence that a Type B orange typically weighs more than a Type A orange.
C. There is no evidence that a Type B orange weighs more than a Type A orange.
D. The mean absolute deviation of the sample is less for a Type A orange than for a Type B orange.
Points Possible: 1

Content Cluster: Summarize and describe distributions representing one population and draw informal comparisons between two populations.

Content Standard: Describe and analyze distributions. (7.SP.3)
b. Informally assess the degree of visual overlap of two numerical data distributions with roughly equal variabilities, measuring the difference between the centers by expressing it as a multiple of a measure of variability. For example, the mean height of players on the basketball team is 10 cm greater than the mean height of players on the soccer team, about twice the variability (mean absolute deviation) on either team; on a dot plot (line plot), the separation between the two distributions of heights is noticeable.

Depth of Knowledge: Level 3
a. Interpret information from a complex graph
c. Make and/or justify conjectures
e. Use concepts to solve a non-routine problem

Calculator Designation: Calculator Neutral
Question 18

The leaders of two youth sports teams randomly select five members of each team and record their ages, as shown.

- Team A: 16, 13, 12, 16, 13
- Team B: 10, 13, 16, 16, 10

Which statement appropriately compares the ages of the team members?

(A) Members of Team A and members of Team B are likely the same average (mean) age.
(B) Members of Team A are likely younger, and they have less variability in their ages.
(C) Members of Team A are likely older, and they have more variability in their ages.
(D) Members of Team A are likely older, and they have less variability in their ages.

Points Possible: 1

Content Cluster: Draw informal comparative inferences about two populations.

Content Standard: Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations. For example, decide whether the words in a chapter of a seventh-grade science book are generally longer than the words in a chapter of a fourth-grade science book. (7.SP.4)

Calculator Designation: Calculator
Question 8

Event Q is more likely to occur than event T. The probability of event T is \( \frac{1}{2} \).

What is a possible probability of event Q?

\[ P(Q) = \]

Points Possible: 1

Content Cluster: Investigate chance processes and develop, use, and evaluate probability models.

Content Standard: Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event; a probability around \( \frac{1}{2} \) indicates an event that is neither unlikely nor likely; and a probability near 1 indicates a likely event. (7.SP.5)

Calculator Designation: Calculator neutral
**Question 21**

Mr. Prescott asks all the students in his class whether they play sports. A randomly selected student in his class is more likely to play sports than not to play sports.

A. What is a possible probability that a randomly selected student from Mr. Prescott’s class plays sports?

B. Based on your probability in part A, what is a possible probability that a randomly selected student from Mr. Prescott’s class does not play sports?

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Points Possible: 1

Content Cluster: Investigate chance processes and develop, use, and evaluate probability models.

Content Standard: Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event. (7.SP.5)

Depth of Knowledge: Level 3
e. Use concepts to solve a non-routine problem

Calculator Designation: Calculator Neutral
Question 37

Joe designs a weighted number generator that produces the integers 0 to 4. He then runs the generator 500 times. The results are shown in the table.

<table>
<thead>
<tr>
<th>Integer</th>
<th>Frequency</th>
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<tbody>
<tr>
<td>0</td>
<td>49</td>
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<tr>
<td>1</td>
<td>74</td>
</tr>
<tr>
<td>2</td>
<td>104</td>
</tr>
<tr>
<td>3</td>
<td>121</td>
</tr>
<tr>
<td>4</td>
<td>152</td>
</tr>
</tbody>
</table>

If Joe runs the generator a total of 4,000 times, which is closest to the expected number of times the integer 4 is produced?

A  152  
B  812  
C  1,018  
D  1,223  

Points Possible: 1

Content Cluster: Investigate chance processes and develop, use, and evaluate probability models.

Content Standard: Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability. For example, when rolling a number cube 600 times, predict that a 3 or 6 would be rolled roughly 200 times, but probably not exactly 200 times. (7.SP.6)

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 9

A gumball machine contains equal numbers of red, yellow, green, and blue gumballs. It randomly gives out one gumball for each pull at the machine.

