COMMON CORE ASSESSMENT COMPARISON FOR MATHEMATICS

GRADE 5

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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/.

Priorities in Mathematics

Grade	Priorities in Support of Rich Instruction and Expectations of Fluency and Conceptual Understanding
K–2	Addition and subtraction, measurement using whole number quantities
3–5	Multiplication and division of whole numbers and fractions
6	Ratios and proportional reasoning; early expressions and equations
7	Ratios and proportional reasoning; arithmetic of rational numbers
8	Linear algebra

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

OPERATIONS AND ALGEBRAIC THINKING (OA)

Cluster: Write and interpret numerical expressions.

5.OA.1 – Use parentheses, brackets, or braces in numerical expressions and evaluate expressions with these symbols.

DCAS-Like

1A

What is the value of this expression?

$$3 \times (4 + 5 \times 3)$$

A. 27

B. 51

C. 57

D. 81

Next-Generation

1B

Evaluate the following numerical expressions. You **cannot** use a calculator.

a. $2 \times 5 + 3 \times 2 + 4 =$ _____

b. $2 \times (5 + 3 \times 2 + 4) =$ _____

c. $2 \times 5 + 3 \times (2 + 4) =$ _____

d. $2 \times (5 + 3) \times 2 + 4 =$ _____

e. $(2 \times 5) + (3 \times 2) + 4 =$ _____

f. $2 \times (5 + 3) \times (2 + 4) =$ _____

Can the parentheses in any of these expressions be removed without changing the value of the expression? Explain your reasoning. Circle the letter of the expression(s) below that would change.

a b c d e f

5.OA.1 – Use parentheses, brackets, or braces in numerical expressions and evaluate expressions with these symbols.

DCAS-Like

2A

What is the value of this expression?

$(150 \div 3) + (6 \times 2) =$ _____

A. 58

B. 62

C. 100

D. 112

Next-Generation

2B

Evaluate each expression. Which expression has the greatest value? You **cannot** use a calculator.

a. $[11 + (20 \div 10)] \times 7 =$ _____

b. $[(13 - 3) + 5] - 4 =$ _____

c. $[5 + (20 \div 2) - 5] =$ _____

d. $15 + [(18 + 5) + 4^2] =$ _____

e. $4 + [6 - (9 + 6)] =$ _____

Expression _____ has the greatest value.

5.OA.2 – Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them. *For example, express the calculation "add 8 and 7, then multiply by 2" as 2 × (8 + 7). Recognize that 3 × (18932 + 921) is three times as large as 18932 + 921, without having to calculate the indicated sum or product.*

DCAS-Like

3A

Translate this statement into an expression:

"Twenty-three less than the sum of forty-nine and thirty-seven."

A. $23 - 49 + 37$

B. $23 - (49 - 37)$

C. $37 + (49 - 23)$

D. $(49 + 37) - 23$

Next-Generation

3B

Match each problem to its correct expression.

Column A	Column B
a. Nineteen times the sum of thirteen and twelve.	i. $(42 + 99) - 85$
b. Fifty-eight times the sum of twenty-one and thirty-two.	ii. $\frac{22}{18} - 16$
c. Eighty-five less than the sum of forty-two and ninety-nine.	iii. $19 \times (13 + 12)$
d. Sixteen less than the quotient of twenty-two divided by eighteen.	iv. $58 \times (21 + 32)$

Cluster: Analyze patterns and relationships.

5.OA.3 – Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane. *For example, given the rule "Add 3" and the starting number 0, and given the rule "Add 6" and the starting number 0, generate terms in the resulting sequences, and observe that the terms in one sequence are twice the corresponding terms in the other sequence. Explain informally why this is so.*

DCAS-Like

4A

Grace measures a bean plant at the end of every month. At the end of month 1, the plant is 4 inches tall. It grows $1\frac{1}{4}$ inch each month for 5 more months. How tall is Grace's bean plant at the end of month 6?

A. $5\frac{1}{4}$ inches

B. $6\frac{1}{4}$ inches

C. $10\frac{1}{4}$ inches

D. $11\frac{1}{2}$ inches

4B

Branden's teacher said that beginning at age 2, children grow about 6 centimeters per year. Branden is 125 centimeters tall and is 9 years old.

In the table below, Branden used his current age and height to calculate his possible height for each of the previous 3 years.

Branden's Age and Height

Branden's Age (years)	Branden's Height (centimeters)
9	125
8	119
7	113
6	107

A. What is a reasonable height for Branden at age 2? Explain or show how you got your answer.

_____ centimeters

B. Write a rule or equation to show how you got your estimate at age 2. Explain your answer:

5.OA.3 – Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane. *For example, given the rule "Add 3" and the starting number 0, and given the rule "Add 6" and the starting number 0, generate terms in the resulting sequences, and observe that the terms in one sequence are twice the corresponding terms in the other sequence. Explain informally why this is so.*

DCAS-Like

5A

Dominic's Automobile Agency has 80 new cars lined up in their lot.

- Every third car has a convertible top.
- Every fourth car has an entertainment system.
- Every eighth car has a security system.

Audrey wants to buy a car with all three of these options. How many cars at Dominic's agency will meet her needs?

A. 56

B. 15

C. 10

D. 3

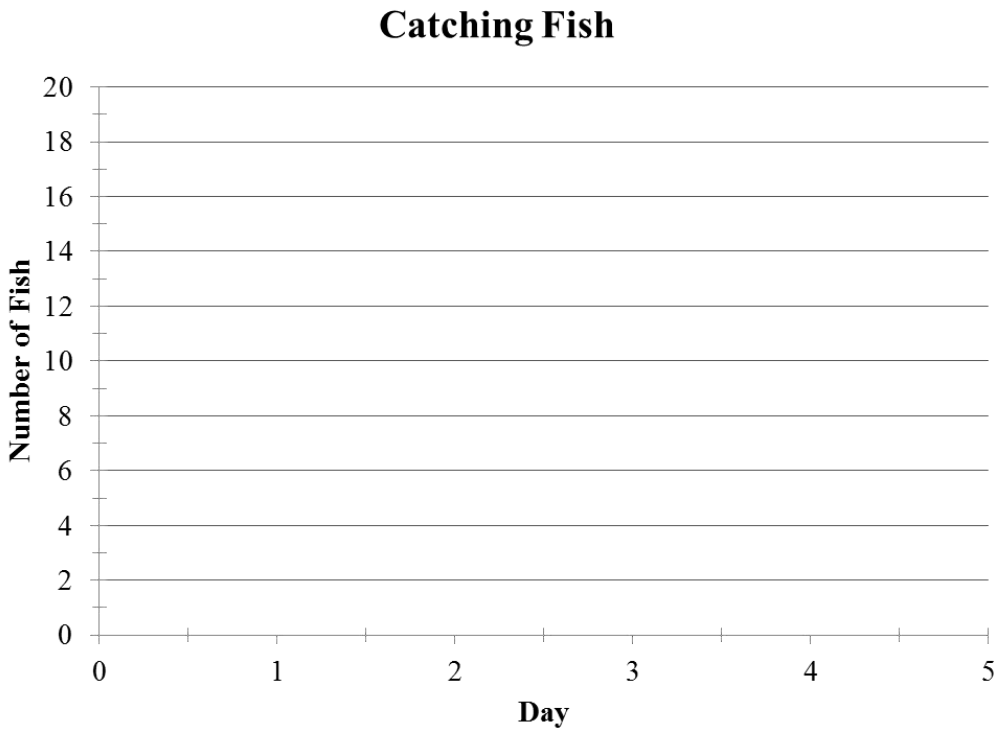
5B

Melisa and Joe go fishing each day for 5 days. The table shows the number of fish they caught on these 5 days.

Days	Melisa's Total Number of Fish	Joe's Total Number of Fish
0	0	0
1	2	4
2	4	8
3	6	12
4	8	16
5	10	20

a. How many fish doe Melisa and Joe have after each of the five days? Explain to support your answers.

b. Plot the points on a coordinate plane and make a line graph and then interpret the graph.



NUMBER AND OPERATIONS IN BASE TEN (NBT)

Cluster: Understand the place value system.

5.NBT.1 – Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left.

DCAS-Like

6A

Which shows a list from smallest to largest?

A. 0.01; 0.001; 0.101; 0.1

B. 0.1; 0.01; 0.001; 0.101

C. 0.001; 0.101; 0.01; 0.1

D. 0.001; 0.01; 0.1; 0.101

Next-Generation

6B

The Canadian side of Niagara Falls has a flow rate of 600,000 gallons per **second**. How many gallons of water flow over the Falls in 10 **minutes**? Show your work.

5.NBT.2 – Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use positive integer exponents to denote powers of 10.

DCAS-Like

7A

Which expression is equivalent to 1,000,000?

A. 10^3

B. 10^4

C. 10^5

D. 10^6

Next-Generation

7B

Complete the number sentences below.

a. $\_\_\_\_\_ \times 10^2 = 2{,}500$

b. $\_\_\_\_\_ \div 10^3 = 0.016$

c. $3.3 \times \_\_\_\_ = 33{,}000$

Write the missing power of ten to make each number sentence true.

d. $78 \times \_\_\_\_ = 78{,}000$

e. $0.34 \times \_\_\_\_ = 34$

f. $512 \div \_\_\_\_ = 0.512$

5.NBT.3 – Read, write, and compare decimals to thousandths.

a. Read and write decimals to thousandths using base-ten numerals, number names, and expanded form, e.g., 347.392 = 3 × 100 + 4 × 10 + 7 × 1 + 3 × (1/10) + 9 × (1/100) + 2 × (1/1000).

b. Compare two decimals to thousandths based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.

