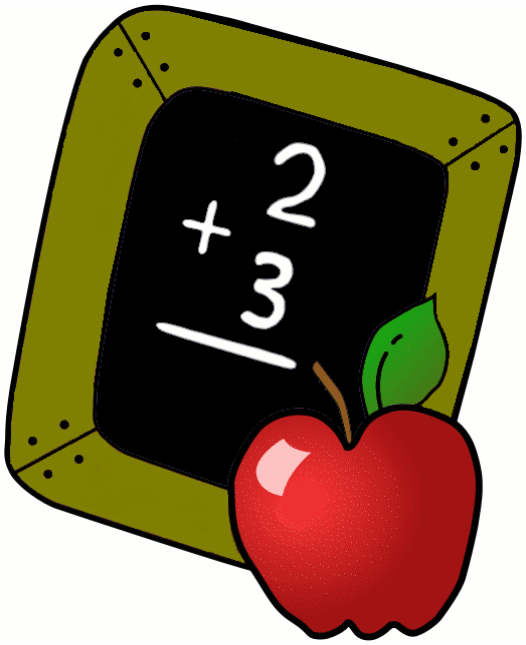
Minnesota Department of Education



Grade 4
Mathematics MCA-III
Item Sampler Teacher Guide

Grade 4 Mathematics MCA Item Sampler
Parent/Teacher Guide

Minnesota Department of Education

The purpose of the Item Samplers is to familiarize students with the online MCA test format. The Item Samplers contain multiple choice items (MC) and technology enhanced items (TE).

This guide includes:

- A snapshot of each item
- Benchmark and examples from the Minnesota Academic Standards for Mathematics
- Item specifications (Content limits contained in the item specifications are intended for use by item developers. They should not be construed as instructional limits.)
- Vocabulary
- Depth of Knowledge (DOK) - see more detail below
- Calculator designation (CL = calculator allowed; NC = no calculator)
- Correct answer
- Table of rationales (explanations for why a student might choose each incorrect answer option, e.g., mixed up addition and subtraction, used incorrect place value, etc.)
- Notes on grade expectations for some items

Cognitive Complexity/Depth of Knowledge (DOK)

Cognitive complexity refers to the cognitive demand associated with an item. The level of cognitive demand focuses on the type and level of thinking and reasoning required of the student on a particular item. Levels of cognitive complexity for MCA-III are based on Norman L. Webb's Depth of Knowledge[1] levels.

Level 1 (recall) items require the recall of information such as a fact, definition, term or simple procedure, as well as performing a simple algorithm or applying a formula. A well-defined and straight algorithmic procedure is considered to be at this level. A Level 1 item specifies the operation or method of solution and the student is required to carry it out.

---

[1] Webb, N. L. *Alignment of science and mathematics standards and assessments in four states* (Research Monograph No. 18). Madison: University of Wisconsin – Madison, National Institute for Science Education, 1999.

Level 2 (skill/concept) items call for the engagement of some mental processing beyond a habitual response, with students required to make some decisions as to how to approach a problem or activity. Interpreting information from a simple graph and requiring reading information from the graph is a Level 2. An item that requires students to choose the operation or method of solution and then solve the problem is a Level 2. Level 2 items are often similar to examples used in textbooks.

Level 3 (strategic thinking) items require students to reason, plan or use evidence to solve the problem. In most instances, requiring students to explain their thinking is a Level 3. A Level 3 item may be solved using routine skills but the student is not cued or prompted as to which skills to use.

Level 4 (extended thinking) items require complex reasoning, planning, developing and thinking, most likely over an extended period of time. Level 4 items are best assessed in the classroom, where the constraints of standardized testing are not a factor.

