COMMON CORE ASSESSMENT COMPARISON FOR MATHEMATICS

GRADE 7

September 2013

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INTRODUCTION

The purpose of this document is to illustrate the differences between the Delaware Comprehensive Assessment System (DCAS) and the expectations of the next-generation Common Core State Standard (CCSS) assessment in Mathematics. A side-by-side comparison of the current design of an operational assessment item and the expectations for the content and rigor of a next-generation Common Core mathematical item are provided for each CCSS. The samples provided are designed to help Delaware's educators better understand the instructional shifts needed to meet the rigorous demands of the CCSS. This document does not represent the test specifications or blueprints for each grade level, for DCAS, or the next-generation assessment.

For mathematics, next-generation assessment items were selected for CCSS that represent the shift in content at the new grade level. Sites used to select the next-generation assessment items include:

- Smarter Balanced Assessment Consortium
- Partnership of Assessment of Readiness for College and Career
- Illustrative Mathematics
- Mathematics Assessment Project

Using released items from other states, a DCAS-like item, aligned to the same CCSS, was chosen. These examples emphasize the contrast in rigor between the previous Delaware standards, known as Grade-Level Expectations, and the Common Core State Standards.

Section 1, DCAS-Like and Next-Generation Assessment Comparison, includes content that is in the CCSS at a different "rigor" level. The examples are organized by the CCSS. For some standards, more than one example may be given to illustrate the different components of the standard. Additionally, each example identifies the standard and is separated into two parts. Part A is an example of a DCAS-like item, and Part B is an example of a next-generation item based on CCSS.

Section 2 includes at least one Performance Task that addresses multiple aspects of the CCSS (content and mathematical practices).

How to Use Various Aspects of This Document
- Analyze the way mathematics standards are conceptualized in each item or task.
- Identify the instructional shifts that need to occur to prepare students to address these more rigorous demands. Develop a plan to implement the necessary instructional changes.
- Notice how numbers (e.g., fractions instead of whole numbers) are used in the sample items.
- Recognize that the sample items and tasks are only one way of assessing the standard.
- Understand that the sample items and tasks do not represent a mini-version of the next-generation assessment.
- Instruction should address "focus," coherence," and "rigor" of mathematics concepts.
- Instruction should embed mathematical practices when teaching mathematical content.

- For grades K–5, calculators should not be used as the concepts of number sense and operations are fundamental to learning new mathematics content in grades 6–12.
- The next-generation assessment will be online and the scoring will be done electronically. It is important to note that students may not be asked to show their work and therefore will not be given partial credit. It is suggested when using items within this document in the classroom for formative assessments, it is good practice to have students demonstrate their methodology by showing or explaining their work.

Your feedback is welcome. Please do not hesitate to contact Katia Foret at katia.foret@doe.k12.de.us or Rita Fry at rita.fry@doe.k12.de.us with suggestions, questions, and/or concerns.

* The Smarter Balanced Assessment Consortium has a 30-item practice test available for each grade level (3-8 and 11) for mathematics and ELA (including reading, writing, listening, and research). These practice tests allow students to experience items that look and function like those being developed for the Smarter Balanced assessments. The practice test also includes performance tasks and is constructed to follow a test blueprint similar to the blueprint intended for the operational test. The Smarter Balanced site is located at: http://www.smarterbalanced.org/.

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Common Core State Standards for Mathematical Practices

Mathematical Practices		Student Dispositions:	Teacher Actions to Engage Students in Practices:
Essential Processes for a Productive Math Thinker	**1. Make sense of problems and persevere in solving them**	• Have an understanding of the situation • Use patience and persistence to solve problem • Be able to use different strategies • Use self-evaluation and redirections • Communicate both verbally and written • Be able to deduce what is a reasonable solution	• Provide open-ended and rich problems • Ask probing questions • Model multiple problem-solving strategies through Think-Aloud • Promote and value discourse • Integrate cross-curricular materials • Promote collaboration • Probe student responses (correct or incorrect) for understanding and multiple approaches • Provide scaffolding when appropriate • Provide a safe environment for learning from mistakes
	6. Attend to precision	• Communicate with precision—orally and written • Use mathematics concepts and vocabulary appropriately • State meaning of symbols and use them appropriately • Attend to units/labeling/tools accurately • Carefully formulate explanations and defend answers • Calculate accurately and efficiently • Formulate and make use of definitions with others • Ensure reasonableness of answers • Persevere through multiple-step problems	• Encourage students to think aloud • Develop explicit instruction/teacher models of thinking aloud • Include guided inquiry as teacher gives problem, students work together to solve problems, and debrief time for sharing and comparing strategies • Use probing questions that target content of study • Promote mathematical language • Encourage students to identify errors when answers are wrong
Reasoning and Explaining	**2. Reason abstractly and quantitatively**	• Create multiple representations • Interpret problems in contexts • Estimate first/answer reasonable • Make connections • Represent symbolically • Talk about problems, real-life situations • Attend to units • Use context to think about a problem	• Develop opportunities for problem-solving strategies • Give time for processing and discussing • Tie content areas together to help make connections • Give real-world situations • Demonstrate thinking aloud for students' benefit • Value invented strategies and representations • More emphasis on the process instead of on the answer
	3. Construct viable arguments and critique the reasoning of others	• Ask questions • Use examples and counter examples • Reason inductively and make plausible arguments • Use objects, drawings, diagrams, and actions • Develop ideas about mathematics and support their reasoning • Analyze others arguments • Encourage the use of mathematics vocabulary	• Create a safe environment for risk-taking and critiquing with respect • Provide complex, rigorous tasks that foster deep thinking • Provide time for student discourse • Plan effective questions and student grouping • Probe students

Mathematical Practices		Students:	Teacher(s) promote(s) by:
Modeling and Using Tools	**4. Model with mathematics**	▪ Realize that mathematics (numbers and symbols) is used to solve/work out real-life situations ▪ Analyze relationships to draw conclusions ▪ Interpret mathematical results in context ▪ Show evidence that they can use their mathematical results to think about a problem and determine if the results are reasonable—if not, go back and look for more information ▪ Make sense of the mathematics	▪ Allowing time for the process to take place (model, make graphs, etc.) ▪ Modeling desired behaviors (think alouds) and thought processes (questioning, revision, reflection/written) ▪ Making appropriate tools available ▪ Creating an emotionally safe environment where risk-taking is valued ▪ Providing meaningful, real-world, authentic, performance-based tasks (non-traditional work problems) ▪ Promoting discourse and investigations
	5. Use appropriate tools strategically	▪ Choose the appropriate tool to solve a given problem and deepen their conceptual understanding (paper/pencil, ruler, base ten blocks, compass, protractor) ▪ Choose the appropriate technological tool to solve a given problem and deepen their conceptual understanding (e.g., spreadsheet, geometry software, calculator, web 2.0 tools) ▪ Compare the efficiency of different tools ▪ Recognize the usefulness and limitations of different tools	▪ Maintaining knowledge of appropriate tools ▪ Modeling effectively the tools available, their benefits, and limitations ▪ Modeling a situation where the decision needs to be made as to which tool should be used ▪ Comparing/contrasting effectiveness of tools ▪ Making available and encouraging use of a variety of tools
Seeing Structure and Generalizing	**7. Look for and make use of structure**	▪ Look for, interpret, and identify patterns and structures ▪ Make connections to skills and strategies previously learned to solve new problems/tasks independently and with peers ▪ Reflect and recognize various structures in mathematics ▪ Breakdown complex problems into simpler, more manageable chunks ▪ "Step back" or shift perspective ▪ Value multiple perspectives	▪ Being quiet and structuring opportunities for students to think aloud ▪ Facilitating learning by using open-ended questions to assist students in exploration ▪ Selecting tasks that allow students to discern structures or patterns to make connections ▪ Allowing time for student discussion and processing in place of fixed rules or definitions ▪ Fostering persistence/stamina in problem solving ▪ Allowing time for students to practice
	8. Look for and express regularity in repeated reasoning	▪ Identify patterns and make generalizations ▪ Continually evaluate reasonableness of intermediate results ▪ Maintain oversight of the process ▪ Search for and identify and use shortcuts	▪ Providing rich and varied tasks that allow students to generalize relationships and methods and build on prior mathematical knowledge ▪ Providing adequate time for exploration ▪ Providing time for dialogue, reflection, and peer collaboration ▪ Asking deliberate questions that enable students to reflect on their own thinking ▪ Creating strategic and intentional check-in points during student work time

For classroom posters depicting the Mathematical Practices, please see: http://seancarberry.cmswiki.wikispaces.net/file/detail/12-20math.docx

RATIOS AND PROPORTIONAL RELATIONSHIPS (RP)

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

7.RP.1 – 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 1/2 mile in each 1/4 hour, compute the unit rate as the complex fraction (1/2)/(1/4) miles per hour, equivalently 2 miles per hour.*

<div align="center">

DCAS-Like

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1A

Your school is having a bake sale. You have volunteered to bake apple pies. Your recipe requires 3 cups of sliced apples for each pie. You have $25.00 to spend on apples.

As you enter the grocery store, you see that they have four different types of apples that each can be used to make apple pies. Given the information listed below, which type of apple would be the best to buy considering the recipe and how much money you have to spend?