DCAS-Like

8A

What is the number represented in this expanded form?

$$3 \times 1 + 0 \times \left(\frac{1}{100}\right) + 3 \times \left(\frac{1}{10}\right) + 4 \times \left(\frac{1}{1000}\right) =$$

A. 4,303

B. 3,304

C. 3,034

D. 3,430

Next-Generation

8B

Match the fraction and expanded form for each number.

a. 200,000	☐	$2 \times \frac{1}{1000}$	☐	$\frac{200,000}{1}$
b. 0.200	☐	$200 \times \frac{1}{1000}$	☐	$\frac{2}{1000}$
c. 0.002	☐	$2 \times 100,000$	☐	$\frac{200}{1000}$

5.NBT.4 – Use place value understanding to round decimals to any place.

DCAS-Like

9A

What is 4.3698 rounded to the nearest thousandth?

A. 4369.8

B. 436.98

C. 4.4000

D. 4.3700

Next-Generation

9B

1. Write each of this set of numbers in the correct box.

   The box on the left is for numbers smaller than 5.5. The box on the right is for numbers bigger than 5.5.

   The first one is done for you.

5.7 5.35 5.025 5.9 5.24 5.473

Smaller	5.5	Larger
		5.7

2. Which number is nearest to 5.5? Explain how you figured this out.

3. Write down a number of your own that is bigger than 5.24 and smaller than 5.35.

   _____

4. Write the numbers in order from smallest to largest. Explain how you decided which is the smallest number.

Cluster: Perform operations with multi-digit whole numbers and with decimals to hundredths.

5.NBT.5 – Fluently multiply multi-digit whole numbers using the standard algorithm.

DCAS-Like

10A

A cookie factory can bake 62 trays of cookies in the morning and 53 trays of cookies in the afternoon. If each tray holds 12 cookies, how many cookies can be baked in 1 day?

A. 1250 cookies

B. 1260 cookies

C. 1370 cookies

D. 1380 cookies

Next-Generation

10B

One factor of a multiplication problem is 238. What could the other factor be if the product is between 1000 and 1500? **List 2 possibilities.**

Explain how you found your solutions.

5.NBT.6 – Find whole-number quotients with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.

DCAS-Like

11A

Maytown Health Food Company received an order of 1,200 Energy Bars. The store will keep 150 Energy Bars to sell in their main store. The rest of the Energy Bars will be packed in boxes of 36 bars to be sold in other stores.

How many full boxes of Energy Bars can the company pack?

A. 10

B. 29

C. 33

D. 37

5.NBT.6B

Mrs. Phelps bought 4 boxes of crayons at the store to share with her students. Each box contained a total of 64 crayons.

Part A

What is the total number of crayons Mrs. Phelps bought at the store? Explain your answer using diagrams, pictures, mathematical expressions, and/or words.

☐ crayons

Part B

Mrs. Phelps wants to give each of her students an equal number of the crayons she bought. There are 32 students in Mrs. Phelps' class. How many crayons should each student get?

☐ crayons

Part C

How many **more** boxes of crayons does Mrs. Phelps need if she wants each of her students to get 12 crayons? Explain your answer using diagrams, pictures, mathematical expressions, and/or words.

☐ crayons

5.NBT.7 – Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.

DCAS-Like

12A

Nicki's class needs to raise $89.45 in order to have a pizza party. So far, she has collected $62.90. How much money does Nicki's class need to buy the pizza party?

A. $17.45

B. $26.55

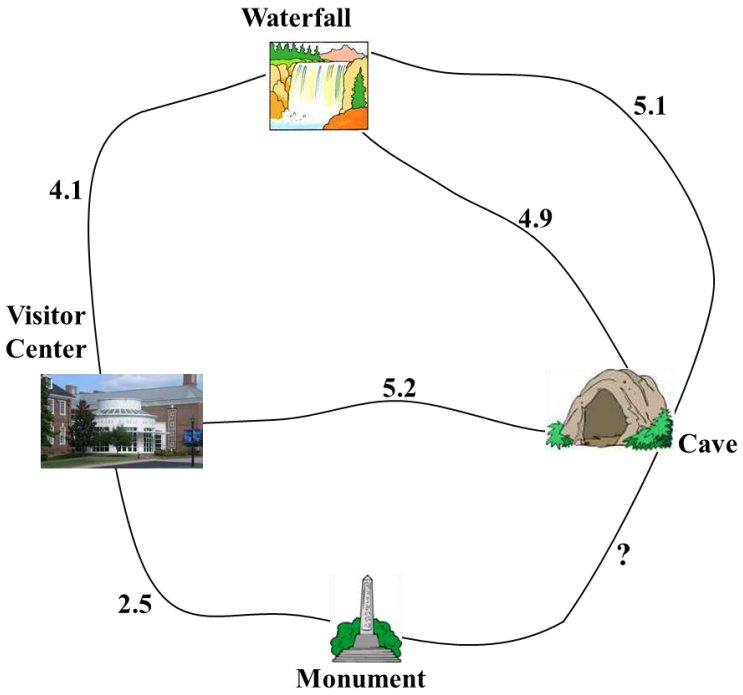
C. $27.55

D. $152.35

Next-Generation

12B

The map below gives the distances, in miles, between various locations in a state park. Theresa traveled the shortest possible total distance along the paths shown on the map. She started at the visitor center and then walked to the waterfall, the cave, and the monument, and then she returned to the visitor center. If Theresa did not retrace her steps along any path, and the total distance that she traveled is 14.7 miles, what is the distance between the cave and the monument?



NUMBER AND OPERATIONS—FRACTIONS (NF)

Cluster: Use equivalent fractions as a strategy to add and subtract fractions.

5.NF.1 – Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators. *For example, 2/3 + 5/4 = 8/12 + 15/12 = 23/12. (In general, a/b + c/d = (ad + bc)/bd.)*

DCAS-Like

13A

Scott ran in a two-day race. The first day he ran $5\frac{3}{4}$ miles. The next day he ran $6\frac{5}{8}$ miles. How many total miles did Scott run?

A. $11\frac{3}{8}$

B. $11\frac{2}{3}$

C. $12\frac{3}{8}$

D. $12\frac{3}{4}$

Next-Generation

13B

The table below shows the length of ribbon, in yards, needed to make different art projects.

Project	Length of Ribbon (in yards)
Flower	$1\frac{3}{4}$
Bulletin Board	$3\frac{1}{3}$
Costume	2
Mask	$\frac{1}{3}$
Puppet	$2\frac{1}{2}$
Picture Frame	$\frac{1}{4}$

Susan has 4 yards of ribbon and wants to make as many **different art projects** as possible. Which art projects can Susan make that will use exactly 4 yards of ribbon altogether?

Show your work.

5.NF.1 – Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators. *For example, 2/3 + 5/4 = 8/12 + 15/12 = 23/12. (In general, a/b + c/d = (ad + bc)/bd.)*

DCAS-Like

14A

It takes Jim $2\frac{3}{4}$ hours to paint a deck. It takes Norman $3\frac{1}{8}$ hours to paint the same deck at another location. How much faster is Jim?

A. $1\frac{2}{4}$ hours

B. $\frac{3}{8}$ hour

C. $1\frac{5}{8}$ hours

D. $1\frac{1}{4}$ hours

Next-Generation

14B

In the morning John hiked $4\frac{8}{10}$ miles. In the afternoon, he hiked $2\frac{1}{2}$ miles. How many miles did John hike altogether/

For items a.–d., select Yes or No to indicate whether each equation can be used to solve the word problem shown above.

a. $4\frac{8}{10} + 2\frac{5}{10} =$ _____ ○ **Yes** ○ **No**

b. $4\frac{8}{10} + 2\frac{1}{10} =$ _____ ○ **Yes** ○ **No**

c. $\frac{40}{10} + \frac{20}{10} =$ _____ ○ **Yes** ○ **No**

d. $\frac{48}{10} + \frac{25}{10} =$ _____ ○ **Yes** ○ **No**

5.NF.2 – Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, e.g., by using visual fraction models or equations to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers. *For example, recognize an incorrect result 2/5 + 1/2 = 3/7 by observing that 3/7 < 1/2.*

DCAS-Like

15A

Monica and Ryan shared 36 cookies. Monica ate $\frac{1}{6}$ of the cookies. Ryan ate $\frac{2}{3}$ of the cookies.

How many cookies were left?

A. 12

B. 29

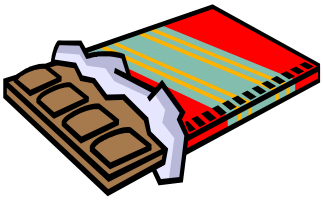
C. 4

D. 6

Next-Generation

15B

Amy, Elizabeth, Katie, Gretchen, and Deb love chocolate.



One afternoon at a meeting, each of them brought their own large candy bar. Each candy bar was the same size. Throughout the meeting, all of the ladies munched on their candy bars. At the end of the meeting, everyone was moaning and groaning about having stomach aches.

Here is a list of what the ladies consumed:

- Amy: two-sixths of her candy bar
- Elizabeth: two-thirds of her candy bar
- Katie: three-fourths of her candy bar
- Gretchen: one-half of her candy bar
- Deb: one-third of her candy bar

a. Determine which of the ladies ate the most chocolate. _____

b. Who ate the least? _____

c. How much chocolate did they eat all together? _____

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

5.NF.3 – Interpret a fraction as division of the numerator by the denominator *(a/b = a ÷ b)*. Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem. *For example, interpret 3/4 as the result of dividing 3 by 4, noting that 3/4 multiplied by 4 equals 3 and that when 3 wholes are shared equally among 4 people each person has a share of size 3/4. If 9 people want to share a 50-pound sack of rice equally by weight, how many pounds of rice should each person get? Between what two whole numbers does your answer lie?*

DCAS-Like

16A

A group of 8 girls went apple picking. The girls picked a total of 25 pounds of apples. They each get to take home the same amount of apples. How many pounds of apples will each girl get?