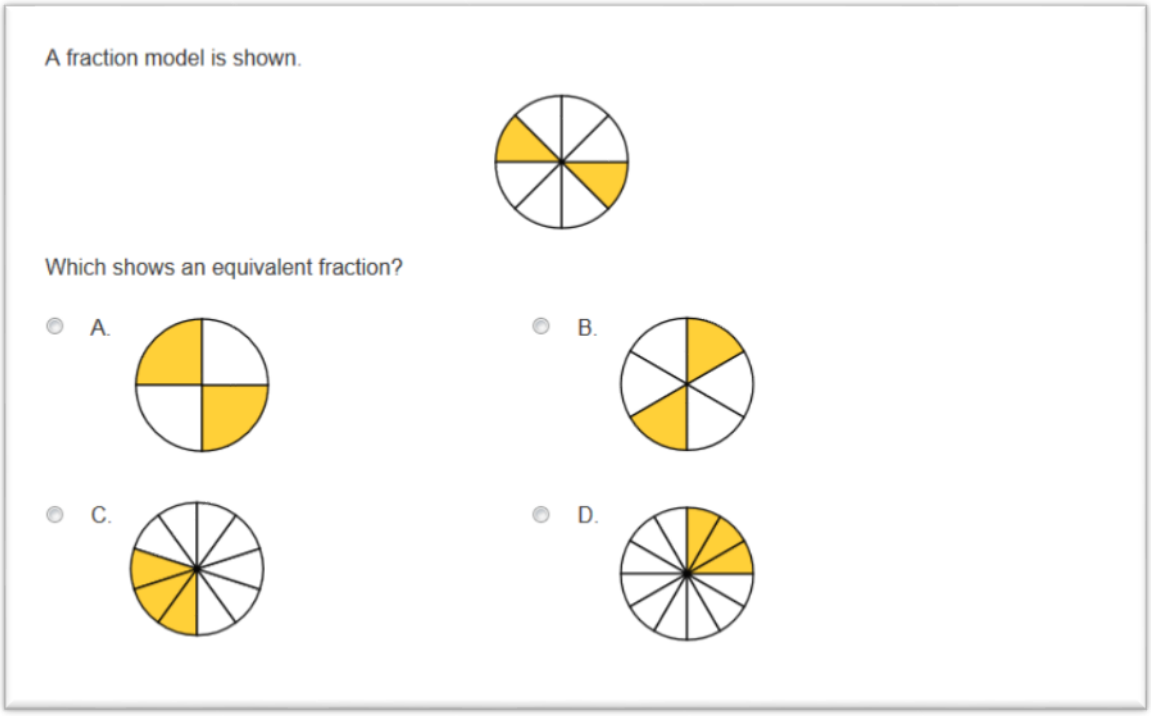
Technology Enhanced Items

There are several types of technology enhanced items. To respond to these questions, students may be required to type a number into a blank, select their answer choice(s), or select and drag. When typing an answer into a blank, the test engine allows students to type in numbers, the division bar (/), decimal points, and negative signs (in certain grades only). The test engine does not allow students to type in other characters, symbols, or letters of the alphabet.

Grade 4 Mathematics MCA Item Sampler
Answer Key

Item #	Correct Answer	Item Type	Benchmark	Calculator
1	D	MC	4.1.2.1	CL
2	A	MC	4.1.2.2	CL
3	C	MC	4.1.2.4	CL
4	N/A	TE	4.2.2.1	CL
5	B	MC	4.3.1.2	CL
6	A	MC	4.3.2.2	CL
7	B	MC	4.3.2.4	CL
8	B	MC	4.3.3.1	CL
9	N/A	TE	4.4.1.1	CL
10	D	MC	4.4.1.1	CL
11	B	MC	4.1.1.1	NC
12	C	MC	4.1.1.2	NC
13	N/A	TE	4.1.1.3	NC
14	D	MC	4.1.1.3	NC
15	C	MC	4.1.1.6	NC
16	N/A	TE	4.1.2.1	NC
17	C	MC	4.1.2.7	NC
18	D	MC	4.2.2.2	NC
19	N/A	TE	4.3.1.2	NC
20	B	MC	4.3.3.3	NC
21	N/A	TE	4.2.1.1	CL
22	C	MC	4.1.1.5	CL
23	C	MC	4.1.2.3	CL
24	D	MC	4.1.2.5	CL
25	C	MC	4.1.2.6	CL
26	B	MC	4.2.1.1	CL
27	C	MC	4.2.2.1	CL
28	A	MC	4.3.1.1	CL
29	B	MC	4.3.3.2	CL
30	C	MC	4.3.2.3	CL
31	B	MC	4.3.3.4	CL
32	N/A	TE	4.4.1.1	CL
33	N/A	TE	4.1.2.6	CL
34	N/A	TE	4.3.1.2	CL
35	N/A	TE	4.1.2.4	CL

Question Number 1



Benchmark: 4.1.2.1
Represent equivalent fractions using fraction models such as parts of a set, fraction circles, fraction strips, number lines and other manipulatives. Use the models to determine equivalent fractions.

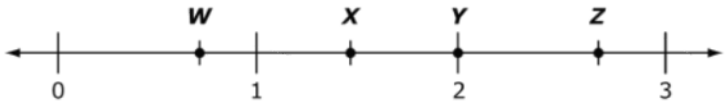
Item Specifications
- Denominators are limited to 2, 3, 4, 5, 6, 8, 10 and 12
- Vocabulary allowed in items: equivalent, represent, numerator, denominator and vocabulary given at previous grades

DOK: 2
Calculator: CL
Answer: D

A	Compared numerators only; $\frac{2}{8}$ is not equal to $\frac{2}{4}$.
B	Compared numerators only; $\frac{2}{8}$ is not equal to $\frac{2}{6}$.
C	Compared visually only; $\frac{2}{8}$ is not equal to $\frac{3}{10}$.
D	Correct. $\frac{2}{8} = \frac{1}{4}$.

Question Number 2

Which point is shown at $\frac{2}{3}$?



A. *W*

B. *X*

C. *Y*

D. *Z*

Benchmark: 4.1.2.2
Locate fractions on a number line. Use models to order and compare whole numbers and fractions, including mixed numbers and improper fractions.
For example: Locate $\frac{5}{3}$ and $\frac{13}{4}$ on a number line and give a comparison statement about these two fractions, such as "$\frac{5}{3}$ is less than $\frac{13}{4}$."

Item Specifications
- Denominators are limited to 2, 3, 4, 5, 6, 8, 10 and 12
- Vocabulary allowed in items: equivalent, numerator, denominator, improper fraction, mixed numbers, compare and vocabulary given at previous grades

DOK: 1
Calculator: CL
Answer: A

A	Correct. $\frac{2}{3}$ is located between 0 and 1.
B	Mixed up $\frac{2}{3}$ with $\frac{3}{2}$; located $\frac{3}{2}$ on number line.
C	Used numerator only; located 2 on number line.
D	Located $2\frac{2}{3}$; ignored 2.

Question Number 3

In the number 200.358, which digit is in the hundredths place?