- Granny Smith
  3 apples make 2 cups of slices
  Cost = $4.25 a dozen
- Gala
  $3\frac{1}{2}$ apples make 2 cups of slices
  Cost = $4.00 a dozen
- Macintosh
  $3\frac{3}{4}$ apples make 2 cups of slices
  Cost = $3.25 a dozen
- Red Delicious
  $3\frac{1}{4}$ apples make 2 cups of slices
  Cost = $3.95 a dozen

A. Granny Smith

B. Gala

C. Macintosh

D. Red Delicious

1B

A restaurant makes a special seasoning for all of its grilled vegetables. Here is how the ingredients are mixed:

- $\frac{1}{2}$ of the mixture is salt

- $\frac{1}{4}$ of the mixture is pepper

- $\frac{1}{8}$ of the mixture is garlic powder

- $\frac{1}{8}$ of the mixture is onion powder

Part A

When the ingredients are mixed in the same ratio as shown above, every batch of seasoning tastes the same.

Study the measurements for each batch in the table. Fill in the blanks so that every batch will taste the same.

	Batch 1	Batch 2	Batch 3
Salt (cups)	1		
Pepper (cups)		1	
Garlic Powder (cups)	$\frac{1}{4}$		1
Onion Powder (cups)			1

Part B

The restaurant mixes a 12-cup batch of the mixture every week.

How many cups of each ingredient do they use in the mixture each week?

	cups salt
	cups pepper
	cups garlic powder
	cups onion powder

7.RP.2 – Recognize and represent proportional relationships between quantities.

   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.

   b. Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.

   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.*

   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.

DCAS-Like

2A

If $\dfrac{10.3}{5.62} = \dfrac{n}{4.78}$, then, of the following, which is closest to n?

A. 2.61

B. 3.83

C. 8.76

D. 8.82

Next-Generation

2B

Helen made a graph that represents the amount of money she earns, y, for the numbers of hours she works, x. The graph is a straight line that passes through the origin and the point (1, 12.5)

Which statement **must** be true?

a.   The slope of the graph is 1.

b.   Helen earns $12.50 per hour.

c.   Helen works 12.5 hours per day.

d.   The y-intercept of the graph is 12.5.

7.RP.2 – Recognize and represent proportional relationships between quantities.

    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.

    b. Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.

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    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.

DCAS-Like

3A

Roxanne plans to enlarge her photograph, which is 4 inches by 6 inches. Which of the following enlargements maintains the same proportions as the original photograph?

A. 5 inches by 7 inches

B. 5 inches by $7\frac{1}{2}$ inches

C. 6 inches by 8 inches

D. 8 inches by 6 inches

3B

The value of y is proportional to the value of x. The constant of proportionality for this relationship is 2. On the grid below, graph this proportional relationship.

7.RP.2 – Recognize and represent proportional relationships between quantities.

 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.

 b. Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.

 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.*

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DCAS-Like

4A

If $\dfrac{P}{41} = 64$, what does $\dfrac{P}{82}$ equal?

A. 32

B. 64

C. 128

D. 5248

Next-Generation

4B

Roberto is making cakes. The number of cups of flour he uses is proportional to the number of cakes he makes.

Roberto uses $22\dfrac{1}{2}$ cups of flour to make 10 cakes.

Which equation represents the relationship between f, the number of cups of flour Roberto uses, and c, the number of cakes he makes?

a. $f = \dfrac{4}{9}c$

b. $f = 2\dfrac{1}{4}c$

c. $f = 2\dfrac{1}{2}c$

d. $f = 10c$

7.RP.3 – 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.*

<div align="center">**DCAS-Like**</div>

5A

The town of Mayville taxes property at a rate of $42 for each $1,000 of estimated value. What is the estimated value of a property on which the owner owes $5,250 in property tax?

A. $42,000

B. $47,250

C. $125,000

D. $220,500

<div align="center">**Next-Generation**</div>

5B

The tires Mary wants to buy for her car cost $200 per tire. A store is offering the following deal.

<div align="center">***Buy 3 tires and get the 4th tire for 75% off!***</div>

Mary will buy 4 tires using the deal. The sales tax is 8%. How much money will Mary save by using the deal versus paying the full price for all 4 tires?

a. $150

b. $162

c. $185

d. $216

7.RP.3 – 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.*

<div align="center">

DCAS-Like

</div>

6A

Kate bought a book for $14.95, a record for $5.85, and a tape for $9.70. If the sales tax on these items is 6 percent and all 3 items are taxable, what is the total amount she must pay for the 3 items including tax?

A. $32.33

B. $32.06

C. $30.56

D. $30.50

<div align="center">

Next-Generation

</div>

6B

Consider a circle that has a circumference of 28π centimeters (cm).

Part A

What is the area, in cm^2, of this circle? Show all work necessary to justify your response.

Part B

What would be the measure of the radius, in cm, of a circle with an area that is 20% greater than the circle in Part A? Show all work necessary to justify your response.

THE NUMBER SYSTEM (NS)

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

7.NS.1 – 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.

   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.*

   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.

   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.

   d. Apply properties of operations as strategies to add and subtract rational numbers.

DCAS-Like

7A
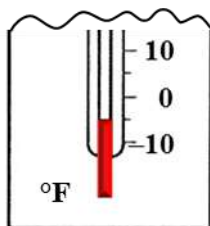
What temperature would be 15° F more than the temperature shown on the thermometer above?

A. –20° F

B. –10° F

C. 10° F

D. 15° F

Next-Generation

7B

Identify the number(s) that makes each statement true. You may select more than one number for each statement.

a. $-4.8 + \boxed{}$ = a positive number   ○ -5.2 ○ 4.9

b. $\boxed{} - 1\frac{1}{2}$ = a negative number   ○ $\frac{3}{2}$ ○ $-\frac{7}{3}$

c. $\boxed{} + 5$ = zero   ○ -5 ○ 5

d. $-2.15 - \boxed{}$ = a negative number   ○ -1.75 ○ -1.34

7.NS.2 – Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.

a. Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as (-1)(-1) = 1 and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts.

b. Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers then -$(p/q) = (-p)/q = p/(-q)$. Interpret quotients of rational numbers by describing real-world contexts.

c. Apply properties of operations as strategies to multiply and divide rational numbers.

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.

DCAS-Like

8A

Jim's cell phone bill is automatically deducting $32 from his bank account every month. How much will the deductions total for the year?

A. –32

B. –44

C. –364

D. –384

8B

Renee, Susan, and Martha will share the cost to rent a vacation house for a week.

- Renee will pay 40% of the cost.
- Susan will pay 0.35 of the cost.
- Martha will pay the remainder of the cost.

Part A

Martha thinks that she will pay $\frac{1}{3}$ of the cost. Is Martha correct? Use mathematics to justify your answer.

Part B

The cost to rent a vacation house for a week is $850. How much will Renee, Susan, and Martha each pay to rent this house for a week?

Renee will pay: $_____

Susan will pay: $_____

Martha will pay: $_____

7.NS.2 – Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.

a. Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as (-1)(-1) = 1 and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts.

b. Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers then -$(p/q) = (-p)/q = p/(-q)$. Interpret quotients of rational numbers by describing real-world contexts.

c. Apply properties of operations as strategies to multiply and divide rational numbers.

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.

DCAS-Like

9A

Simplify: $-36 \div (4)$

A. –9

B. +9

C. $\dfrac{-1}{9}$

D. $\dfrac{+1}{9}$

9B

Two of these statements are true in **all** cases:

- Statement 1: The greatest common factor of any two distinct prime numbers is 1.
- Statement 2: The greatest common factor of any two distinct composite numbers is 1.
- Statement 3: The product of any two integers is a rational number.
- Statement 4: The quotient of any two integers is a rational number.

Part A

Which two statements are true in **all** cases?

_____   _____

Part B

For both statements that you did **not** choose in Part A, provide one clear reason and/or example for each statement that proves the statement can be false.

Statement ___: Reason/example

Statement ___: Reason/example

7.NS.3 – 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.)

DCAS-Like

10A

The manager of a company has to order new engines for its delivery trucks after the trucks have been driven 150,000 miles. One of the delivery trucks currently has 119,866 miles on it. The truck has the same delivery route each week and is driven an average of 40,000 miles each year. At this rate, the manager should expect this truck to reach 150,000 miles in approximately how many months?

A. Between 4 and 6 months

B. Between 6 and 8 months

C. Between 8 and 10 months

D. More than 10 months

Next-Generation

10B

Anne's family is driving to her uncle's house. The family travels 383.5 miles between 10:15 a.m. and 4:45 p.m.

a. What is an equation that Anne can use to determine their average rate of travel for the day, R, in miles per hour? Drag the tiles to complete an equation.

383.5	6.5	10.25	4.75
+	−	×	÷

☐ ☐ ☐ $= R$

b. Calculate the family's average rate of travel for the day. Then, fill in the blank to complete the following statement. You can enter a whole number or a decimal rounded to the nearest tenth.

The family's average rate of travel for the day is _____ miles per hour.

c. Anne tells her family, "It's a good thing we traveled as fast as we did. If our rate had been 50 miles per hour, we wouldn't have gotten to his house until about…."

Fill in the blank to complete the following statement:

If their average rate had been 50 miles per hour, Anne's family would have

arrived at her uncle's house at _____:_____ p.m.

7.NS.3 – 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.)

11A

In 1990, the postal rate was 25 cents for the first ounce and 20 cents for each additional ounce or part of an ounce. What did it cost to mail a package that weighed 6.8 ounces?

A. $1.25

B. $1.40

C. $1.45

D. $1.75

11B

Jane and Eric are helping their teacher buy supplies for a research project. Every student will get a bag with 2 pencils and 30 index cards.

The teacher gave Jane $17 to buy pencils from the school store. The pencils come in boxes of 12 and cost $1.69 per box.