A. $\frac{1}{3}$ pound

B. $3\frac{1}{8}$ pounds

C. $17\frac{1}{8}$ pounds

D. 200 pounds

Next-Generation

16B

Wesley walked 11 miles in 4 hours. If he walked the same distance every hour, how far did he walk in one hour? Write your answer using the units provided. (5280 feet = 1 mile)

a. _____ miles

b. _____ miles _____ feet

c. _____ feet

5.NF.4 – Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.

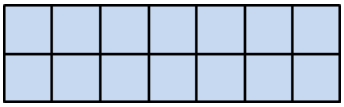
a. Interpret the product *(a/b) × q* as a parts of a partition of *q* into *b* equal parts; equivalently, as the result of a sequence of operations *a × q ÷ b. For example, use a visual fraction model to show (2/3) × 4 = 8/3, and create a story context for this equation. Do the same with (2/3) × (4/5) = 8/15. (In general, (a/b) × (c/d) = ac/bd.)*

b. Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas.

DCAS-Like

17A

A rectangle is divided into 14 congruent square tiles. Each tile has a side length of $\frac{1}{4}$ inch.



What is the area in square inches of the rectangle?

A. $\frac{5}{8}$ in.^{2}

B. $\frac{7}{8}$ in.^{2}

C. $\frac{9}{4}$ in.^{2}

D. $\frac{14}{4}$ in.^{2}

17B

Two students created posters for a school election.

a. Carolyn created a square-shaped poster. The length of each side of this poster is $1\frac{1}{2}$ feet. What is the area of this poster, in square feet?

_____ square feet

b. William created a rectangular poster with the same area as Carolyn's poster. His poster has different dimensions than Carolyn's poster. What could be the dimensions of William's poster, in feet?

Length = _____ feet Width = _____ feet

5.NF.4 – Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.

a. Interpret the product *(a/b) × q* as a parts of a partition of *q* into *b* equal parts; equivalently, as the result of a sequence of operations *a × q ÷ b. For example, use a visual fraction model to show (2/3) × 4 = 8/3, and create a story context for this equation. Do the same with (2/3) × (4/5) = 8/15. (In general, (a/b) × (c/d) = ac/bd.)*

b. Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas.

DCAS-Like

18A

Tony drew a rectangle with side lengths of $2\frac{1}{2}$ units and $\frac{3}{2}$ units. What is the area of the rectangle?

A. $\frac{16}{8}$ of a unit

B. $\frac{8}{4}$ of a unit

C. $\frac{15}{4}$ of a unit

D. $\frac{16}{2}$ of a unit

Next-Generation

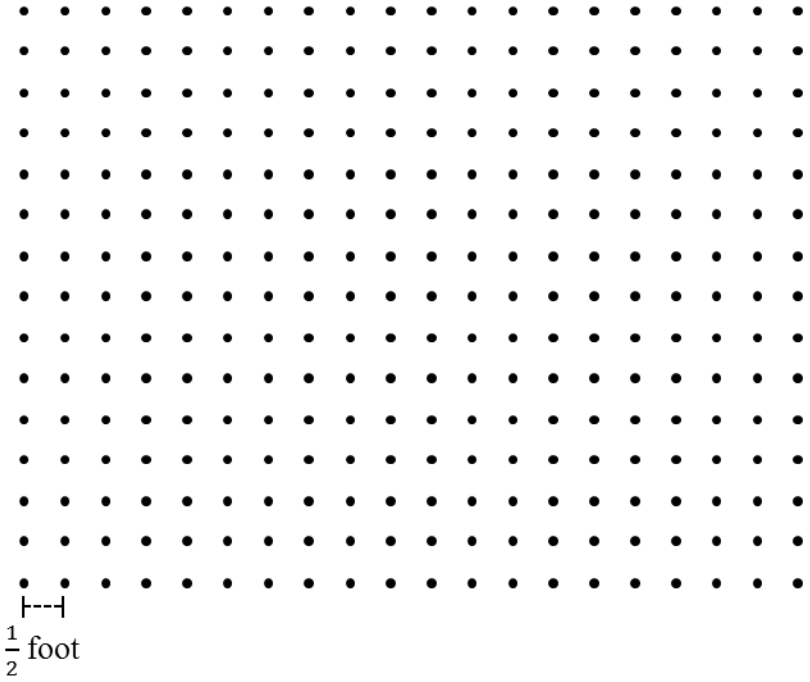
18B

Gregory is installing tile on a rectangular floor.

- He is using square tiles.
- The length of a side of each tile is $\frac{1}{2}$ foot.
- The area of the floor is 22 square feet.
- The width of the floor is 4 feet.

Use the grid to model the rectangular floor that Gregory is installing.

Click on the square tile and then click anywhere in the grid to place a copy of the tile on the grid. Continue as many times as necessary.	 Click on a tile in the grid and then click on the trashcan to remove extra tiles.



What is the length, in feet, of the floor? _____ feet

5.NF.5 – Interpret multiplication as scaling (resizing) by:

a. Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication.

b. Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence $a/b = (n \times a)/(n \times b)$ to the effect of multiplying a/b by 1.

DCAS-Like

19A

Without performing the actual calculation, which of the following is true?

A. $\frac{8}{11} \times \frac{7}{4} < \frac{4}{7}$

B. $\frac{6}{10} \times \frac{7}{8} > \frac{6}{10}$

C. $\frac{3}{8} \times \frac{10}{6} = \frac{3}{8}$

D. $\frac{1}{9} \times \frac{3}{3} = \frac{1}{9}$

Next-Generation

19B

For items a. through c., select **Yes** or **No** to indicate whether each fraction can be placed in the box to make a true inequality.

$$\frac{3}{4} \times \square > \frac{3}{4}$$

a.	$\frac{12}{9}$	○ Yes	○ No
b.	$\frac{9}{9}$	○ Yes	○ No
c.	$\frac{9}{12}$	○ Yes	○ No

5.NF.6 – Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem.

DCAS-Like

20A

Connie ran $\frac{3}{4}$ of a 20-mile trail on Saturday. How many miles did she run on Saturday?

A. 5 miles

B. 10 miles

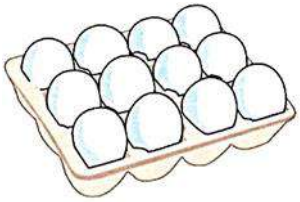
C. 15 miles

D. 19 miles

Next-Generation

20B

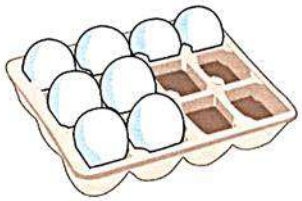
On Sunday, Travis bought the carton of eggs pictured below.



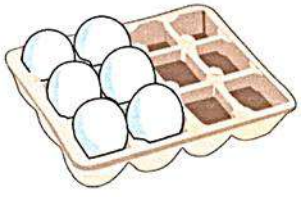
- On Monday, Travis used $\frac{1}{4}$ of the eggs in the carton.
- On Tuesday, Travis used $\frac{2}{3}$ of the eggs that remained in the carton after Monday.

Which picture represents the number of eggs remaining in the carton after Travis used eggs on Tuesday?

a.



b.



c.

c.

5.NF.7 – Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions. (Students able to multiply fractions in general can develop strategies to divide fractions in general, by reasoning about the relationship between multiplication and division. But division of a fraction by a fraction is not a requirement at this grade.)

a. Interpret division of a unit fraction by a non-zero whole number, and compute such quotients. *For example, create a story context for (1/3) ÷ 4 and use a visual fraction model to show the quotient; use the relationship between multiplication and division to explain that (1/3) ÷ 4 = 1/12 because (1/12) × 4 = 1/3.*

b. Interpret division of a whole number by a unit fraction, and compute such quotients. *For example, create a story context for 4 ÷ (1/5) and use a visual fraction model to show the quotient; use the relationship between multiplication and division to explain that 4 ÷ (1/5) = 20 because 20 × (1/5) = 4.*

c. Solve real-world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions, e.g., by using visual fraction models and equations to represent the problem. *For example, How much chocolate will each person get if 3 people share 1/2 lb of chocolate equally? How many 1/3-cup servings are in 2 cups of raisins?*

DCAS-Like

21A

A farmer mows one-fifth of an acre each day. If his property has three acres, how many days will it take to mow it all?

A. 3 days

B. 5 days

C. 8 days

D. 15 days

Next-Generation

21B

Tara had a great soccer game!

After the soccer game, the coach awarded Tara $\frac{1}{8}$ a bag of licorice to share with her friends. She decided to share the contents of the licorice bag with her teammates Sara and Jessica. How much of the licorice bag will each girl receive?

MEASUREMENT AND DATA (MD)

Cluster: Convert like measurement units within a given measurement system.

5.MD.1 – Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step real world problems.

DCAS-Like

22A

The scale on Todd's map is 1 inch = 200 miles. The distance from his house to his Grandma's house on the map is $5\frac{1}{4}$ inches.

What is the distance in miles from Todd's house to his Grandma's house?