- A. 2
- B. 3
- C. 5
- D. 8

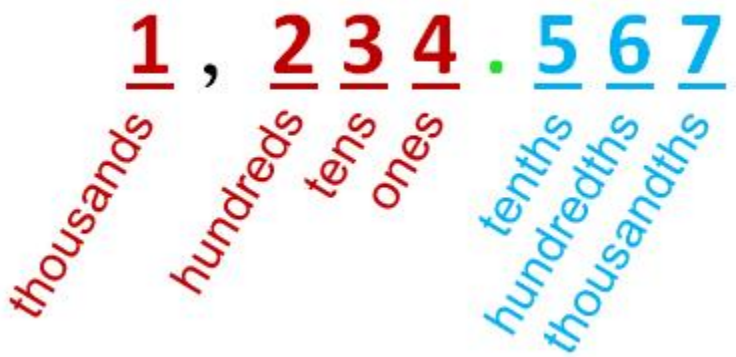
Benchmark: 4.1.2.4
Read and write decimals with words and symbols; use place value to describe decimals in terms of thousands, hundreds, tens, ones, tenths, hundredths and thousandths.
For example: Writing 362.45 is a shorter way of writing the sum:
3 hundreds + 6 tens + 2 ones + 4 tenths + 5 hundredths,
which can also be written as:
three hundred sixty-two and forty-five hundredths.

Item Specifications
- Vocabulary allowed in items: decimal and vocabulary given at previous grades

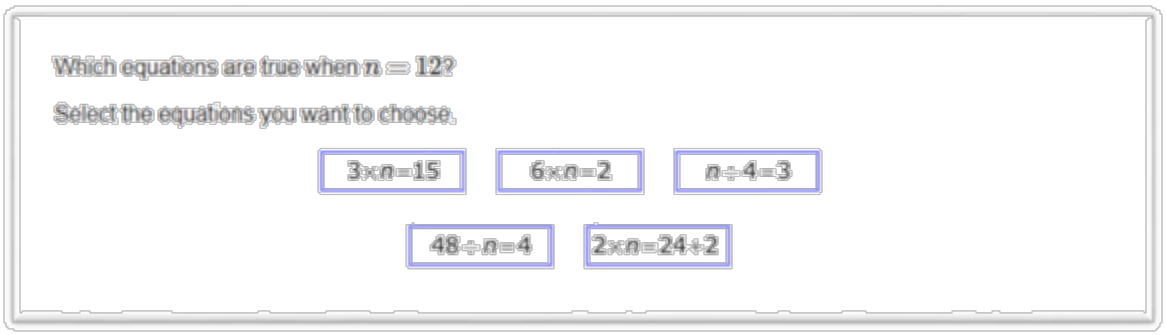
DOK: 1
Calculator: CL
Answer: C

A	Found digit in hundreds place instead of hundredths place.
B	Found digit in tenths place instead of hundredths place.
C	Correct. 5 is in the hundredths place.
D	Found digit in thousandths place instead of hundredths place.

Notes on grade expectations: Students should know the following place values.



Question Number 4

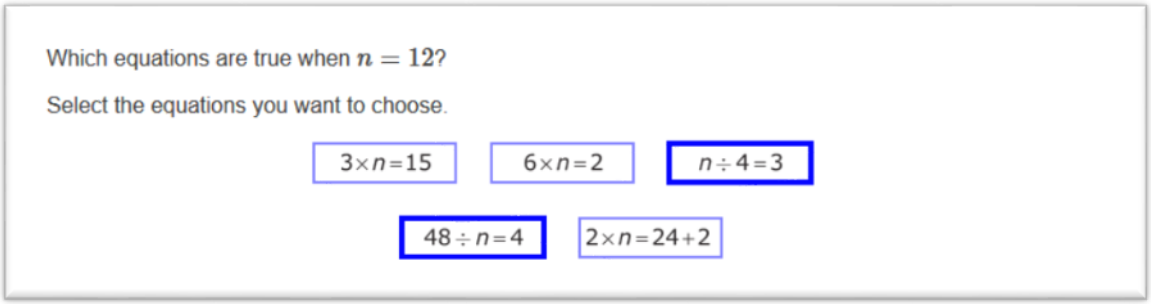


Benchmark: 4.2.2.1
Understand how to interpret number sentences involving multiplication, division and unknowns. Use real-world situations involving multiplication or division to represent number sentences.
For example: The number sentence $a \times b = 60$ can be represented by the situation in which chairs are being arranged in equal rows and the total number of chairs is 60.

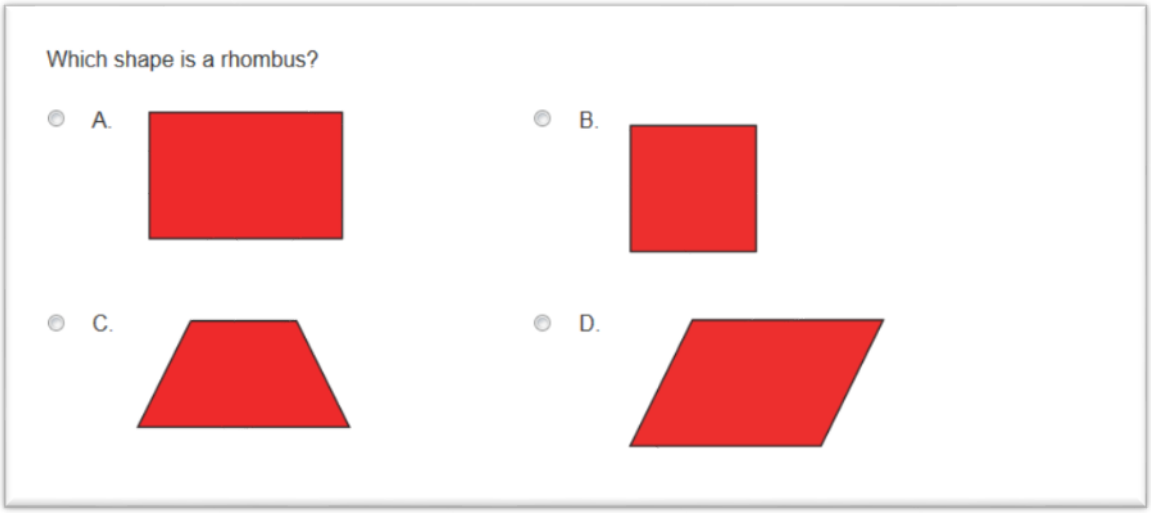
Item Specifications
- Numbers must be less than 100
- Variables, boxes or blanks may be used to represent unknown numbers
- Vocabulary allowed in items: variable and vocabulary given at previous grades