Eric was given $19 to buy index cards at an office supply store. Index cards are sold in packs of 150 cards and cost $2.99 per pack.

a. Jane buys as many boxes of pencils as she can afford. Eric buys as many index cards as he can afford. How many complete bags of supplies can they make?

○ Fewer than 10   ○ Between 10 and 24

○ Between 25 and 40   ○ More than 40

b. Each bag contains 2 pencils and 30 index cards. How much will each bag cost? Give your answer to the nearest **cent**. Fill in the blank to complete the sentence.

Each bag of supplies costs _____ cents to make.

EXPRESSIONS AND EQUATIONS (EE)

Cluster: Use properties of operations to generate equivalent expressions.

7.EE.1 – Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.

DCAS-Like

12A

Which expression represents the sum of $(2x - 5y)$ and $(x + y)$?

A. $3x - 4y$

B. $3x - 6y$

C. $x - 4y$

D. $x - 6y$

Next-Generation

12B

In the following equation, a and b are both integers.

$$a(3x - 8) = b - 18x$$

What is the value of a?

What is the value of b?

7.EE.2 – Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related. *For example, a + 0.05a = 1.05a means that "increase by 5%" is the same as "multiply by 1.05."*

DCAS-Like

13A

Leo bought a used car for x dollars. One year later, the value of the car was $0.88x$. Which expression is another way to describe the change in the value of the car?

A. 0.12% decrease

B. 0.88% decrease

C. 12% decrease

D. 88% decrease

Next-Generation

13B

All books in a store are being discounted by 30%.

Part A

Let x represent the regular price of any book in the store. Write an expression that can be used to find the sale price of any book in the store.

Expression [   ]

Part B

Jerome bought a book on sale at the store. The sale price of the book was $8.96. Write and solve an equation to determine the regular price of the book to the nearest cent.

Equation [   ]

Regular price of book [   ]

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

7.EE.3 – 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 as strategies 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.*

DCAS-Like

14A

David bought a computer that was 20% off the regular price of $1,080. If an 8% sales tax was added to the cost of the computer, what was the total price David paid for it?

A. $302.40

B. $864.00

C. $933.12

D. $1,382.40

Next-Generation

14B

A framed picture 24-inches wide and 28-inches high is shown in the diagram below.

The picture will be hung on a wall where the distance from the floor to ceiling is 8 feet.

The center of the picture must be $5\frac{1}{4}$ feet from the floor. Determine the distance from the ceiling to the top of the picture frame. Show your work.

7.EE.4 – 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.

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?*

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.*

DCAS-Like

15A

Which steps can be used to solve for the value of y?

$$\frac{2}{3}(y + 57) = 178$$

A. Divide both sides by $\frac{2}{3}$, then subtract 57 from both sides

B. Subtract 57 from both sides, then divide both sides by $\frac{2}{3}$

C. Multiply both sides by $\frac{2}{3}$, then subtract 57 from both sides

D. Subtract $\frac{2}{3}$ from both sides, then subtract 57 from both sides
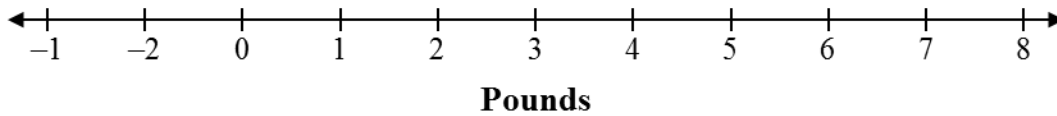
15B

David wants to buy 2 pineapples and some bananas.

- The price of 1 pineapple is $2.99.
- The price of bananas is $0.67 per pound.

David wants to spend less than $10.00. Write an inequality that represents the number of pounds of bananas, b, David can buy.

On the number line below, draw a graph that represents the number of pounds of bananas David can buy.

Pounds

7.EE.4 – 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.

    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?*

    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.*

<div align="center">

DCAS-Like

</div>

16A

When John bought his new computer, he purchased an online computer help service. The help service has a yearly fee of $25.50 and a $10.50 charge for each help session a person uses. If John can only spend $170 for the computer help this year, what is the maximum number of help sessions he can use this year?

A. 4 sessions

B. 12 sessions

C. 13 sessions

D. 14 sessions

<div align="center">

Next-Generation

</div>

16B

Mandy's monthly earnings consist of a fixed salary of $2,800 and an 18% commission on all her monthly sales. To cover her planned expenses, Mandy needs to earn an income of at least $6,400 this month.

a. Write an inequality that, when solved, will give the amount of sales Mandy needs to cover her planned expenses.

b. Graph the solution of the inequality on the number line.

0
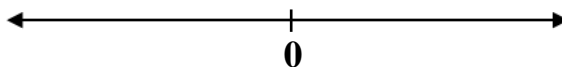
GEOMETRY (G)

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

7.G.1 – 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.

<center>**DCAS-Like**</center>

17A

A scale drawing for a construction project uses a scale of 1 inch = 4 feet. The dimensions of the rectangular family room on the scale drawing are 7.5 inches by 12 inches.

What will be the actual area of the floor of the family room after the construction project is completed?

A. 90 square feet

B. 156 square feet

C. 360 square feet

D. 1440 square feet

<center>**Next-Generation**</center>

17B

A company designed two rectangular maps of the same region. These maps are described below.

- Map 1: The dimensions are 8 inches by 10 inches. The scale is $\frac{3}{4}$ mile to 1 inch.

- Map 2: The dimensions are 4 inches by 5 inches.

Which ratio represents the scale on Map 2?

a. $\frac{1}{2}$ mile to $\frac{3}{4}$ inch

b. $\frac{3}{4}$ miles to $\frac{1}{2}$ inch

c. $\frac{1}{4}$ mile to 1 inch

d. $\frac{3}{8}$ mile to 1 inch

7.G.2 – Draw (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle.

DCAS-Like

18A

Rocky's Tunnel Company makes tunnels for playgrounds. Each tunnel has a circular opening with a diameter of 36 in. Which diagram shows a tunnel opening with a diameter of 36 in.?

A.

36 in.

B.

36 in.

C.

36 in.

D.

36 in.

18B
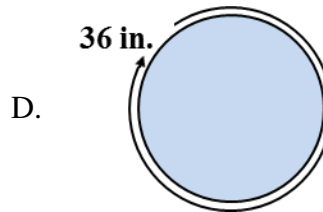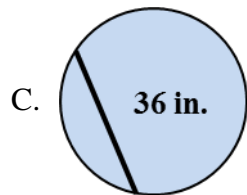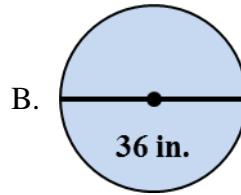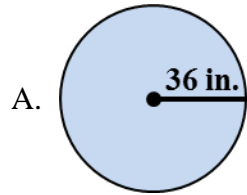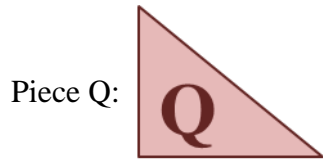
Piece Q:

On the grid below, use piece Q to draw a right triangle, W, that has an area four times the area of piece Q. Label both the original triangle Q and the new triangle W.
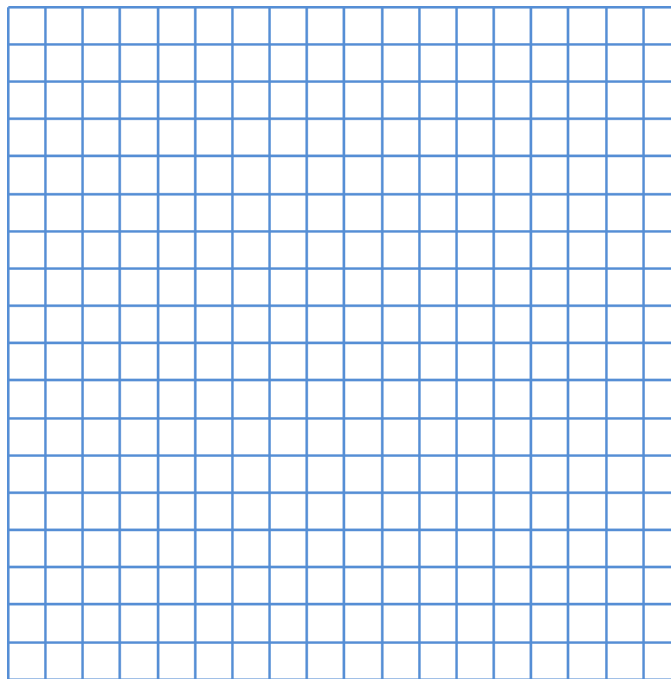
7.G.3 – Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.

DCAS-Like

19A

Which is the vertical cross-section going through the center of the figure shown?
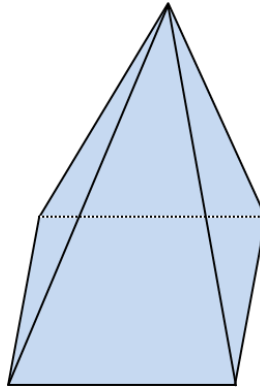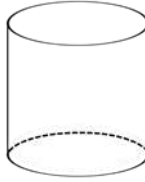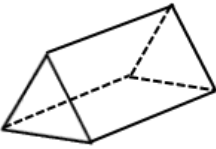
A. Triangle

B. Circle

C. Square

D. Trapezoid

Next-Generation

19B

For each figure below, identify the shape of the horizontal and vertical cross-section.