A. 1,000 miles

B. 1,050 miles

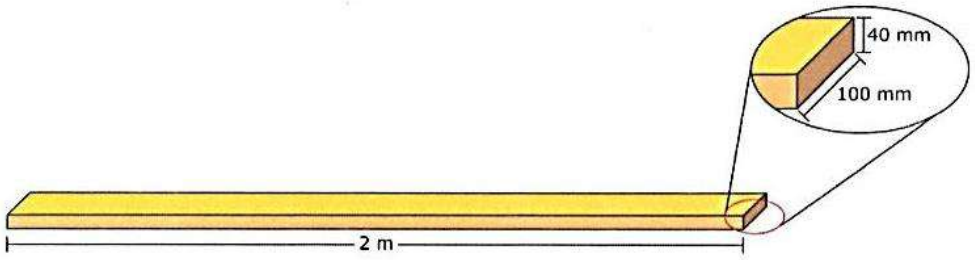
C. 1,500 miles

D. 24,000 miles

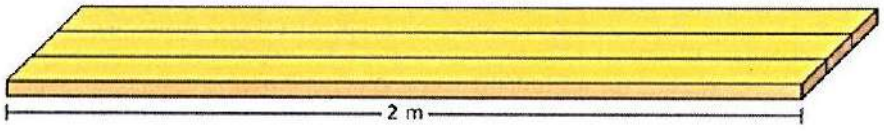
Next-Generation

22B

Shelby needs wooden boards to build a platform. Each board is shaped like a rectangular prism and has a length of 2 meters, a height of 40 millimeters, and a width of 100 millimeters as shown below.



To build a platform, Shelby will place the boards side by side as shown in this diagram. The platform will have a total width of 12 meters.



What is the least number of boards that Shelby needs to build the platform?

_____ boards

5.MD.1 – Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step real world problems.

DCAS-Like

23A

John prepared 3 liters of tomato soup for his anniversary party. He has to serve the soup to each guest. A soup bowl holds 200 milliliters of soup. How many soup bowls will he be able to fill?

A. 15 bowls

B. 66 bowls

C. 150 bowls

D. 600 bowls

Next-Generation

23B

Xian is practicing his long jumps for the track team.

- His first jump measured 3 yards, 1 foot, 2 inches.
- His second jump measured 2 yards, 2 feet, 9 inches.

How much farther is Xian's first jump than his second jump? Be sure to include the measurement units.

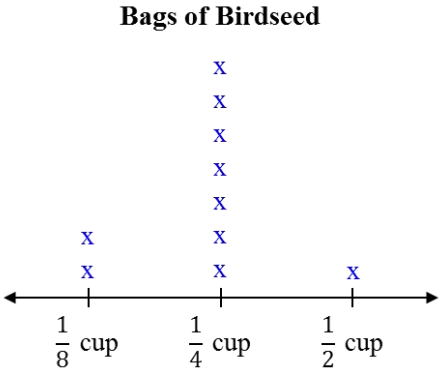
Cluster: Represent and interpret data.

5.MD.2 – Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Use operations on fractions for this grade to solve problems involving information presented in line plots. *For example, given different measurements of liquid in identical beakers, find the amount of liquid each beaker would contain if the total amount in all the beakers were redistributed equally.*

DCAS-Like

24A

A pet store has 10 small bags of birdseed. The line plot shows the amounts of birdseed in these small bags.



The pet store needs to fill $\frac{1}{2}$–cup containers with all the birdseed from these small bags. What is the least number of $\frac{1}{2}$–cup containers the pet store needs?

A. 4

B. 5

C. 8

D. 10

Next-Generation

24B

A baker had 10 sacks containing the following amounts of flour: $4\frac{1}{2}$ lb, $3\frac{1}{4}$ lb, $2\frac{1}{2}$ lb, $2\frac{1}{2}$ lb, 4 lb, $3\frac{1}{4}$ lb, $4\frac{1}{4}$ lb, 5 lb, $2\frac{1}{2}$ lb, $3\frac{1}{4}$ lb

Plot the measurements on a line plot.

- Give the line plot a title and label the axis.
- If the baker redistributed the flour equally among the 10 bags, how much flour would be in each bag? Explain your thinking.

Cluster: Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition.

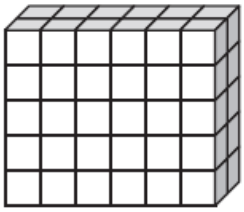
5.MD.4 – Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units.

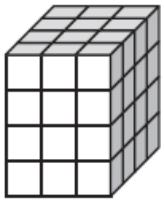
DCAS-Like

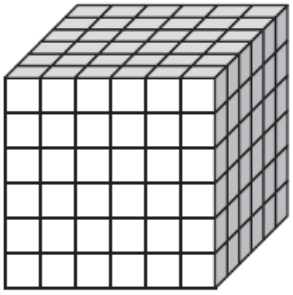
25A

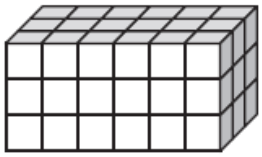
Wanda used 1-centimeter cubes to build a right rectangular prism that has a volume of 60 cubic centimeters.

Which of the following could represent the prism that Wanda built?

A 

B. 

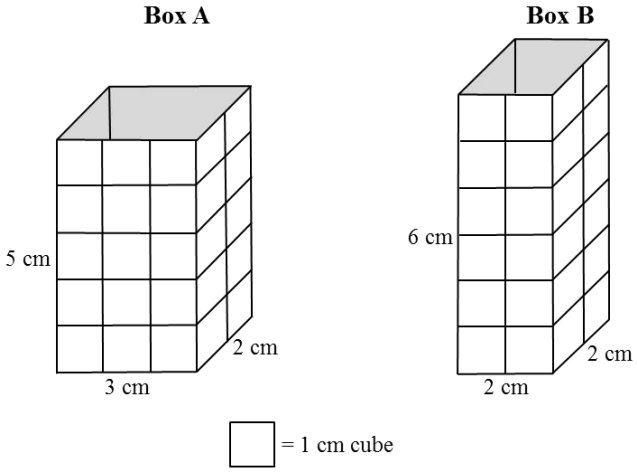
C. 

D. 

Next-Generation

25B

Steve fills Box A and Box B with one centimeter cubes.



1. How many cubes can Steve fit into Box A? _____

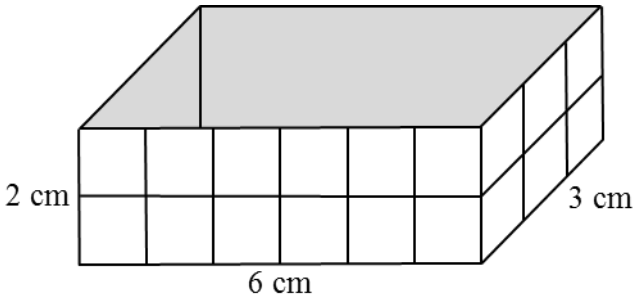
   Explain how you figured it out.

2. How many cubes can Steve fit into Box B? _____

   Explain how you figured it out.

3. Which of the two boxes can hold more cubes? _____

4. Find the measurements of **a different box** that holds the same number of cubes as the box below.



_____ cm long _____ cm wide _____ cm high

5.MD.5 – Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume.

a. Find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes, and show that the volume is the same as would be found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base. Represent three-fold whole-number products as volumes, e.g., to represent the associative property of multiplication.

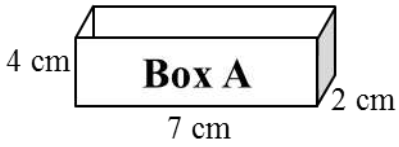
b. Apply the formulas $V = l \times w \times h$ and $V = b \times h$ for rectangular prisms to find volumes of right rectangular prisms with whole-number edge lengths in the context of solving real-world and mathematical problems.

c. Recognize volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts, applying this technique to solve real world problems.

DCAS-Like

26A

What is the volume of Box A?



A. 13 cubic centimeters

B. 34 cubic centimeters

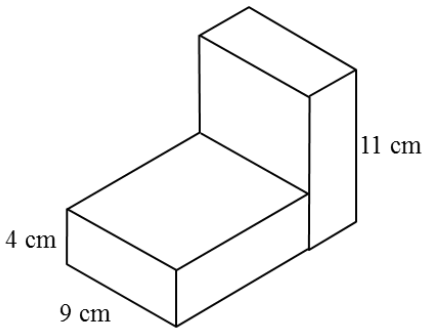
C. 56 cubic centimeters

D. 98 cubic centimeters

Next-Generation

26B

This diagram shows the dimensions, in centimeters, of two identical rectangular prisms joined together.



What is the combined volume of these prisms?

_____ cubic centimeters

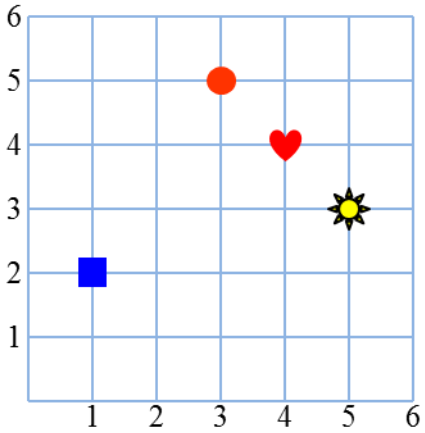
GEOMETRY (G)

Cluster: Graph points on the coordinate plane to solve real-world and mathematical problems.

5.G.1 – Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., x-axis and x-coordinate, y-axis and y-coordinate).

DCAS-Like

27A



Which ordered pair indicates the location of the circle?