DOK: 2
Calculator: CL
Answer:

This is a technology-enhanced item. The correct answer is shown. A student must select all of the correct equations in order to receive 1 point.



Question Number 5



Benchmark: 4.3.1.2
Describe, classify and draw quadrilaterals, including squares, rectangles, trapezoids, rhombuses, parallelograms and kites. Recognize quadrilaterals in various contexts.

Item Specifications
- Naming of quadrilaterals is limited to quadrilateral, square, rectangle, trapezoid, rhombus, parallelogram and kite
- Allowable notation: 90°
- Vocabulary allowed in items: vertex, congruent, and vocabulary given at previous grades

DOK: 1
Calculator: CL
Answer: B

A	Selected a 4-sided figure (rectangle) with sides that are not of equal length.
B	Correct. The shape (square) has exactly 4 sides of equal length. (A square is a rhombus with 4 right angles.)
C	Selected a 4-sided figure (trapezoid) with sides that are not of equal length.
D	Selected a 4-sided figure (parallelogram) with sides that are not of equal length.

Notes on grade expectations: Grade 4 students move beyond recognizing shapes and applying a word name. They learn to classify polygons based on attributes of sides and angles.

Question Number 6

An angle is shown.

Which describes the angle?

A. Acute

B. Obtuse

C. Right

D. Straight

Benchmark: 4.3.2.2
Compare angles according to size. Classify angles as acute, right and obtuse.
For example: Compare different hockey sticks according to the angle between the blade and the shaft.

Item Specifications
- Allowable notation: 90°, angle arc
- Vocabulary allowed in items: vocabulary given at previous grades

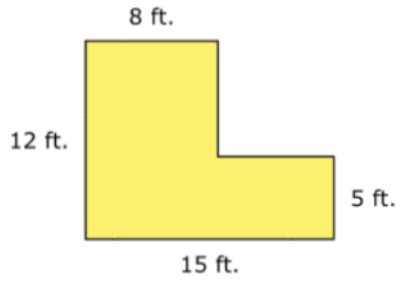
DOK: 1
Calculator: CL
Answer: A

A	Correct. The angle is less than 90 degrees.
B	Mixed up definition of acute and obtuse; angle is not greater than 90 degrees.
C	Mixed up definition of acute and right; angle is not equal to 90 degrees.
D	Although the rays are straight, this does not describe the angle they form.

Notes on grade expectations: Grade 4 students learn that the size of an angle is not based on the lengths of the rays that form the angle nor on the orientation of the opening.

Question Number 7

The shape of a floor is shown.



What is the area of the floor?

- A. 40 sq. ft.
- B. 131 sq. ft.
- C. 171 sq. ft.
- D. 180 sq. ft.

Benchmark: 4.3.2.4
Find the areas of geometric figures and real-world objects that can be divided into rectangular shapes. Use square units to label area measurements.

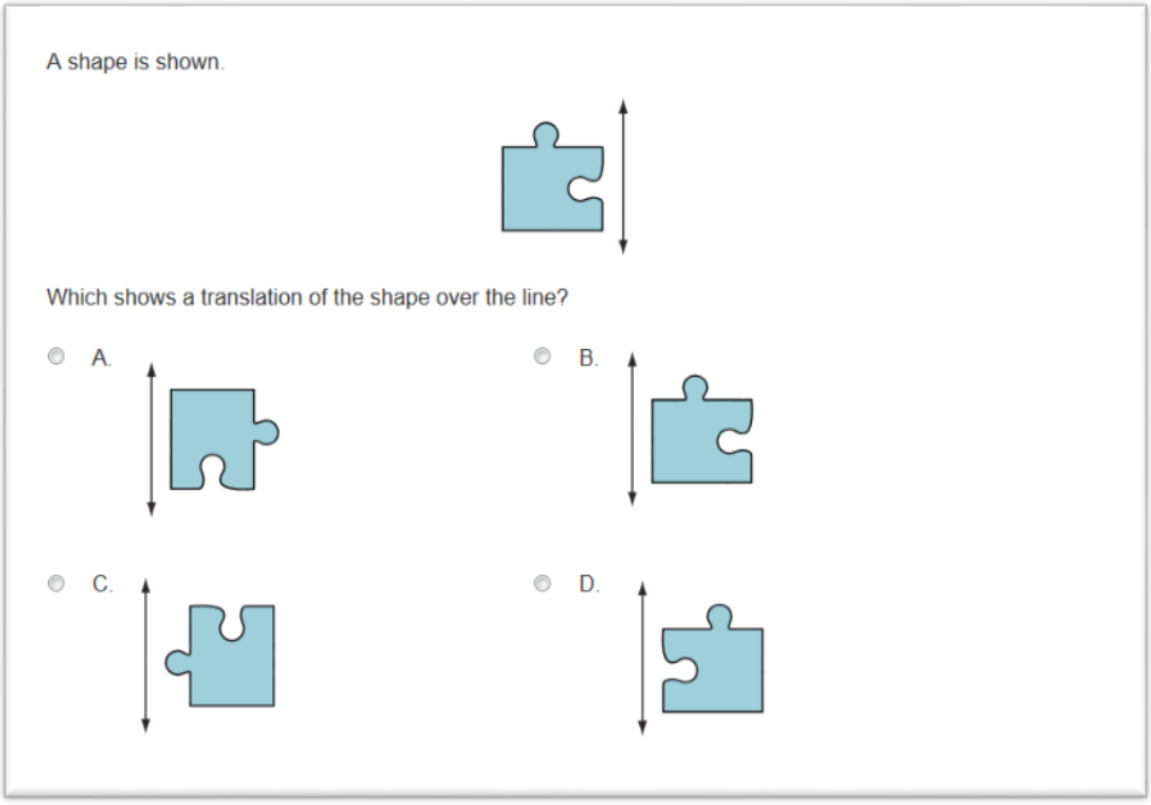
Item Specifications
- Vocabulary allowed in items: area, and vocabulary given at previous grades