Figure	Cross-Section	Shape			
a.	Horizontal	○ Triangle	○ Circle	○ Rectangle	○ Trapezoid
	Vertical	○ Triangle	○ Circle	○ Rectangle	○ Trapezoid
b.	Horizontal	○ Triangle	○ Circle	○ Rectangle	○ Trapezoid
	Vertical	○ Triangle	○ Circle	○ Rectangle	○ Trapezoid
c.	Horizontal	○ Triangle	○ Circle	○ Rectangle	○ Trapezoid
	Vertical	○ Triangle	○ Circle	○ Rectangle	○ Trapezoid

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

7.G.4 – Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.

<div align="center">

DCAS-Like

</div>

20A

In the figure to the right, a circle with center O and radius of length 3 is inscribed in a square. What is the area of the shaded region?
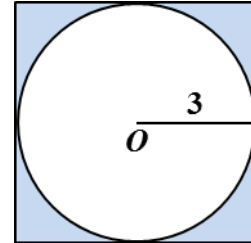
A. 3.86

B. 7.73

C. 28.27

D. 32.86

<div align="center">

Next-Generation

</div>

20B

An artist used silver wire to make a square that has a perimeter of 40 inches. She then used copper wire to make the largest circle that could fit in the square as shown below.
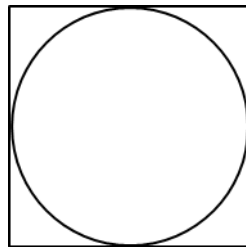
How many more inches of silver wire did the artist use compared to copper wire? (Use $\pi = 3.14$) Show all work necessary to justify your response.

7.G.5 – Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure.

21A

In the figure to the right, what is the measure of angle *DAC*?

A. 47°

B. 57°

C. 90°

D. 137°
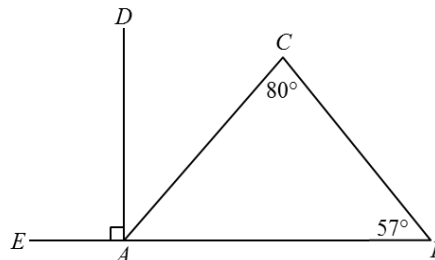
21A

Use the diagram to answer the question.
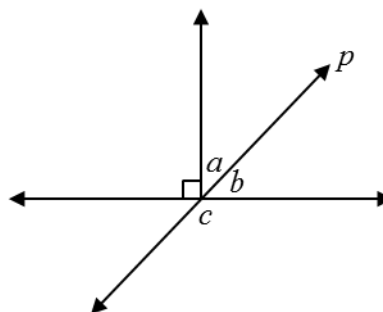
Line *p* divides a right angle into two angles, *a* and *b*, and also creates angle *c*.

a. If the measure of angle $b = 42°$, what is the measure of angle *c*? _____

b. Imagine how the angles *a*, *b*, and *c* will change if line p is rotated around the intersection point. Describe in words how angles *a*, *b*, and *c* will change as line *p* rotates clockwise toward the horizontal line.

As angle *a* increases,

c. Write an equation that could be used to find the value of *c* if *a* is known. Use only the variables *a* and *c* in your equation. Start your equation with *c =*.

$c =$

7.G.5 – Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure.

22A
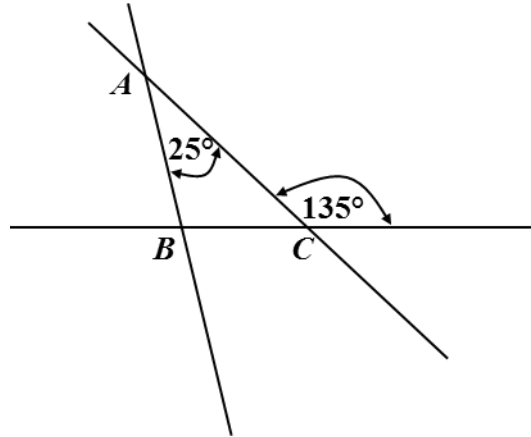
In the triangle, what is the degree measure of $\angle ABC$?

A. $45°$

B. $100°$

C. $110°$

D. $135°$

22B

Part A

Indicate whether each of these statements is always true, sometimes true, or never true.

1. The sum of the measures of two complementary angles is 90°.

    ○ Always True   ○ Sometimes True   ○ Never True

2. Vertical angles are also adjacent angles.

    ○ Always True   ○ Sometimes True   ○ Never True

3. Two adjacent angles are complementary.

    ○ Always True   ○ Sometimes True   ○ Never True

4. If the measure of an angle is represented by x, then the measure of its supplement is represented by $180 - x$.

    ○ Always True   ○ Sometimes True   ○ Never True

5. If two lines intersect, each pair of vertical angles are supplementary.

    ○ Always True   ○ Sometimes True   ○ Never True

Part B

For each statement you chose as "Sometimes True," provide one example of when the statement is true and one example of when the statement is not true. Your examples should be a diagram with the angle measurements labeled. If you did not choose any statement as "Sometimes True," write "None" in the workspace below.

7.G.6 – 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.

DCAS-Like

23A

A rectangular pool 24-feet long, 8-feet wide, and 4-feet deep is filled with water. Water is leaking from the pool at the rate of 0.40 cubic foot per minute. At this rate how many **hours** will it take for the water level to drop 1 foot?

A. 8

B. 12

C. 16

D. 32

Next-Generation

23B

Using the rectangular prism shown below, create a new prism with a surface area of between 44 square inches and 54 square inches.

Click on the prism and drag it to the work area. Then stack additional prisms vertically to create the new prism. The prism may be used more than one time.

1 in.

2 in.

3 in.
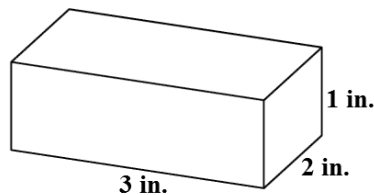
Work Area

7.G.6 – 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.

DCAS-Like

24A

Brian likes to go bird watching along the Harvest Park Trail in a nearby forest preserve. He wants to calculate the area enclosed by the trail, which is shown below.
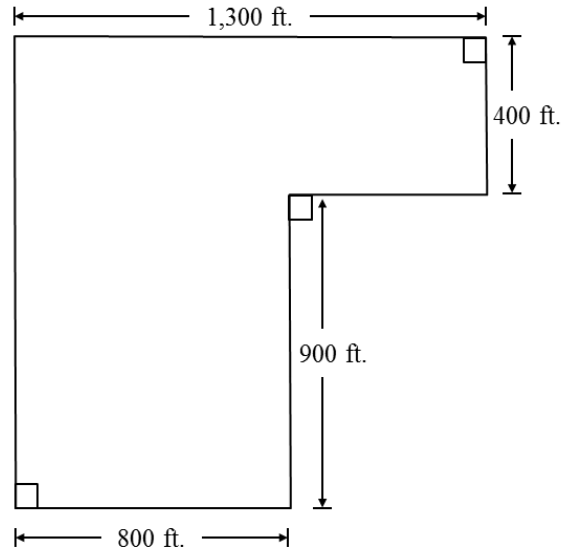
Based on the diagram, what is the closest approximation of the area **in square yards** of the land enclosed by the trail?

A. 188,000 sq. yds.

B. 138,000 sq. yds.

C. 600 sq. yds.

D. 300 sq. yds.

24B

Look at the triangular prism below. Each triangular face of the prism has a base of 3 centimeters (cm) and a height of 4 cm. The length of the prism is 12 cm.
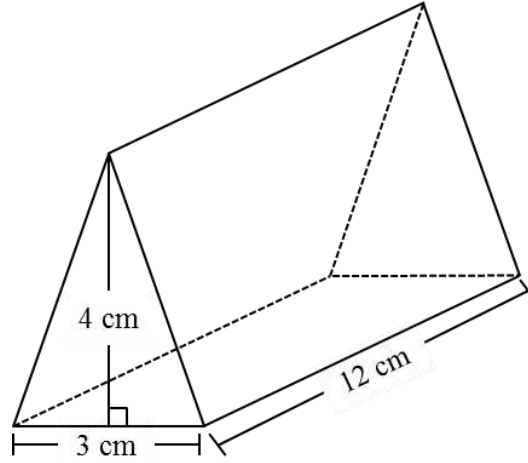
What is the volume, in cm^3, of this triangular prism?

STATISTICS AND PROBABILITY (SP)

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

7.SP.1 – 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.

DCAS-Like

25A

A poll is being taken at the Junior High School to determine whether to change the school mascot. Which of the following would be the best place to find a sample of students to interview that would be most representative of the entire student body?

A. An algebra class

B. The cafeteria

C. The guidance office

D. The faculty room

25B

Amanda asked a random sample of 40 students from her school to identify their birth month. There are 300 students in her school. Amanda's data is shown in this table.

Student Birth Months

Birth Month	Number of Students
January	3
February	0
March	3
April	10
May	4
June	3
July	4
August	3
September	2
October	2
November	3
December	3

Which of these statements is **best** supported by the data?

a. Exactly 25% of the students in Amanda's school have April as their birth month.

b. There are no students in Amanda's school that have a February birth month.

c. There are probably more students at Amanda's school with an April birth month than a July birth month.

d. There are probably more students at Amanda's school with a July birth month than a June birth month.

7.SP.2 – Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions. *For example, estimate the mean word length in a book by randomly sampling words from the book; predict the winner of a school election based on randomly sampled survey data. Gauge how far off the estimate or prediction might be.*

DCAS-Like

26A

There are three students who are running for student council president. Mrs. Jones randomly surveyed some of the students who will vote and recorded the results in the table below. If there are 480 students in the school, approximately how many will vote for Jackson?