A. (3, 5)

B. (5, 3)

C. (5, 5)

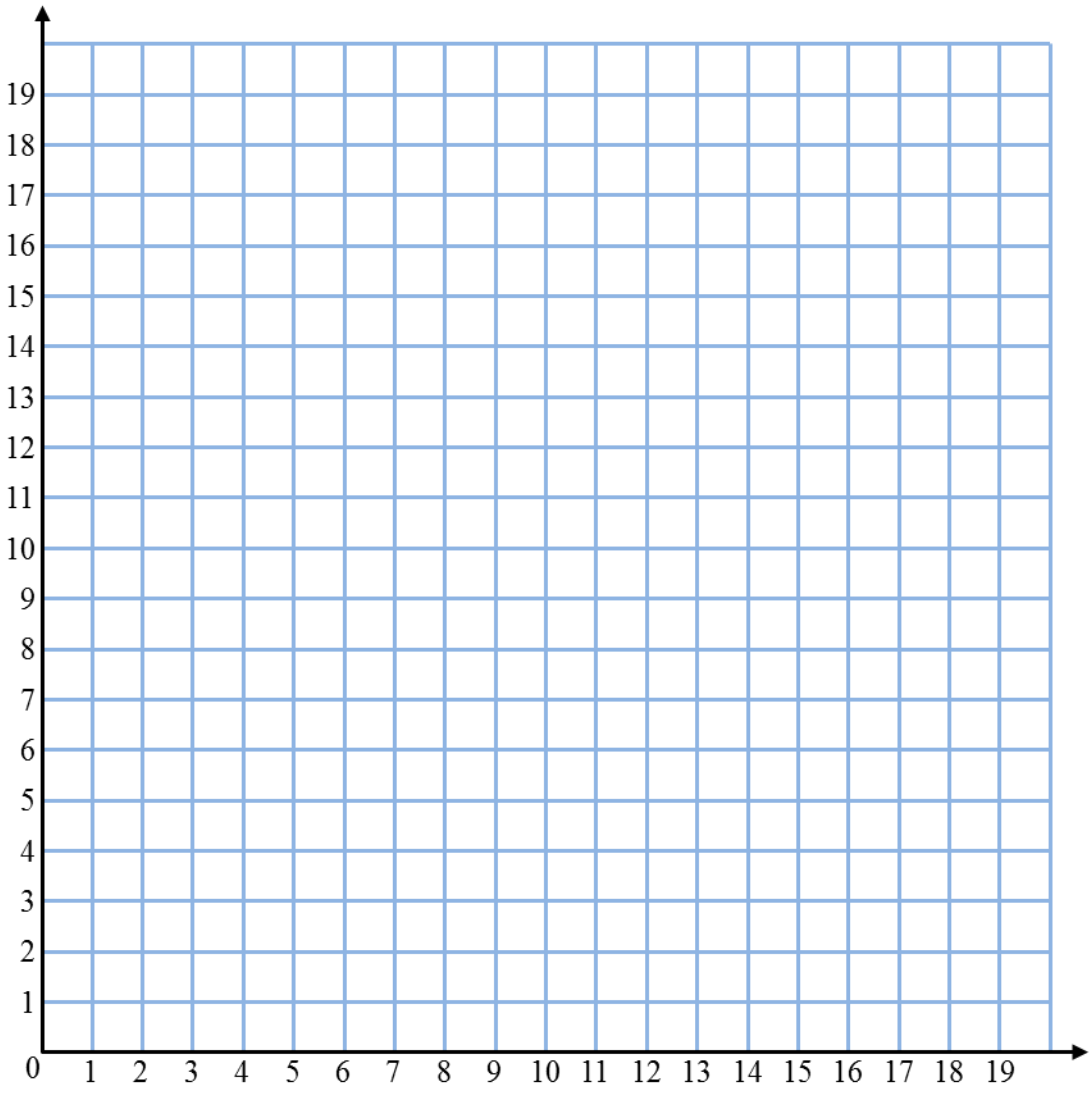
D. (2, 1)

Next-Generation

27B:

Edna drew a square that had an area of 36 square units using the grid shown below. She started drawing her square at (7, 10).

Draw the square that Edna could have made in the grid below. Be sure to label the coordinates of each vertex of the square.



The vertices of Edna's square are:

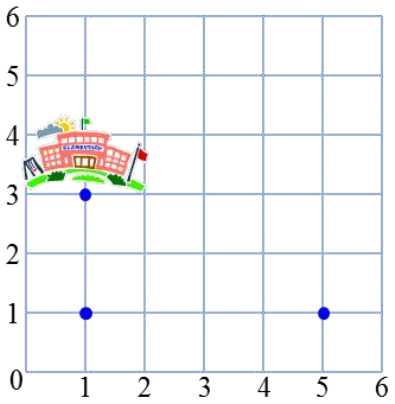
(7, 10) (_____, _____) (_____, _____) (_____, _____)

5.G.2 – Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.

DCAS-Like

28A

The track team warms up for practice by jogging through the neighborhood near the school. A coordinate grid of the neighborhood is shown below:



The team runs from the school along a path that forms a rectangle. Three of the vertices of the rectangle are shown on the grid. What are the coordinates of the fourth vertex of the rectangle?

A. (2, 5)

B. (3, 5)

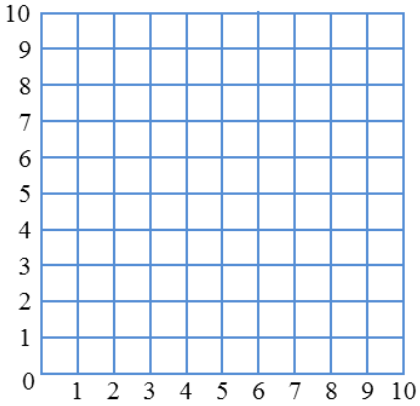
C. (5, 3)

D. (5, 4)

Next-Generation

28B

Josh's frog jumps 7 blocks east (right), then 4 blocks north (up), and 3 blocks west (left). How far is he from where he started? Use the coordinate graph below to help you.



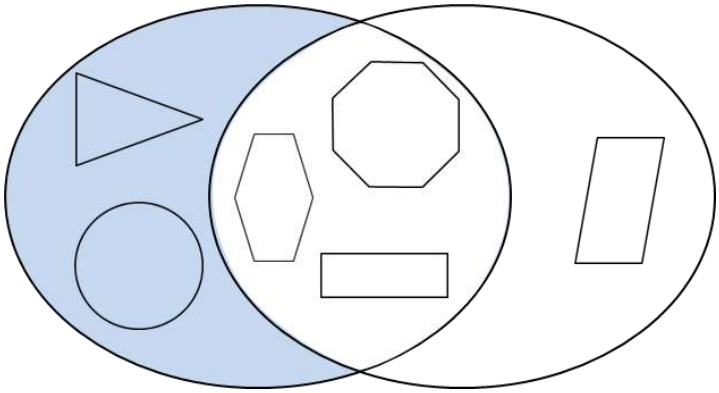
Cluster: Classify two-dimensional figures into categories based on their properties.

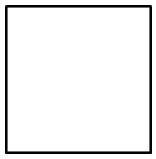
5.G.3 – Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. *For example, all rectangles have four right angles and squares are rectangles, so all squares have four right angles.*

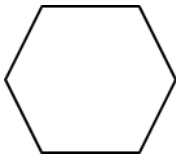
DCAS-Like

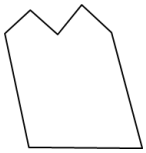
29A

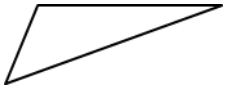
Joanne sorted shapes based on their properties of symmetry and parallel lines. Which of the following shapes should go in the shaded region?



A. 

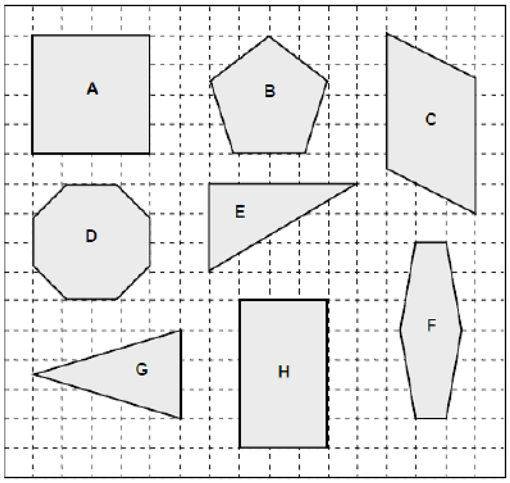
B. 

C. 

D. 

29B

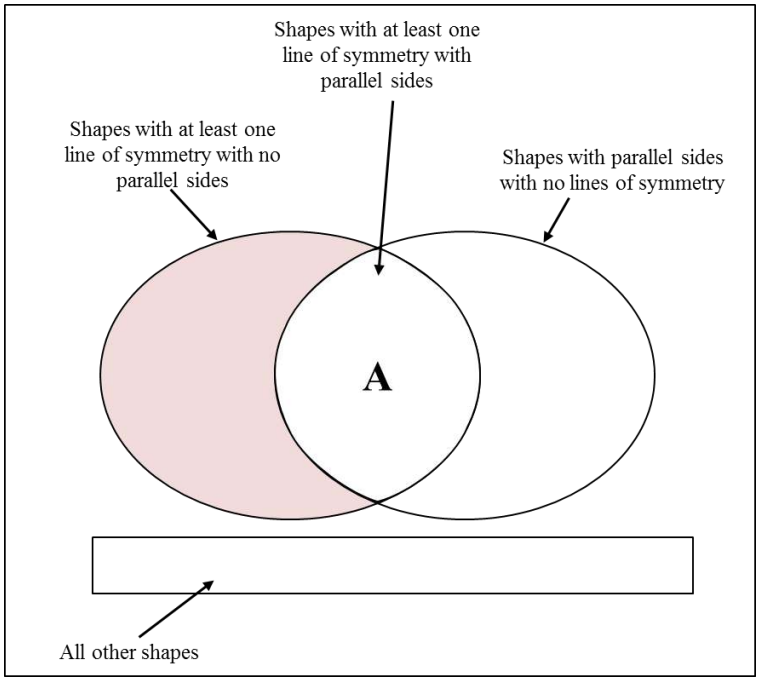
Here are some two-dimensional shapes drawn on square grid paper.