DOK: 2
Calculator: CL
Answer: B

A	Multiplied 8×5 to get 40.
B	Correct. $15 \times 12 - (7 \times 7) = 131$ or $8 \times 12 + 7 \times 5 = 131$
C	Calculated $12 \times 8 + 15 \times 5$ to get 171. Length of second rectangle is 7, not 15.
D	Multiplied 15×12 to get total area of 180; did not subtract the missing 7 by 7 area.

Notes on grade expectations: Areas of geometric figures should be calculated by breaking the figure into rectangular shapes, then finding the areas of those rectangles and summing the results. Students could also find the area of the “large” rectangle and subtract the area of the unshaded rectangular part.

Question Number 8



Benchmark: 4.3.3.1
Apply translations (slides) to figures.

Item Specifications
- Vocabulary allowed in items: translation, reflection, rotation, symmetry, congruent, transformation, image, and vocabulary given at previous grades

DOK: 1
Calculator: CL
Answer: B

A	Mixed up rotation (turn) with translation (slide).
B	Correct. A translation is a slide.
C	Mixed up rotation (turn) with translation (slide).
D	Mixed up reflection (flip) with translation (slide).

Question Number 9

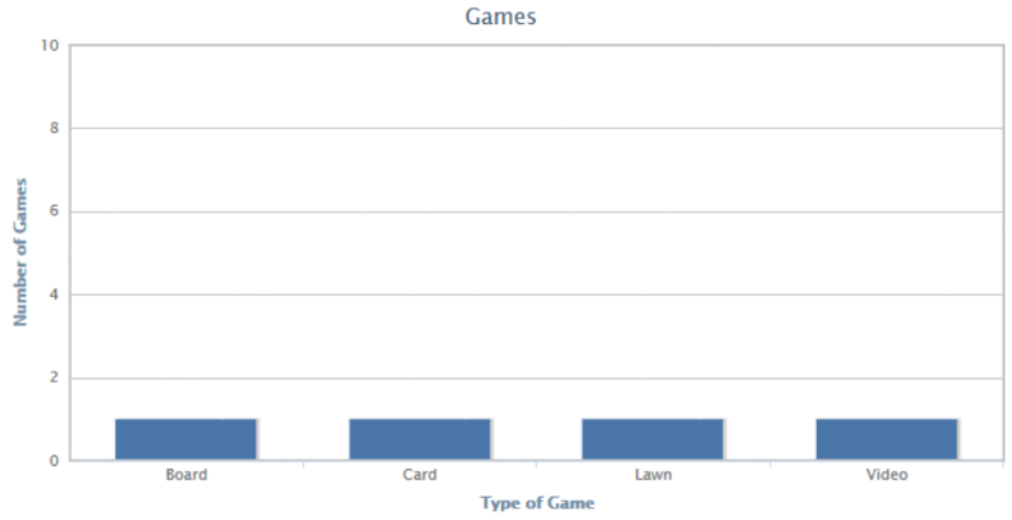
Rita counted the number of different types of games she has.

Games

Type of Game	Number of Games
Board	4
Card	6
Lawn	5
Video	3

Use the information in the table to complete the bar graph.

Drag the top of each bar to the correct height.



Benchmark: 4.4.1.1
Use tables, bar graphs, timelines and Venn diagrams to display data sets. The data may include fractions or decimals. Understand that spreadsheet tables and graphs can be used to display data.

Item Specifications
- Denominators are limited to 2, 3, 4, 5, 6, 8, 10 and 12
- Decimals are limited to hundredths
- When interpreting data, displays may include tables, bar graphs, timelines, Venn diagrams, line plots and pictographs
- Vocabulary allowed in items: timeline, Venn diagram, survey, and vocabulary given at previous grades

DOK: 2
Calculator: CL
Answer:

This is a technology-enhanced item. The correct answer is shown. A student must complete the bar graph correctly in order to receive 1 point.