Candidates	Nick	Jackson	Taylor
Survey Results	15	18	12

A. 192

B. 18

C. 86

D. 90

26B
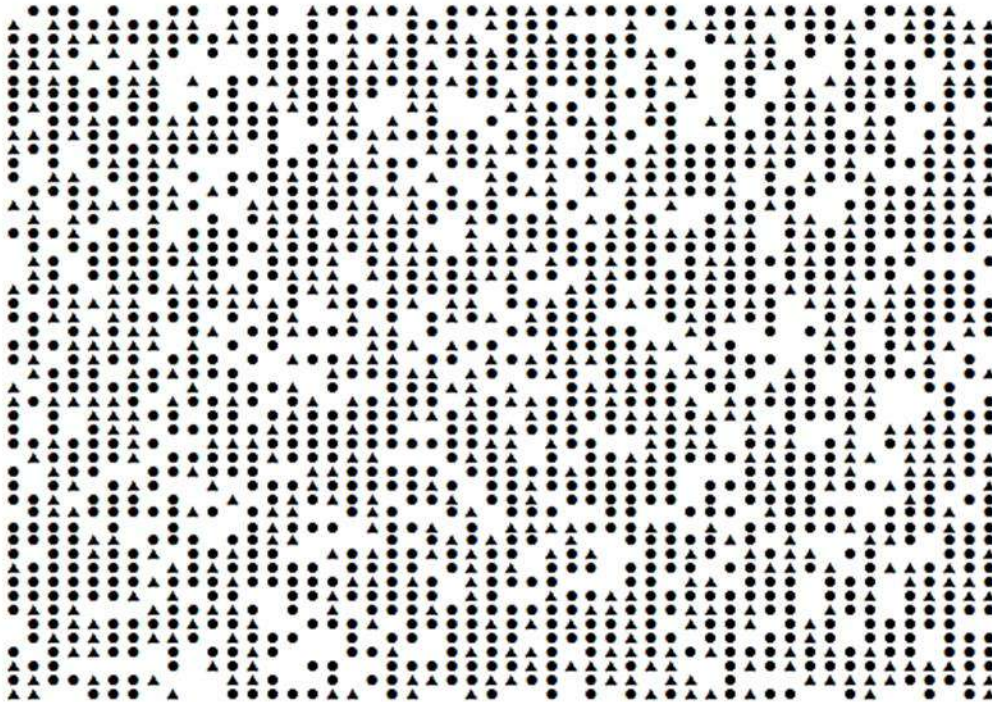
Counting Trees

This diagram shows some trees in a tree farm.

The circles ● show old trees and the triangles ▲ show young trees.

Tom wants to know how many trees are of each type but says it would take too long counting them all, one-by-one.

1. What method could he use to estimate the number of trees of each type? Explain your method fully.

2. Use your method to estimate the number of:

   a. Old trees

   b. Young trees

Cluster: Draw informal comparative inferences about two populations.

7.SP.3 – Informally assess the degree of visual overlap of two numerical data distributions with similar 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, the separation between the two distributions of heights is noticeable.*

DCAS-Like

27A

The height of players in inches for a basketball team is:

85, 83, 76, 78, 89, 80, 79, 81, 74, 82, 82, 84, 80, 84

The height of players in inches for a soccer team is:

70, 65, 79, 80, 69, 66, 71, 70, 74, 62, 65, 74, 74, 79, 70, 71, 72, 69, 77, 74, 70, 67, 67, 72

What is the approximate mean height difference between the two sports?

A. 11

B. 19

C. 10

D. 8

Next-Generation

27B

On the neighborhood football team, the offense and defense are constantly arguing about who is more athletic. Finally, they decide to settle the argument by competing in a feat of athleticism. The two sides set up an obstacle course that will test their speed, agility, and flexibility. Each individual's total time is displayed below, in seconds. Use measures of center and variability to describe which side won and by how much.

Offense

```
                                          X
                              X           X
        X    X       X        X   X   X   X            X
  ←─┬────┬────┬────┬────┬────┬────┬────┬────┬────┬────┬────┬────┬────┬──→
    61   62   63   64   65   66   67   68   69   70   71   72   73   74
```
Total Time

Defense

```
                                                       X
             X                        X                X
        X    X                X   X   X        X   X
  ←─┬────┬────┬────┬────┬────┬────┬────┬────┬────┬────┬────┬────┬────┬──→
    61   62   63   64   65   66   67   68   69   70   71   72   73   74
```
Total Time
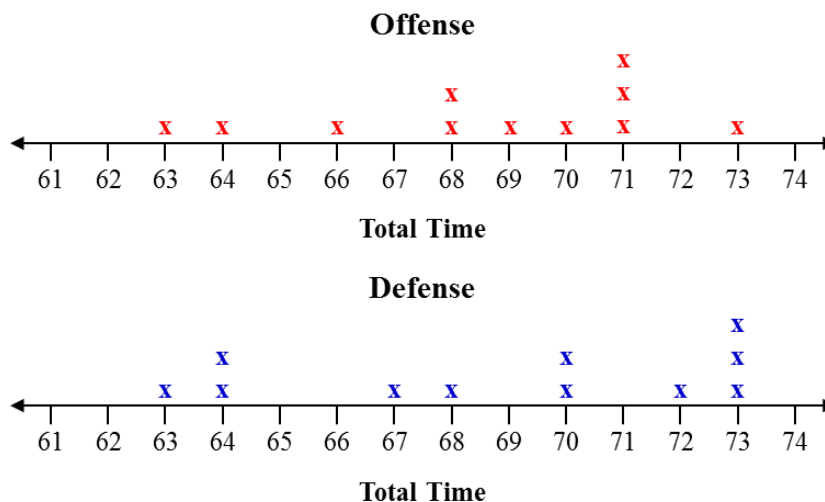
7.SP.4 – Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations. *For example, decide whether the words in a chapter of a seventh-grade science book are generally longer than the words in a chapter of a fourth-grade science book.*

DCAS-Like

28A

The table shows the number of turkey and ham sandwiches sold by Derby's Deli for several days in one week.

Sandwiches Sold at Derby's Deli

Day	Turkey	Ham
Monday	7	9
Tuesday	13	11
Wednesday	8	8
Thursday	15	6
Friday	12	16

What is the difference between the median number of turkey sandwiches sold and the median number of ham sandwiches sold?

A. 0

B. 1

C. 2

D. 3

28B

The number of books sold by each student in two classes for a fund raiser is summarized by these box plots.

Number of Books Sold
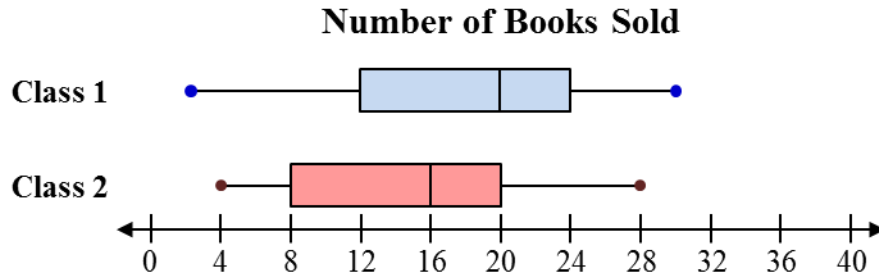
The principal concluded that there was more variability in the number of books sold by Class 1 than Class 2. Which statement is true about the principal's conclusion?

a. It is valid because the median for Class 1 is greater than the median for Class 2.

b. It is valid because the range for Class 1 is greater than the range for Class 2.

c. It is invalid because the minimum value for Class 1 is less than the minimum value for Class 2.

d. It is invalid because the interquartile range for Class 1 is less than the interquartile range for Class 2.

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

7.SP.5 – 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.

DCAS-Like

29A

The nine chips shown above are placed in a sack and then mixed up. Madeline draws one chip from this sack. What is the probability that Madeline draws a chip with an even number?

$$\boxed{1} \quad \boxed{2} \quad \boxed{3} \quad \boxed{4} \quad \boxed{5}$$

$$\boxed{6} \quad \boxed{7} \quad \boxed{8} \quad \boxed{9}$$
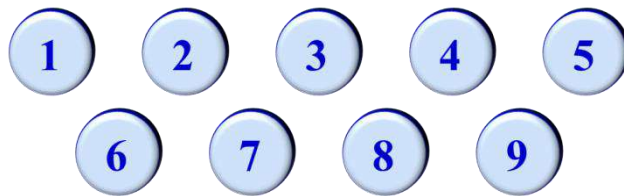
A. $\dfrac{1}{9}$

B. $\dfrac{1}{4}$

C. $\dfrac{4}{5}$

D. $\dfrac{4}{9}$

29B

Carl and Beneta are playing a game using this spinner.
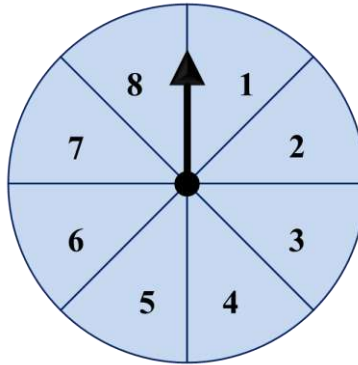
Carl will win the game in his next spin if the arrow lands on a section labeled 6, 7, or 8. Carl claims it is likely, but not certain, that he will win the game on his next spin. Explain why Carl's claim is **not** correct.

Beneta will win the game on her next spin if the result of the spin satisfies event *X*. Beneta claims it is likely, but not certain, that she will win the game on her next spin. Describe an event *X* for which Beneta's claim is correct.

7.SP.6 – 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.