What is the probability of getting a red or green gumball from one pull at the machine?

Points Possible: 1

Content Cluster: Investigate chance processes and develop, use, and evaluate probability models.

Content Standard: Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy. (7.SP.7)

a. Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events. For example, if a student is selected at random from a class, find the probability that Jane will be selected and the probability that a girl will be selected.

Calculator Designation: Calculator neutral
Question 2

A factory produces 80,000 candies each day. They produce equal quantities of four flavors: cherry, lemon, orange, and strawberry. The candies are mixed together during packaging.

What is the probability that a randomly selected candy is orange?

Points Possible: 1

Content Cluster: Investigate chance processes and develop, use, and evaluate probability models.

Content Standard: Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy. (7.SP.7)

a. Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events. For example, if a student is selected at random from a class, find the probability that Jane will be selected and the probability that a girl will be selected.

Calculator Destination: Calculator neutral
Question 7

Zayne has a bag filled with coins. The bag contains 7 quarters, 8 dimes, 3 nickels, and 9 pennies. He randomly chooses a coin from the bag. What is the probability that Zayne chooses a quarter or a nickel?

Points Possible: 1

Content Cluster: Investigate chance processes and develop, use, and evaluate probability models.

Content Standard: Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy. (7.SP.7)

b. Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process. For example, find the approximate probability that a spinning penny will land heads up or that a tossed paper cup will land open-end down. Do the outcomes for the spinning penny appear to be equally likely based on the observed frequencies?

Calculator Designation: Calculator neutral
Question 41

The letter tiles shown are placed in a bowl. Matt selects one tile from the bowl.

H J K M O P S U Z Y

What is the probability that Matt will select one of the letters in the word “JUMP”?

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<td>8/9</td>
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</table>
Points Possible: 1

Content Cluster: Investigate chance processes and develop, use, and evaluate probability models.

Content Standard: Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy. (7.SP.7)
a. Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events. For example, if a student is selected at random from a class, find the probability that Jane will be selected and the probability that a girl will be selected.

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 36

A bag contains 25 cookies. There are 15 chocolate chip cookies, 7 peanut butter cookies, and the rest are oatmeal raisin cookies.

What is the probability of randomly choosing a chocolate chip or peanut butter cookie from the bag?

Points Possible: 1

**Content Cluster:** Investigate chance processes and develop, use, and evaluate probability models.

**Content Standard:** Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy. (7.SP.7)

b. Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process. For example, find the approximate probability that a spinning penny will land heads up or that a tossed paper cup will land open-end down. Do the outcomes for the spinning penny appear to be equally likely based on the observed frequencies?

**Calculator Destination:** Calculator neutral
Question 39

Kayla rolls two fair number cubes each numbered 1 through 6. She needs to roll a sum of 9 or more to win a game. She rolls the number cubes one at a time. She rolls a 5 with the first number cube.

What is the probability that Kayla will win the game?

Points Possible: 1

Content Cluster: Investigate chance processes and develop, use, and evaluate probability models.

Content Standard: Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation. (7.SP.8)

a. Understand that, just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs.

Calculator Destination: Calculator
**Question 5**

Arianne drives by a stop light near her home once every morning. The stop light has red, yellow, and green lights. She wants to know the probability of the light being red on two mornings.

Which list represents the sample space for two mornings at the stop light?

- red, yellow, green
- red/red, yellow/yellow, green/green
- red/yellow, red/green, yellow/green, yellow/red, green/yellow, green/red
- red/red, red/yellow, red/green, yellow/red, yellow/yellow, yellow/green, green/red, green/yellow, green/green

**Points Possible: 1**

**Content Strand:** Investigate chance processes and develop, use, and evaluate probability models.

**Content Standard:** Find probabilities of compound events using organized lists, tables, tree diagrams, and simulations. *(7.SP.8)*

*b.* Represent sample spaces for compound events using methods such as organized lists, tables, and tree diagrams. For an event described in everyday language, e.g., “rolling double sixes,” identify the outcomes in the sample space which compose the event.

**Calculator Designation:** Calculator neutral