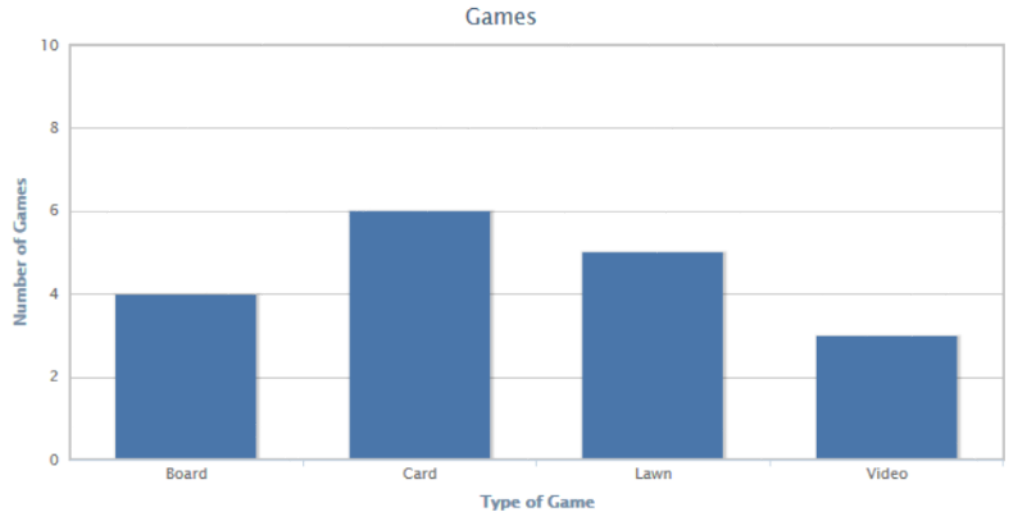
Rita counted the number of different types of games she has.

Games

Type of Game	Number of Games
Board	4
Card	6
Lawn	5
Video	3

Use the information in the table to complete the bar graph.

Drag the top of each bar to the correct height.

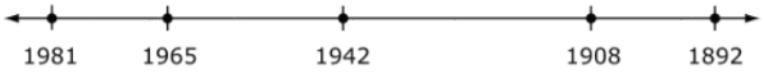


Notes on grade expectations: Students should complete the bar graph of the data by dragging the top of each bar to the correct height.

Question Number 10

A student creates a timeline for a history project. Which shows a timeline?

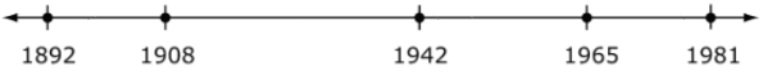
A.



B.

C.

D.



Benchmark: 4.4.1.1
Use tables, bar graphs, timelines and Venn diagrams to display data sets. The data may include fractions or decimals. Understand that spreadsheet tables and graphs can be used to display data.

Item Specifications
- Denominators are limited to 2, 3, 4, 5, 6, 8, 10 and 12
- Decimals are limited to hundredths
- When interpreting data, displays may include tables, bar graphs, timelines, Venn diagrams, line plots and pictographs
- Vocabulary allowed in items: timeline, Venn diagram, survey, and vocabulary given at previous grades

DOK: 2
Calculator: CL
Answer: D

A	Numbers are not ordered from least to greatest.
B	Spacing is uniform instead of being proportional to the times between the dates.
C	1892 is in the last position instead of the first position.
D	Correct. Numbers ordered from least to greatest and spacing proportional to time between dates.

Question Number 11

There are 35 students going on a class trip. The students ride in vans. There are 7 students riding in each van. How many vans are needed to take all the students?

- A. 4
- B. 5
- C. 6
- D. 7

Benchmark: 4.1.1.1
Demonstrate fluency with multiplication and division facts.

Item Specifications
- Factors are limited to 1–9
- Vocabulary allowed in items: quotient and vocabulary given at previous grades

DOK: 1
Calculator: NC
Answer: B

A	Did not use correct division fact.
B	Correct. $\frac{35}{7} = 5$
C	Did not use correct division fact.
D	Did not use correct division fact.

Question Number 12

A truck has 50 boxes of jump ropes. Each box contains 100 jump ropes. How many jump ropes are on the truck?

- A. 50
- B. 500
- C. 5,000
- D. 50,000

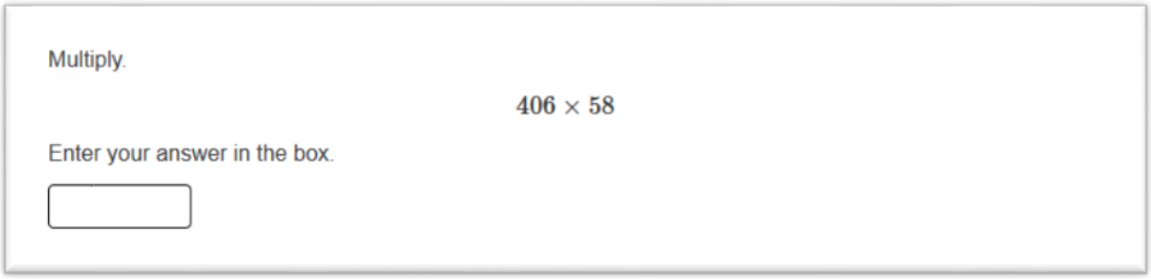
Benchmark: 4.1.1.2
Use an understanding of place value to multiply a number by 10, 100 and 1000.

Item Specifications
- Numbers multiplied by 10, 100 and 1000 may contain at most, 2 digits
- Numbers must be whole numbers
- Vocabulary allowed in items: vocabulary given at previous grades

DOK: 1
Calculator: NC
Answer: C

A	Answer should be a multiple of one thousand, not ten.
B	Answer should be a multiple of one thousand, not one hundred.
C	Correct. $50 \times 100 = 5{,}000$
D	Answer should be a multiple of one thousand, not ten thousand.