DCAS-Like

30A

Ranger Goya is recording the numbers of sightings of different types of birds he sees in the state park in the graph below.

Birds Seen in State Park
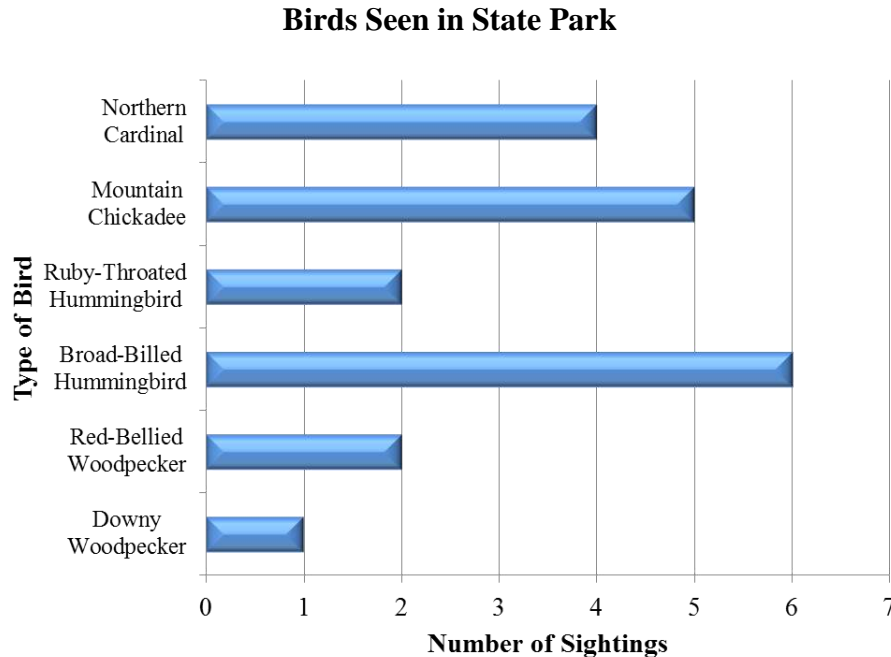
Based on these results, what is the probability that the next type of bird Ranger Goya sees is a type of hummingbird?

A. $\dfrac{1}{6}$

B. $\dfrac{1}{3}$

C. $\dfrac{2}{5}$

D. $\dfrac{2}{3}$

30B

Luis wants to make a game spinner in which the chance of landing on blue will be twice the chance of landing on red. He is going to label each section either red, *R*, or blue, *B*. Show how he could label his spinner.
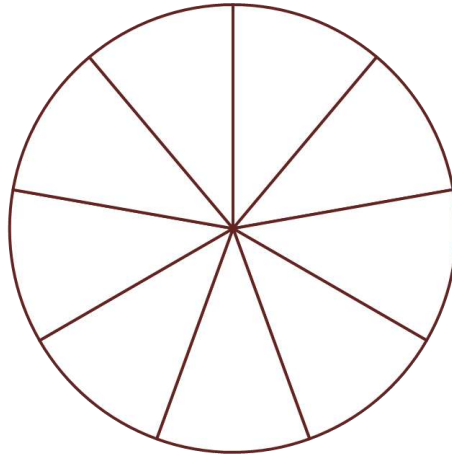
Number of blues: _____

Number of reds: _____

Explain how you found your answer.

7.SP.7 – 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.

    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.*

    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?*

<div align="center">

DCAS-Like
</div>

31A

The spinner below is used in a carnival game. The table shows the actual numbers of times the spinner landed on different colors after being spun 40 times.

Spinner Results	
Color	**Number of Spins**
Black	8
Blue	12
Green	10
Red	10
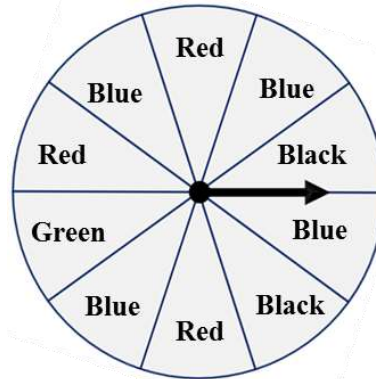
Which color has the same theoretical and experimental probability of the spinner landing on it?

A. Black

B. Blue

C. Green

D. Red

31B

Henry is playing a game using a bag of tokens that contains exactly 28 black tokens and 12 white tokens. On each player's turn a single token is drawn at random from the bag and then returned to the bag at the end of the turn. Each token is the same size and shape. Henry recorded the first 10 draws as either black (*B*) or white (*W*) as shown below.

B, *W*, *W*, *W*, *B*, *B*, *B*, *W*, *B*, *B*

a. Based on the information given, what is the theoretical probability of the next player drawing a white token?

b. Based on the information given, what is the experimental probability of the next player drawing a white token?

c. Henry says that, by only decreasing the number of black tokens in the bag, the theoretical probability of drawing a white token can be made to equal to the experimental probability of drawing a white token. How many black tokens should be removed for Henry's statement to be true?

d. Henry uses the original bag of tokens that contains exactly 28 black tokens and 12 white tokens. He says that by only increasing the number of white tokens in the bag, the theoretical probability of drawing a white token can be made to equal that experimental probability of drawing a white token. Show or explain why Henry's statement is incorrect.

7.SP.8 – Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation.

    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.

    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.

    c. Design and use a simulation to generate frequencies for compound events. *For example, use random digits as a simulation tool to approximate the answer to the question: if 40% of donors have type A blood, what is the probability that it will take at least 4 donors to find one with type A blood?*

<div align="center">

DCAS-Like

</div>

32A

How many different three-digit whole numbers can be written using each of the digits 4, 5, and 6 exactly once?

A. 6

B. 15

C. 24

D. 120

<div align="center">

Next-Generation

</div>

32B

David has these two spinners.
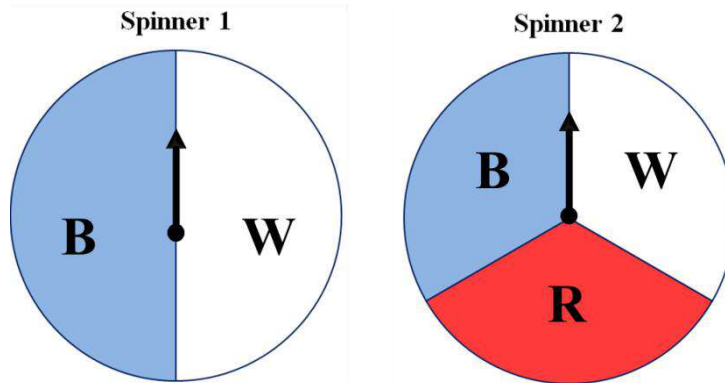
Spinner 1 is divided into two equal parts, and spinner 2 is divided into three equal parts.

a. Complete the table to show all possible outcomes of spinning the arrows on both spinners at the same time. Choose one of the corresponding tiles with the letters *B*, *W*, and *R* in the table for each spin.

Spinner 1	Spinner 2
B	R

B	W	R

b. When spun at the same time, what is the probability the arrow on one spinner will land on blue (*B*) and the arrow on the other spinner will land on white (*W*)? Write your answer as a fraction.

c. If David spins both arrows together 180 times, about how many times will one arrow land on *B* and the other arrow land on *W*?

ANSWER KEY AND ITEM RUBRICS

Ratios and Proportional Relationships (RP)

DCAS-Like Answer	Next-Generation Solution		
1A: C (7.RP.1)	**1B:**		

	Points	**Possible Points**
Part A Student gives 6 or 7 correct answers:	2	2

	Batch 1	**Batch 2**	**Batch 3**
Salt (cups)	1	**2**	**4**
Pepper (cups)	$\frac{1}{2}$	1	**2**
Garlic Powder (cups)	$\frac{1}{4}$	$\frac{1}{2}$	1
Onion Powder (cups)	$\frac{1}{4}$	$\frac{1}{2}$	1

Note: Equivalent fractions and decimals are also considered correct.

(Partial credit: Student gives 4 or 5 correct answers.)   (1)   (1)

Part B Student gives a correct answer:		**Points**	**Possible Points**
	6 — cups salt 3 — cups pepper 1.5 — cups garlic powder 1.5 — cups onion powder	1	1

Note: Equivalent fractions and decimals are also considered correct.

	Total Points	3	3

DCAS-Like Answer	Next-Generation Solution
2A: C (7.RP.2)	**2B:** *Key and Distractor Analysis* a. Reverses the meaning of the coordinates b. Key c. Focuses on the vertical axis d. Thinks 12.5 is the initial value
3A: B (7.RP.2)	**3B:** *Key and Distractor Analysis* Student must select two of these points: (-4, -8), (-3, -6), (-2, -4), (-1, -2), (0, 0), (1, 2), (2, 4), (3, 6), (4, 8)
4A: A (7.RP.2)	**4B:** *Key and Distractor Analysis* a. Inverts the ratio b. Key c. Student things $22\frac{1}{2} \div 10 = 2\frac{1}{2}$ d. Uses 10 as the coefficient
5A: C (7.RP.2)	**5B:** a. Student uses 200×0.75 b. Key c. Student uses $200 \div 1.08$ and rounds d. Student uses $4 \times 200 \times 0.75 \times 1.08$

DCAS-Like Answer	Next-Generation Solution
6A: A (7.RP.3)	**6B:** *Sample Top-Score Response* *Part A* First, I found the radius: $r = \frac{28\pi}{2\pi} = 14$ cm. Then, I found the area: $A = \pi(14^2) = 196\pi$ cm^2 OR $A \approx (3.14)(14^2) \approx 615.44$ cm^2 *Part B* First, I multiplied the area of the circle in Part A by 1.20, which is 20% more than the original: $A = 196\pi$ cm^2 = 235.2π cm^2. Then, I found the radius by solving the area formula for *r*: $\qquad 235.2\pi = \pi r^2$ $\qquad\ \ 235.2 = r^2$ $\qquad\ \ 15.34 \approx r$ *Scoring Rubric* Responses to this item will receive 0-4 points based on the following: **4 points:** The student shows a thorough understanding of how to solve a real-world problem involving the area and circumference of a circle by using proportional relationships. The student correctly answers both parts and shows sufficient work to justify both answers. **3 points:** The student shows a solid understanding of how to solve a real-world problem involving the area and circumference of a circle by using proportional relationships. The student correctly answers both parts but only shows sufficient work to justify one answer. OR The student shows sufficient strategy to justify both answers but makes a computational error that leads to one incorrect answer. **2 points:** The student shows a partial understanding of how to solve a real-world problem involving the area and circumference of a circle by using proportional relationships. The student correctly answers Part A and shows sufficient work to justify the answer. OR The student correctly answers Part B based on an incorrect answer to Part A and shows sufficient work to justify the answer. OR The student shows sufficient strategy to justify both answers but makes minor computational errors that lead to two incorrect answers.