1. What is the mathematical name of shape F? _____

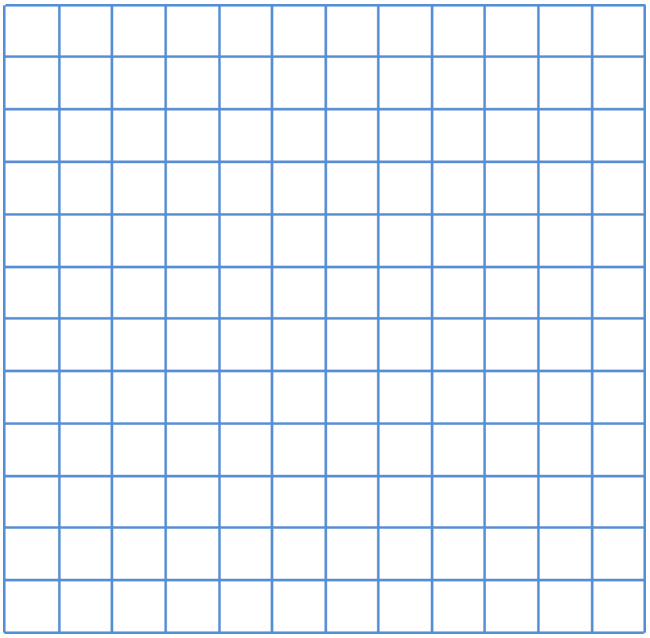
2. How many lines of symmetry does shape D have? _____

3. Write the letter of each shape in the correct region of the diagram on below. The first one has been done for you.



Part 4 is on the next page.

4. Draw another shape that could do into the shaded region.

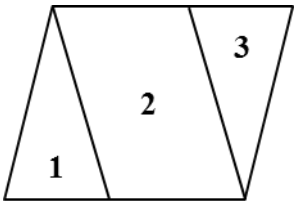


5.G.4 – Classify two-dimensional figures in a hierarchy based on properties.

DCAS-Like

30A

When Section 3 is removed from the parallelogram below, which of the following best describes the figure?



A. Trapezoid

B. Rectangle

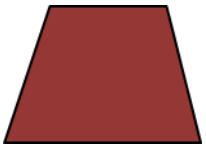
C. Rhombus

D. Kite

Next-Generation

30B

a. Which words describe this shape? Choose all that apply.



- ❑ Quadrilateral
- ❑ Square
- ❑ Trapezoid
- ❑ Rhombus
- ❑ Parallelogram

b. Draw a shape that has no lines of symmetry, exactly two right angles, and one acute angle.

c. How many sides does it have? _____

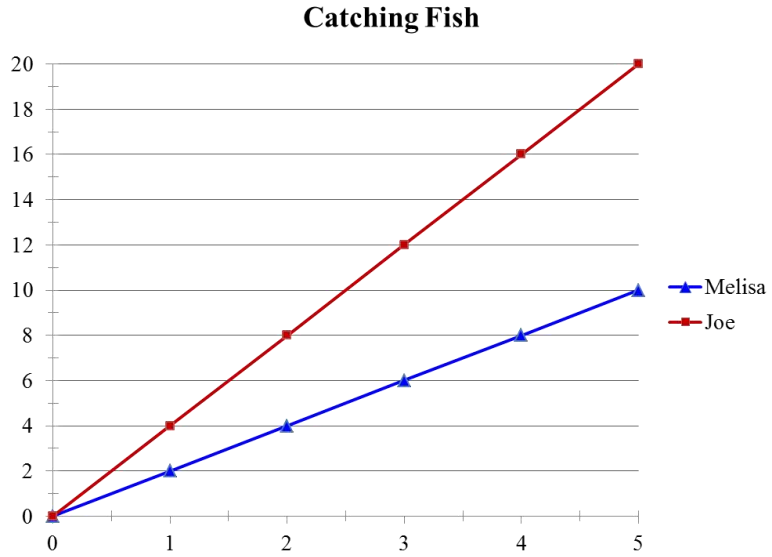
ANSWER KEY AND ITEM RUBRICS

Operations and Algebraic Thinking (OA)

DCAS-Like Answer	Next-Generation Solution
1A: C (5.OA.1)	**1B:** a. We follow the usual order of operations and multiply before adding: $2 \times 5 + 3 \times 2 + 4 = 20$ b. Before multiplying the first 2, we complete the operations inside the parentheses using order of operations: $2 \times (5 + 3 \times 2 + 4) = 30$ c. We first complete the addition in parentheses and then follow the usual order of operations: $2 \times 5 + 3 \times (2 + 4) = 28$ d. We first complete the addition in parentheses and then follow the usual order of operations: $2 \times (5 + 3) \times 2 + 4 = 36$ e. In this case, the placement of parentheses does not change the value of the expression. We can remove them and see that we get the same expression as in part a.: $(2 \times 5) + (3 \times 2) + 4 = 20$ f. We first complete the addition in parentheses and then multiply: $2 \times (5 + 3) \times (2 + 4) = 96$ The five expressions aside from part e. evaluate to different results. Therefore, we cannot remove any of the parentheses without changing the value of the expression, since doing so would give us one of the other expressions in the list. For example, if we remove the parentheses in item b., we get the expression from item a. The placement of the parentheses forces us to complete the computations in a different order than we would according to the standard order of operations.
2A: B (5.OA.1)	**2B:** *Key* a. Answer because it is 91. b. 11 c. 10 d. 54 e. 5

DCAS-Like Answer	Next-Generation Solution
3A: D (5.OA.2)	**3B:** **Column A** a. Nineteen times the sum of thirteen and twelve. b. Fifty-eight times the sum of twenty-one and thirty-two. c. Eighty-five less than the sum of forty-two and ninety-nine. d. Sixteen less than the quotient of twenty-two divided by eighteen. **Column B** i. $(42 + 99) - 85$ ii. $\frac{22}{18} - 16$ iii. $19 \times (13 + 12)$ iv. $58 \times (21 + 32)$

DCAS-Like Answer	Next-Generation Solution
4A: C (5.OA.3)	**4B:** *Sample Top-Score Response* A. If you follow the pattern in the table (–6) and go all the way down to 2, you get the answer of 83 centimeters. Also, Branden was 2 years old 7 years ago. $(7 \text{ years})(6 \text{ cm}) = 42 \text{ cm}$ is the number of centimeters he has grown. Now, at 9 years old, he is 125 cm so I subtracted 42 cm and I got 83 cm at age 2. B. $6 \times (\text{age since 2 years old}) + (\text{age at 2 years old}) = \text{current age}$ Example: At 8 years old, Brendan is 119 centimeters tall because $6 \times 6 + 83 = 119$. This also works for the other ages. Other equivalent rules or equations are acceptable. *Scoring Rubric* Responses to this item will receive 0-2 points based on the following: **2 points:** The student demonstrates an ability to construct viable arguments in support of his or her reasoning by providing a complete explanation about the equation that represents the information in the table, and by providing 83 centimeters as a reasonable height. **1 point:** The student demonstrates a partial ability to construct viable arguments in support of his or her reasoning by providing 83 as a reasonable height but does not adequately relate the information in the table to the equation. **0 points:** The student demonstrates inconsistent or no ability to construct viable arguments in support of his or her reasoning.

DCAS-Like Answer	Next-Generation Solution
5A: D (5.OA.3)	**5B:** *Student* My graph shows that Joe always has more fish than Melisa. Joe's fish increases at a higher rate since he catches 4 fish every day. Melisa only catches 2 fish every day, so her number of fish increases at a smaller rate than Joe's. Important to note as well that the lines become increasingly further apart. Identify apparent relationships between corresponding terms. Additional relationships: the two lines will never intersect; there will not be a day in which Melisa and Joe have the same total of fish, explain the relationship between the number of days that has passed, and the number of fish each person has ($2n$ or $4n$, n being the number of days. 

Number and Operations in Base Ten (NBT)

DCAS-Like Answer	Next-Generation Solution
6A: D (5.NBT.1)	**6B:** *Solution* $600{,}000 \times (60 \times 10)$ (Note: Conversion between seconds and minutes is essential to get correct answer.) $600{,}000 \times 600$ $36 \times 100{,}000 \times 100$ 360,000,000 gallons in 10 minutes 36×10^7 gallons is also acceptable
7A: D (5.NBT.2)	**7B:** a. $25 \times 10^2 = 2{,}500$ b. $16 \div 10^3 = 0.016$ c. $3.3 \times 10^4 = 33{,}000$ d. $78 \times 10^3 = 78{,}000$ e. $0.34 \times 10^2 = 34$ f. $512 \div 10^3 = 0.512$

DCAS-Like Answer	Next-Generation Solution
8A: B (5.NBT.3)	**8B:** *Solution* a. 200,000 [c.] $2 \times \frac{1}{1000}$ [a.] $\frac{200,000}{1}$ b. 0.200 [b.] $200 \times \frac{1}{1000}$ [c.] $\frac{2}{1000}$ c. 0.002 [a.] $2 \times 100,000$ [b.] $\frac{200}{1000}$

<table>
<tr><th>DCAS-Like Answer</th><th>Next-Generation Solution</th></tr>
<tr><td>9A: D
(5.NBT.4)</td><td>9B:
Key and Scoring Rubric
<table>
<tr><th></th><th>Points</th><th>Section Points</th></tr>
<tr><td>1. Gives the correct answer.
In the left-hand box: 5.35, 5.025, 5.24, 5.473
In the right-hand box: (5.7), 5.9
Partial Credit
Lose one point for each number incorrectly placed</td><td>
3

(2)
(1)</td><td>

3</td></tr>
<tr><td>2. Gives correct answer: 5.473
Gives a correct explanation such as: It rounds to 5.5 and no other number does.</td><td>1
1</td><td>
2</td></tr>
<tr><td>3. Gives correct answer: any number larger than 5.24 and less than 5.35</td><td>1</td><td>1</td></tr>
<tr><td>4. Gives correct answer: 5.025, 5.24, 5.35, 5.473, 5.7, 5.9
Partial Credit
One error or first and last correct
Gives a correct explanation such as: I looked at the first number after the decimal point and choose zero because it was the smallest.</td><td>1