Question Number 13

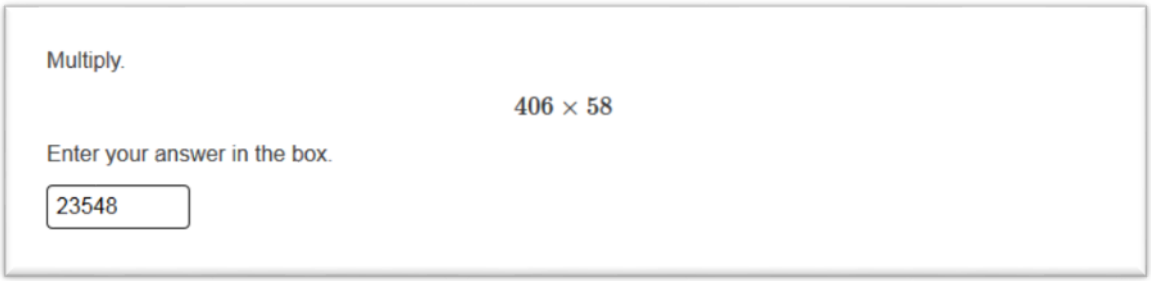


Benchmark: 4.1.1.3
Multiply multi-digit numbers, using efficient and generalizable procedures, based on knowledge of place value, including standard algorithms.

Item Specifications
- Items will contain multiplication of a one- or two-digit number by a two- or three-digit number
- Numbers must be whole numbers
- Items must not have context
- Vocabulary allowed in items: factor and vocabulary given at previous grades

DOK: 1
Calculator: NC
Answer:

This is a technology-enhanced item. The correct answer is shown. A student must type the correct answer in the box in order to receive 1 point.



Note: The allowable characters that can be entered in the answer box are digits 0-9, fraction bar (/) and decimal point (.). Students cannot enter a comma in numbers with more than 3 digits. Familiarity with calculators will help the students with this concept.

Question Number 14

Two numbers are multiplied together.

$$\begin{array}{r} 724 \\ \times\ 8\square \\ \hline 62{,}264 \end{array}$$

Which digit goes in the box?

A. 0

B. 1

C. 4

D. 6

Benchmark: 4.1.1.3
Multiply multi-digit numbers, using efficient and generalizable procedures, based on knowledge of place value, including standard algorithms.

Item Specifications
- Items will contain multiplication of a one- or two-digit number by a two- or three-digit number
- Numbers must be whole numbers
- Items must not have context
- Vocabulary allowed in items: factor and vocabulary given at previous grades

DOK: 2
Calculator: NC
Answer: D

A	Chose 0 because, in ones place, mixed up $4+1=4$ with $4\times0=4$.
B	Chose 1 because, in ones place, $4\times1=4$, but $724\times81=58{,}644$, not 62,264.
C	Chose 4 from ones place.
D	Correct. In ones place, $4\times6=24$ and $724\times86=62{,}264$.

Question Number 15

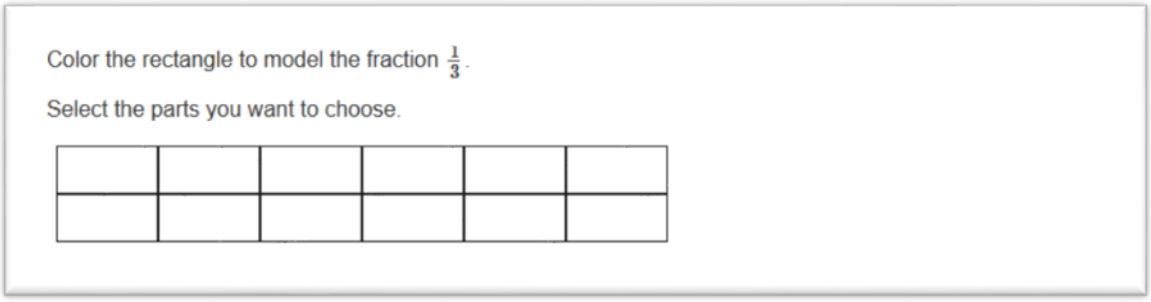
Benchmark: 4.1.1.6
Use strategies and algorithms based on knowledge of place value, equality and properties of operations to divide multi-digit whole numbers by one- or two-digit numbers. Strategies may include mental strategies, partial quotients, the commutative, associative, and distributive properties and repeated subtraction.
For example: A group of 324 students is going to a museum in 6 buses. If each bus has the same number of students, how many students will be on each bus?

Item Specifications
- Dividend may contain at most, 3 digits
- Vocabulary allowed in items: quotient, divisor, dividend and vocabulary given at previous grades

DOK: 1
Calculator: NC
Answer: C

A	While dividing, found hundreds digit, then incorrectly subtracted $9-8$ to get 0 instead of 1.
B	While dividing, found hundreds digit and subtracted $9-8=1$, then put 1 in the tens place of the quotient.
C	Correct.
D	While dividing, found hundreds digit and subtracted $9-8=1$, then pulled down 8 instead of 0 as the next digit.