DCAS-Like Answer	Next-Generation Solution
	1 point: The student shows a limited understanding of how to solve a real-life problem involving the area and circumference of a circle by using proportional relationships. The student correctly answers Part A. OR The student correctly answers Part B based on an incorrect answer to Part A. OR The student shows sufficient strategy to justify an answer to one part but either answers incorrectly or does not provide an answer.
	0 points: The student shows inconsistent or no understanding of how to solve a real-life problem involving the area and circumference of a circle by using proportional relationships.

The Number System (NS)

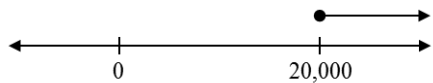| DCAS-Like Answer	Next-Generation Solution
7A: C (7.NS.1)	**7B:** *Key:* $4.9, -\dfrac{7}{3}, -5, -1.75,$ and 1.34 *Scoring Rubric* **2 points:** The student shows thorough understanding of the addition and subtraction of rational numbers and that the sum of opposites is zero. This is shown by the student answering all parts correctly and choosing $4.9, -\dfrac{7}{3}, -5, -1.75,$ and 1.34. **1 point:** The student shows understanding of the addition and subtraction of rational numbers but limited understanding that the sum of opposites is zero. This is shown by the student correctly answering statements a, b, and d. OR The student makes an error on one part of the response but otherwise answers all parts correctly. **0 points:** The student shows inconsistent or no understanding of addition and subtraction of rational numbers or that the sum of the opposites is zero. This is shown by the student incorrectly answering two or more parts.
8A: D (7.NS.2)	**8B:** *Sample Top-Score Response* *Part A* Martha is incorrect. She will pay $\dfrac{1}{4}$ of the cost. $1 - (40\% + 0.35)$ $1 = (0.40 + 0.35)$ $1 - 0.75$ $0.25 = \dfrac{25}{100} = \dfrac{1}{4}$

DCAS-Like Answer	Next-Generation Solution
	Part B Renee: $340.00 Susan: $297.50 Martha: $212.50 *Scoring Rubric* Responses to this item will receive 0-3 points based on the following: **3 points;** The student shows a thorough understanding of how solving a real-world problem can lead to flawed reasoning. The student shows a thorough understanding of solving a real-world problem involving numeric expressions with rational numbers. This is shown by the student indicating that Martha is incorrect with justification and correctly calculates the amount each person pays. **2 points:** The student shows good understanding of solving a real-world problem involving numeric expressions with rational numbers. The student recognizes that Martha will not pay $\frac{1}{3}$ of the cost but makes a minor error in showing the calculation to support the response to Part A. This error is then consistently applied in responding to Part B. **1 point:** The student shows limited understanding of solving a real-world problem involving numeric expressions with rational numbers. The student can correctly calculate Renee's and/or Susan's portion of the trip, but other parts of the response are incorrect. **0 points:** The student shows inconsistent or no understanding of how solving a real-world problem can lead to flawed reasoning or how to solve a real-world problem involving numeric expressions with rational numbers. Simply claiming that Martha's portion of the trip rental is not equal to $\frac{1}{3}$ is not sufficient to earn any points.

DCAS-Like Answer	Next-Generation Solution
9A: A (7.NS.2)	**9B:** *Part A* ▪ Statements 1 and 3 are true. *Part B* ▪ Statement 2 is not true because the greatest common factor of 12 and 16 is 4. ▪ Statement 4 is not true because 1/0 is not a rational number. *Scoring Rubric* Responses to this item will receive 0-2 points based on the following: **2 points:** The student shows thorough understanding of how to test propositions with specific examples. The student identifies the 2 true statements and provides counterexamples for the 2 statements that are not true. **1 point:** The student shows partial understanding of how to test propositions with specific examples. The student identifies the 2 true statements, but neither counterexample for the false statements is accurate. OR The student provides at least one correct counterexample for 1 of the true statements. **0 points:** The student shows limited or no understanding of how to test propositions with specific examples.
10A: C (7.NS.3)	**10B:** <table><tr><td></td><td>**Maximum Points**</td></tr><tr><td>a. Student gives the correct answer: $383.5 \div 6.5 = R$</td><td>1</td></tr><tr><td>b. Student gives the correct answer: 59 or 59.0</td><td>1</td></tr><tr><td>c. Student gives the correct answer: 5:55 p.m.</td><td>1</td></tr><tr><td>*Total Points*</td><td>*3*</td></tr></table>

DCAS-Like Answer	Next-Generation Solution
11A: C (7.NS.3)	**11B:** <table><tr><td></td><td>**Maximum Points**</td></tr><tr><td>a. Student gives the correct answer: Between 25 and 40</td><td>1</td></tr><tr><td>b. Student gives the correct answer: 88 cents</td><td>1</td></tr><tr><td>*Total Points*</td><td>*2*</td></tr></table>

Expressions and Equations (EE)

DCAS-Like Answer	Next-Generation Solution
12A: A (7.EE.1)	**12B:** *Sample Top-Score Response* Each part is scored independently, and is worth 1 point for a correct response. $a = -6$ $b = 48$
13A: C (7.EE.2)	**13B:** *Sample Top-Score Response* Part A: $x - 0.30x$ or $0.70x$ Part B: The regular price of the book was $12.80. $$x - 0.30x = 8.96$$ $$0.70x = 8.96$$ $$x = 12.80$$ *Scoring Rubric* Responses to this item will receive 0-3 points based on the following: **3 points:** The student is able to create both an expression and equation related to sale and regular prices of a book and solve the equation correctly. **2 points:** The student is able to create both an expression and equation related to sale and regular prices of a book but makes a minor error in solving the equation. OR The student is able to use alternate strategies to find a correct answer for the price of the book but does not know how to correctly show the expression or equation. **1 point:** The student can write either the expression or the equation correctly but not both. The student is not able to get the correct answer for the price of the book. **0 points:** The student shows inconsistent or no understanding of writing expressions or of solving an equation for real-life problems.

DCAS-Like Answer	Next-Generation Solution
14A: C (7.EE.3)	**14B:** *Key:* $1\frac{7}{12}$ feet, 1 foot 7 inches, or 19 inches and appropriate work is shown.
15A: A (7.EE.4)	**15B:** *Sample Top-Score Response* Inequality: $b < 6$ The graph should be a line segment with an open or closed circle at 0 and an open circle at 6. *Scoring Rubric* Responses to this item will receive 0-3 points based on the following: **3 points:** The student has thorough understanding of how to solve a real-life problem involving inequalities and how to graph inequalities on a number line. This is shown by the student determining and graphing the solution. **2 points:** The student has thorough understanding of how to solve a real-life problem involving inequalities and partial understanding of how to graph inequalities on a number line. This is shown by the student correctly determining the solution but having incorrect endpoint(s) on the graph. **1 point:** The student has an understanding of how to solve a real-life problem but limited understanding of how to graph the solution. This is shown by the student determining the solution but making two or more errors in graphing the solution. OR The student has an understanding of how to graph inequalities but limited understanding of how to solve a real-life problem involving inequalities. This is shown by the student correctly graphing an incorrect solution to the real-life problem. **0 points:** The student shows little or no understanding of how to solve a real-life problem involving inequalities or how to graph inequalities.
16A: C (7.EE.4)	**16B:** a. Mandy must sell at least $20,000 in goods this month in order to cover her planned expenses. b.

Geometry (G)

DCAS-Like Answer	Next-Generation Solution
17A: D (7.G.1)	**17B:** *Key and Distractor Analysis* a. Found correct relationship but reversed order b. Correct c. Subtracted the first term of ratio by scale factor d. Multiplied the first term of ratio by scale factor
18A: B (7.G.2)	**18B:** Student draws any right triangle where the base times the height equals 80. Example: base = 8 and height = 10 $A = \dfrac{1}{2}b \times h$ $A = \dfrac{1}{2}(8 \times 10)$ $A = \dfrac{1}{2}(80) = 40$
19A: A (7.G.3)	**19B:** a. Horizontal: Circle Vertical: Triangle b. Horizontal: Circle Vertical: Rectangle c. Horizontal: Rectangle Vertical: Triangle

DCAS-Like Answer	Next-Generation Solution
20A: B (7.G.4)	**20B:** *Sample Top-Score Response* ▪ Each side of the square has a length of $40 \times \frac{1}{4} = 10$ inches. ▪ The radius of the circle is $\frac{10}{2} = 5$ inches, so the circumference of the circle is $2 \times \pi \times 5 = 10 \times 3.14 = 31.4$ inches. ▪ The perimeter of the square minus the circumference of the circle is $40 - 31.4 = 8.6$ inches. *Scoring Rubric* Responses to this item will receive 0-2 points based on the following: **2 points:** The student shows thorough understanding of how to solve a real-world problem involving circumference. The student determines the correct answer to the problem and provides clear justification for the answer. **1 point:** The student shows partial understanding of how to solve a real-world problem involving circumference. The student determines the correct answer to the problem without providing justification for the answer. OR The student provides a correct strategy with an incorrect or missing answer. **0 points:** The student shows limited or no understanding of how to solve a real-world problem involving circumference. The student does not provide a correct answer or strategy.