(1)
(1)</td><td>1

3</td></tr>
<tr><td>Total Points</td><td></td><td></td></tr>
</table></td></tr>
</table>

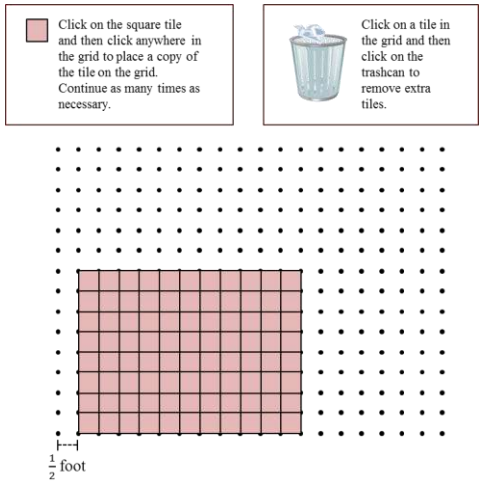
DCAS-Like Answer	Next-Generation Solution
10A: D (5.NBT.5)	**10B:** *Solution* Student answers may include: ▪ 5 is the other factor because $5 \times 200 = 1{,}000$. 200 is close to 238 so the product will be a little bit more than 1,000. ▪ 6 is the other factor because $6 \times 200 = 1{,}200$. 200 is close to 238 so the product will be a little bit more than 1,200. ▪ 7 would not be another factor because $7 \times 200 = 1{,}400$, but $7 \times 30 = 210$. $1{,}400 + 210$ is over 1,500. ▪ 4 would not be another factor because $4 \times 200 = 800$ and $4 \times 30 = 120$. $800 + 120$ is close to 1,000. OR ▪ 4.5 would be another factor because $4.5 = 4\frac{1}{2}$ and $4\frac{1}{2} \times 200 = 800 + 100 = 900$ and $4\frac{1}{2} \times 30 = 120 + 15 = 135$. So, $4\frac{1}{2} \times 238$ is a little more than 1035. Make note of students that use algorithms to find products between 1,000 and 1,500. This may indicate that these students need more practice with estimation. Make note of students who choose unreasonable factors to begin finding products between 1,000 and 1,500. Even if they eventually do find the right factors and get the answer correct, this may indicate that these students need more practice with estimation and number sense.
11A: B (5.NBT.6)	**11B:** *Sample Top-Score Response* *Part A:* 256. I multiplied 4 by 64 and got 256 because there are 64 crayons in 4 boxes. *Part B:* 8 *Part C:* Since each student has 8 crayons from 4 boxes, she only needs 2 more boxes (half as many so 128 crayons) in order to give each student 4 more crayons, for a total of 12 crayons each.
12A: B (5.NBT.7)	**12B:** Student must understand that Theresa cannot retrace her steps, and they proceed with either addition or subtraction to obtain the answer. The difficulty of the item is in the fact that there is extraneous information not needed to solve the problem. $14.7 - (4.1 + 4.9 + 2.5) = 3.2$ miles

Number and Operations—Fractions (NF)

DCAS-Like Answer	Next-Generation Solution
13A: C (5.NF.1)	**13B**: *Key:* costume, picture frame, and flower $2 + \frac{1}{4} + 1\frac{3}{4} = 4$
14A: B (5.NF.1)	**14B**: *Key:* yes, no, no, yes *Scoring Rubric* Responses to this item will receive 0-2 points based on the following: **2 points:** YNNY – Thoroughly understands how to set up an addition problem by changing mixed numerals with unlike denominators to mixed numerals with like denominators or to equivalent improper fractions with like denominators. **1 point:** YNNN, NNNY – Recognizes one equivalent addition problem with like denominators, but not both forms (mixed and improper fractions). **0 points:** YYYY, YYYN, YNYY, NYYY, YNYY, YYNY, YYNN, YNYN, NYNY, NNYY, NNYN, NYNN, NNNN – Shows inconsistent or no understanding of how to set up an addition problem with like denominators.

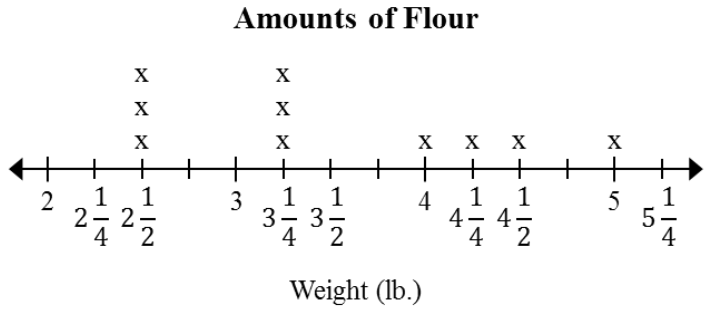
DCAS-Like Answer	Next-Generation Solution
15A: D (5.NF.2)	**15B** *Solution and Sample Strategy* The student may use the fraction manipulatives or least common multiple (LCM) to find common denominators, convert the fractions to equivalent fractions, and add the numerical representation of the fractions to find the total amount of chocolate eaten. ▪ Find LCM: 12 2, 4, 6, 8, 10, 12, 14 3, 6, 9, 12, 15 4, 8, 12, 16 6, 12, 18 ▪ Convert fractions: $\frac{2}{6}=\frac{4}{12}, \frac{2}{3}=\frac{8}{12}, \frac{3}{4}=\frac{9}{12}, \frac{1}{2}=\frac{6}{12}, \frac{1}{3}=\frac{4}{12}$ a. & b. Amy and Deb both ate the least amount of chocolate. They ate 4 pieces. Katie ate the most, as she ate 9 pieces of chocolate. c. The total amount of chocolate eaten was $\frac{4}{12}+\frac{8}{12}=\frac{12}{12}$ (1 candy bar) $\frac{9}{12}+\frac{6}{12}+\frac{4}{12}=\frac{19}{12}$ OR 1 candy bar and $\frac{7}{12}$ of a candy bar for a total of $2\frac{7}{12}$ candy bars
16A: B (5.NF.3)	**16B:** *Solution* Wesley walked $2\frac{3}{4}=2.75$ miles in one hour, which is also 2 miles and 3,960 feet, or 14,520 feet. In this problem the whole consists of 11 miles, and we are asked to determine the number of miles walked in each of 4 hours. This problem helps lay the ground work for students to understand ratios and rates in 6th grade and beyond. To complete the conversion for this problem, the student must know that there are 5,280 feet in each mile.

DCAS-Like Answer	Next-Generation Solution
17A: B (5.NF.4)	**17B:** *Sample Top-Score Response* a. Area is $\frac{9}{4}$ b. One possible answer: length = $\frac{3}{4}$ feet and width = 3 feet. Any combination of length and width with a product that yields $\frac{9}{4}$ square feet. *Scoring Note:* Decimal answers are acceptable for all parts of this item. *Scoring Rubric* Responses to this item will receive 0-2 points based on the following: **2 points:** The student has thorough understanding of solving real-world problems involving area of two dimensional objects. This is shown by the student answering all parts correctly. **1 point:** The student has partial understanding of solving real-world problems involving area of two-dimensional objects but may not have attended to precision. The answer in item a. is correct, but the student makes an error in determining the dimensions of the rectangular poster in item b. OR Item a. is incorrect, but item b. dimensions give the same area as item b. **0 points:** The student shows inconsistent or no understanding on how to solve real-world problems involving area of two-dimensional objects.

DCAS-Like Answer	Next-Generation Solution
18A: C (5.NF.4)	**18B**: *Sample Top-Score Response*  What is the length, in feet, of the floor? $5\frac{1}{2}$ or 5.5 feet *Scoring Rubric* Responses to this item will receive 0-2 points based on the following: **2 points:** Student thoroughly understands the relationship between area and its dimensions. Can model a rectangular floor that has an area of 22 square feet and identify the length of the floor as $5\frac{1}{2}$ feet. **1 point:** Student understands how length and width relate to area and can create a rectangular floor of 22 square feet, but incorrectly identifies the length of the floor. OR The student can determine the length of the floor by dividing 22 by 4 but cannot model the rectangular floor with the tiles. **0 points:** Student shows little or no understanding of how length and width related to area of a rectangular floor when one dimension of the floor has a fractional value.

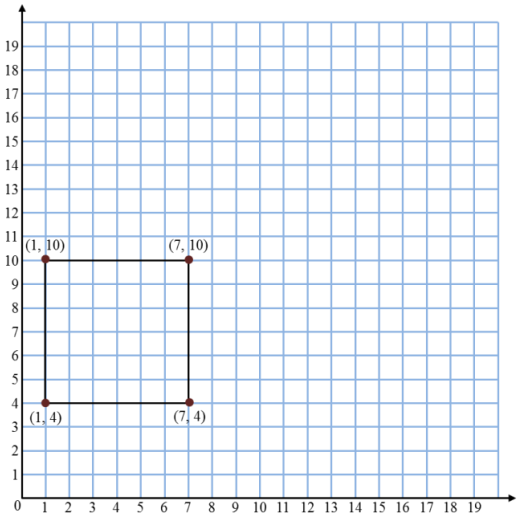
DCAS-Like Answer	Next-Generation Solution
19A: D (5.NF.5)	**19B:** a. Y $\left(\frac{3}{4} \times \frac{12}{9} = \frac{3}{3} = 1\right)$ b. N $\left(\frac{3}{4} \times \frac{9}{9} = \frac{9}{12} = \frac{3}{4}\right)$ c. N $\left(\frac{3}{4} \times \frac{9}{12} = \frac{9}{16}\right)$
20A: C (5.NF.6)	**20B**: *Key and Distractor Analysis* a. Disregarded first bullet and multiplied $\frac{2}{3}$ by 12. b. Found number used on Tuesday. c. Correct d. Added $\frac{1}{4}$ and $\frac{2}{3}$ and subtracted from $\frac{12}{12}$.
21A: D (5.NF.7)	**21B:** *Key:* $\frac{1}{8} \times \frac{1}{3} = \frac{1}{24}$

Measurement and Data (MD)

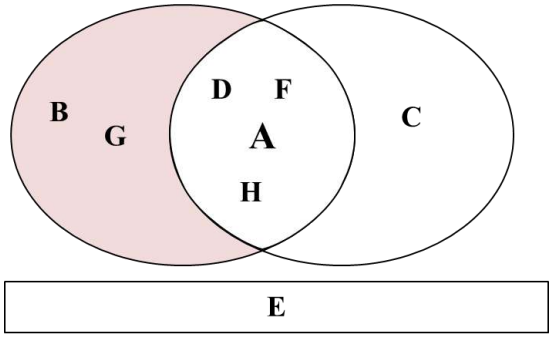
DCAS-Like Answer	Next-Generation Solution
22A: B (5.MD.1)	**5.MD.1B:** *Key:* 120
23A: A (5.MD.1)	**23B:** *Key and Distractor Analysis:* Student must know that 1 yard = 3 feet and 1 foot = 12 inches. So, 1st jump in inches is $108 + 12 + 2 = 122$ inches. 2nd jump is $72 + 24 + 9 = 105$ inches. Difference is 17 inches or 1 foot 5 inches.
24A: B (5.MD.2)	**24B:** a.  b. Student will need to find total amount of flour and divide by 10 to find amount in one bag. Different strategies are acceptable. Regrouping and sharing equally among 10 bags using pictorial representations, but at grade 5 we expect them to go to the Algebraic thinking directly. $(4 + 5) + \left(4\frac{1}{2} + 2\frac{1}{2} + 2\frac{1}{2} + 2\frac{1}{2}\right) + \left(3\frac{1}{4} + 3\frac{1}{4} + 4\frac{1}{4} + 3\frac{1}{4}\right) =$ $9 + 12 + 14 = 35$ lbs. $\frac{35}{10} = 3\frac{1}{2}$ lbs. per bag

<table>
<tr><th>DCAS-Like Answer</th><th>Next-Generation Solution</th></tr>
<tr><td>25A: A
(5.MD.4)</td><td>25B:
Key and Scoring Rubric
<table>
<tr><th></th><th>Points</th><th>Section Points</th></tr>
<tr><td>1. Gives correct answer: 30 cubes
Gives a correct explanation such as: There are 6 cubes on each layer and 5 cubes. $3 \times 2 \times 5 =$</td><td>1
1</td><td>2</td></tr>
<tr><td>2. Gives correct answer: 24 cubes
Shows work such as: $2 \times 2 \times 6 =$</td><td>1
1</td><td>2</td></tr>
<tr><td>3. Gives correct answer: Box A</td><td>1</td><td>1</td></tr>
<tr><td>4. Gives correct answer such as: $4 \times 3 \times 3$ or $2 \times 2 \times 9$
Boxes with a 6×3 or 3×6 base should not be accepted.</td><td>1</td><td>1</td></tr>
<tr><td>Total Points</td><td></td><td>6</td></tr>
</table></td></tr>
<tr><td>26A: C
(5.MD.5)</td><td>26B:
Key: 792 cubic centimeters</td></tr>
</table>

Geometry (G)

DCAS-Like Answer	Next-Generation Solution
27A: A (5.G.1)	**27B:** *Sample Top-Score Response*  *Scoring Rubric* **2 points:** The student shows an ability to make productive use of problem-solving strategies by plotting points located at (1, 4), (7, 4), (1, 10) or (13, 4), (7, 4), (13, 10) or (13, 16), (7, 16), (13, 10) or (1, 16), (7, 16, (1, 10). **1 point:** The student shows some ability to make productive use of problem-solving strategies by plotting points of a square that wither has area of 36 square units but does not use (7, 10) as a vertex. OR The student creates a square using (7, 10) as one vertex of the square but does not attend to the requirement of having an area of 36 square units. **0 points:** The student shows little or no understanding of plotting points of a square with an area of 36 square units.

DCAS-Like Answer	Next-Generation Solution
28A: C (5.G.2)	**28B:** *Answer:* He is 8 blocks from his starting place—this is true for any starting point.

<table>
<tr><th>DCAS-Like Answer</th><th>Next-Generation Solution</th></tr>
<tr><td>29A: C
(5.G.3)</td><td>
29C:
Key and Scoring Rubric
<table>
<tr><th></th><th>Points</th><th>Section Points</th></tr>
<tr><td>1. Gives correct answer: hexagon</td><td>1</td><td>1</td></tr>
<tr><td>2. Gives correct answer: 8</td><td>1</td><td>1</td></tr>
<tr><td>3. Completes the diagram.
 

7 letters is correct with no extras.
Partial Credit
6 or 5 letters correct
4 or 3 letters correct</td><td>

3

(2)
(1)</td><td>

3</td></tr>
<tr><td>4. 1 point for a shape with line(s) of symmetry,
and 1 point for a shape with no parallel sides</td><td>1
1</td><td>2</td></tr>
<tr><td>Total Points</td><td></td><td>7</td></tr>
</table>
</td></tr>
</table>

DCAS-Like Answer	Next-Generation Solution
30A: A (5.G.4)	**30B:** *Solution:* a. Yes/No/Yes/No/No b.  c. 4 sides

PERFORMANCE TASKS

Performance Task 1

The following is a link to a grade 5 Performance Task released by Smarter Balanced Assessment Consortium. The Performance Task is Claim 4, Modeling and Data Analysis.

MAT.05.PT.4.SCHFE.A.272* – *School Festival

- Primary Content Domain: Number and Operations in Base Ten
- Secondary Content Domains: Number and Operations – Fractions

Performance Task 2: Cindy's Cats

This task challenges a student to use knowledge of fractions to solve one- and multi-step problems with fractions. A student must show understanding of operations and fractions to find equivalent numerical representations to add and subtract fractions and compare size of fractions. A student must demonstrate an understanding of operations with fractions to multiply a fraction times a whole number.

Common Core State Standards:

5.NF.2 – Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, e.g., by using visual fraction models or equations to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers. *For example, recognize an incorrect result 2/5 + 1/2 = 3/7 by observing that 3/7 < 1/2.*

5.NF.4 – Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.

a. Interpret the product (a/b) × q as a parts of a partition of q into b equal parts; equivalently, as the result of a sequence of operations a × q ÷ b. *For example, use a visual fraction model to show (2/3) × 4 = 8/3, and create a story context for this equation. Do the same with (2/3) × (4/5) = 8/15. (In general, (a/b) × (c/d) = ac/bd.)*

b. Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas.

This problem gives you the chance to solve fraction problems in a practical context.

Cindy has 3 cats: Sammy, Tommy, and Suzi.

1. Cindy feeds them on Cat Crunchies

   Each day Sammy eats $\frac{1}{2}$ of the box, Tommy eats $\frac{1}{8}$ of the box, and Suzi eats $\frac{1}{4}$ of the box.

   What fraction of a whole box do the cats eat, in all, each day? _____

   Show how you figured this out.

2. Tommy and Suzi spend much of each day sleeping.

   Tommy sleeps for $\frac{3}{5}$ of the day, and Suzi sleeps for $\frac{7}{10}$ of the day.

   Which of the two cats sleeps for longer? _____

   How much longer does it sleep each day? _____

   Show how you figured this out.

3. Cindy's cats often share a carton of cat milk.

   Sammy always drinks $\frac{1}{3}$ of the carton, Tommy always drinks $\frac{5}{12}$ of the carton, and Suzi always drinks $\frac{1}{6}$ of the carton.

   What fraction of the carton of cat milk is left over? _____

   Show how you figured it out.

4. Cindy's cats love to jump in and out of their cat door.

   Yesterday the cat door was used 100 times by her cats.

   Sammy used it for $\frac{1}{4}$ of the times, and Tommy used it for $\frac{3}{10}$ of the times.

   How many times did Suzi use the cat door? _____

   Explain how you figured it out.

Cindy's Cats Scoring Rubric

The core element of performance required by this task is to solve fraction problems in a practical context. Based on this, credit for specific aspects of performance should be assigned as follows:	**Points**	**Section Points**
1. Gives correct answer: $\frac{7}{8}$	1	
Shows work such as: $\frac{1}{2}+\frac{1}{4}+\frac{1}{8}=\frac{4}{8}+\frac{2}{8}+\frac{1}{8}=\frac{7}{8}$	1	2
2. Gives correct answer: Suzi by $\frac{1}{10}$ of a day. Accept 10% or 2 $\frac{4}{10}$ hours	1	
Shows correct work such as: $\frac{3}{5}=\frac{6}{10}$ and so $\frac{7}{10}-\frac{6}{10}=\frac{1}{10}$	1	
Accept work in percents.		2
3. Gives correct answer: $\frac{1}{12}$	1	
Shows correct work such as: $\frac{1}{3}+\frac{5}{12}+\frac{1}{6}=\frac{4}{12}+\frac{5}{12}+\frac{2}{12}=\frac{11}{12}$ $\frac{12}{12}-\frac{11}{12}=\frac{1}{12}$	1	
Partial credit: Gives answer $\frac{11}{12}$ and shows correct work.	(1)	2
4. Gives correct answer: 45 times	1	
Gives correct explanations such as: $\frac{1}{4}=\frac{25}{100}$ and $\frac{3}{10}=\frac{30}{100}$ So, $25+30=55$ Therefore, Sammy and Tommy used it 55 times. $100-55=45$ This means Suzi used it 45 times.	1	
Partial credit: Gives answer such as $\frac{9}{20}$, $\frac{18}{40}$, or 45% and shows correct work.	(1)	2
Total Points		***8***