DCAS-Like Answer	Next-Generation Solution
21A: A (7.G.5)	**21B:** a. $c = 138°$ b. As angle a increases, angle b decreases and angle c increases. c. $c = 90 + a$ *Scoring Notes* Other equations may be considered correct. $c = 180 - (90 - a)$, $c - 90 - a$, and $c + b = a + b + 90$ should be accepted. $c + b = 2(a + b)$ is a correct equation but does not help find c directly. *Scoring Rubric* - Part a: 1 point for 48 degrees ("degrees" is not required) - Part b: 1 point for correctly describing what happens to angles b and c - Part c: 1 point for a correct equation

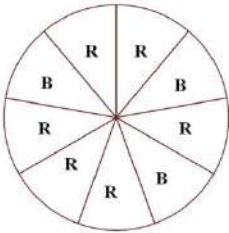| DCAS-Like Answer	Next-Generation Solution

22A: C
(7.G.5)
	22B:
	
	Sample Top-Score Response
	
	Part A
	
	1. Always True 4. Always True
	2. Never True 5. Sometimes True
	3. Sometimes True
	
	Part B
	
	Statement 3: Example of True—two adjacent angles that have a sum of 90°
	  Example of Not True—two adjacent angles that have a sum of 80°
	Statement 5: Example of True—two intersecting lines with all angle measurements of 90°
	  Example of Not True—two lines that intersect with no right angles
	
	Scoring Rubric
	
	Responses to this item will receive 0-3 points based on the following:
	
	3 points: The student has thorough understanding of facts about supplementary, complementary, vertical, and adjacent angles and can justify these facts using examples. The student evaluates all five statements correctly and provides correctly labeled drawings for Statements 3 and 5 if discrete angles are used for the justification.
	
	2 points: The student has good understanding of facts about supplementary, complementary, vertical, and adjacent angles and can justify these facts using examples. The student evaluates all five statements correctly and provides drawing for Statements 3 and 5 but does not include angle measures if discrete angles are used for the justification. OR The student evaluates all five statements correctly and provides a correct drawing for either Statement 3 or 5 but not both. OR The student correctly evaluates Statements 3 and 5 and provides correctly labeled drawings for Statements 3 and 5 but incorrectly evaluates one of the other statements.

DCAS-Like Answer	Next-Generation Solution
	1 point: The student has limited understanding of facts about supplementary, complementary, vertical, and adjacent angles and how to justify these facts using examples. This is shown by the following: Answered all 5 statements correctly but either does not provide drawings for Statements 3 and 5. OR The student answered some questions incorrectly but has either Statement 3 or 5 correct with supporting drawings and/or angle measures.
	0 points: The student shows inconsistent or no understanding of facts about supplementary, complementary, vertical, and adjacent angles and how to justify these facts using examples.
23A: A (7.G.6)	**23B:** *Key Distractor and Analysis* 4 prisms should be stacked vertically.
24A: B (7.G.6)	**24B:** *Key:* 72 cm^3 $$V = \left(\tfrac{1}{2} \times 3 \times 4\right) \times 12 = 6 \times 12 = 72$$

Statistics and Probability (SP)

DCAS-Like Answer	Next-Generation Solution
25A: B (7.SP.1)	**25B:** *Key and Distractor Analysis* a. Bases the inference on the exact figures calculated from the table b. No one in the sample has a February birth month c. Key d. Not strongly supported by the data
26A: A (7.SP.2)	**26B:** 1. Explains that a small representative section could be selected. Then, the number of old trees in that section could be counted as well as the number of young trees in that section could be counted. These numbers could be used to make an estimate for the whole area. 2. Accept different organized sectioning methods. For example: the total area is 17.5×12 sq cm For example: if we select an area 2 cm $\times$ 2 cm. Counting the number of trees, we get 28 old trees and 11 young trees. An estimate of the number of old trees is: $28 \times 17.5 \times 12 \div 4 = 1{,}470$, or approximately 1,500. Accept values in the range 1,200 to 1,600. An estimate of the number of young trees is $11 \times 17.5 \times 1 \div 4 = 577$, or approximately 600. Accept values in the range 500 to 700.

DCAS-Like Answer	Next-Generation Solution
27A: C (7.SP.3)	**27B:** *Solution* - Range for both offense and defense = 10 - Mean (offense) = 68.54 - Mean (defense) = 68.81 In this problem, we want the lowest individual times to make a conclusion. The mean individual time is almost the same for both sides, but the median time is better for the offense (spread of values not the range is more clustered around the mean), so the offense is slightly better.
28A: D (7.SP.4)	**28B:** *Key and Distractor Analysis* a. Assumed the median is a measure of variability b. Correct c. Assumed the minimum value is a measure of variability d. Did not correctly determine the interquartile range

DCAS-Like Answer	Next-Generation Solution
29A: D (7.SP.5)	**29B:** *Sample Top-Score Response* Carl's claim is incorrect. The probability that Carl will spin a 6 or higher is 0.375. This means that it is more likely that Carl will spin a number less than 6 on his next turn. For Beneta, event *X* could be "the arrow lands on a section labeled with a number greater than 2." *Scoring Rubric* Responses to this item will receive 0-2 points based on the following: **2 points:** The student shows thorough understanding of how to use understanding of likelihood and probability to critique the reasoning of others. The student explains why Carl's claim is incorrect and describes an appropriate event for Beneta. **1 point:** The student shows partial understanding of how to use understanding of likelihood and probability to critique the reasoning of others. The student explains why Carl's claim is incorrect. OR The student describes an appropriate event for Beneta. **0 points:** The student shows inconsistent or no understanding of how to use likelihood and probability to critique the reasoning of others. The student fails to provide a correct explanation or event.

DCAS-Like Answer	Next-Generation Solution
30A: C (7.SP.6)	**30B:** Number of blues = 6 sections Number of reds = 3 sections *P* (blue) = 2*P* (red) So, ratio is 1:3 and since there are 9 sections, 6 sections must be blue and 3 must be red.

DCAS-Like Answer	Next-Generation Solution
31A: A (7.SP.7)	**31B:** *Sample Answer* a. $\frac{12}{40}$ or $\frac{6}{20}$ or $\frac{3}{10}$ or equivalent b. $\frac{4}{10}$ or $\frac{2}{5}$ or equivalent c. If you take out 10 black tokens, the theoretical probability of drawing a white token will be $\frac{12}{30} = \frac{4}{10}$, the same as the experimental probability. d. If you increase the number of white tokens by 6, you will have 18 white tokens and a total of 46 tokens, so the theoretical probability will be $\frac{18}{46}$, or about 0.391, which is less than $\frac{2}{5}$. If you increase the number of white tokens by one more, you will have a theoretical probability of $\frac{19}{47}$, or about 0.404, which is greater than $\frac{2}{5}$. So, there is no number of white tokens you can add to get exactly 0.4. *Scoring Rubric* a. 1 point for determining the theoretical probability of drawing a white token b. 1 point for determining the experimental probability of drawing a white token c. 1 point for determining that 10 black tokens must be removed for Henry's statement to be true d. 1 point for showing that the number of white tokens cannot be increased by a whole number to result in the theoretical and experimental probabilities being equal. Note: Scorers should follow along with the student's work throughout. If student makes an error in a previous part and subsequent answers are correct based on the earlier error, student should not be penalized again.

DCAS-Like Answer	Next-Generation Solution
32A: A (7.SP.8)	**32B:** *Exemplary Response* a. <table><tr><td>**Spinner 1**</td><td>**Spinner 2**</td></tr><tr><td>B</td><td>R</td></tr><tr><td>**B**</td><td>**B**</td></tr><tr><td>**B**</td><td>**W**</td></tr><tr><td>**W**</td><td>**R**</td></tr><tr><td>**W**</td><td>**B**</td></tr><tr><td>**W**</td><td>**W**</td></tr></table> b. $\frac{1}{3}$ c. 60 *Scoring Notes* ▪ In part b, $\frac{2}{6}$ is acceptable as well. If a student makes an error in part a, the fraction in part b should match the table. ▪ The point for part c can be earned based on an incorrect fraction in part b. *Point Assigned* ▪ Part a: 1 point for correctly showing all possible combinations ▪ Part b: 1 point for correct fraction ▪ Part c: 1 point for correct number of spins

SECTION 3: PERFORMANCE TASK

GRADE 7 PERFORMANCE TASK

The following is a link to a grade 7 Performance Task released by Smarter Balanced Assessment Consortium. The Performance Task is Claim 4, Modeling and Data Analysis.

MAT.07.PT.4.SFUND.A 401 *– School Fund Raisers*
- Primary Content Domain: Expression and equations
- Secondary Content Domains: Ratio and Proportional Relationships; Statistics and Probability