Question Number 16

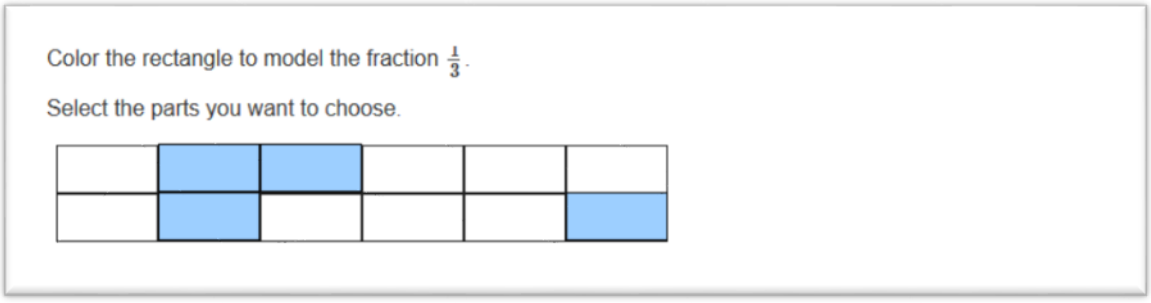


Benchmark: 4.1.2.1
Represent equivalent fractions using fraction models such as parts of a set, fraction circles, fraction strips, number lines and other manipulatives. Use the models to determine equivalent fractions.

Item Specifications
- Denominators are limited to 2, 3, 4, 5, 6, 8, 10 and 12
- Vocabulary allowed in items: equivalent, represent, numerator, denominator and vocabulary given at previous grades

DOK: 1
Calculator: NC
Answer:

This is a technology-enhanced item. A correct answer is shown. A student must shade any 4 of the 12 parts in order to receive 1 point.



Question Number 17

Benchmark: 4.1.2.7
Round decimals to the nearest tenth.
For example: The number 0.36 rounded to the nearest tenth is 0.4.

Item Specifications
- Numbers must be less than 500
- Decimals may be given up to thousandths
- Vocabulary allowed in items: decimal and vocabulary given at previous grades

DOK: 1
Calculator: NC
Answer: C

A	Truncated at the tenths place.
B	Rounded to the nearest hundredth instead of the nearest tenth.
C	Correct. Rounded 5 up to 6 because the next digit, 8, is 5 or greater.
D	Rounded to the nearest one.

Question Number 18

Robert has 54 pencils. He has 1 box of pencils and 3 packages of pencils. The box has 24 pencils. Which equation can be used to find *p*, the number of pencils in each package?

A. $p = 54 + 3 \times 24$

B. $24 = 54 + 3 \times p$

C. $54 = 3 + 24 \times p$

D. $54 = 24 + 3 \times p$

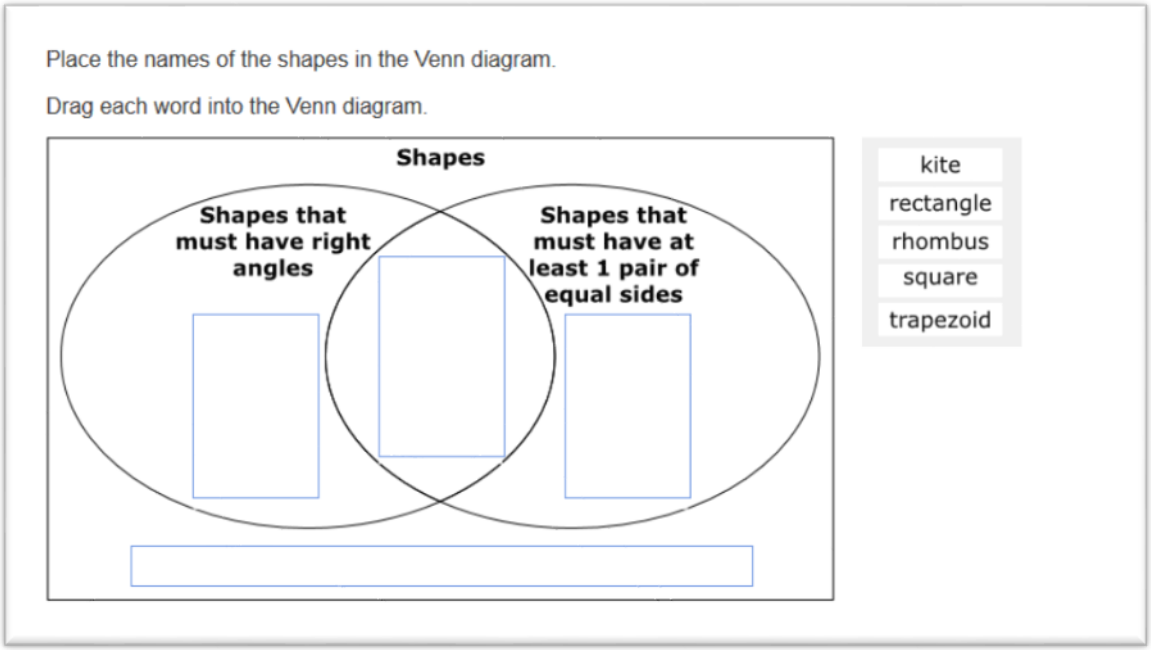
Benchmark: 4.2.2.2
Use multiplication, division and unknowns to represent a given problem situation using a number sentence. Use number sense, properties of multiplication, and the relationship between multiplication and division to find values for the unknowns that make the number sentences true.
For example: If $84 is to be shared equally among a group of children, the amount of money each child receives can be determined using the number sentence $84 \div n = d$.
Another example: Find values of the unknowns that make each number sentence true:
$12 \times m = 36$
$s = 256 \div t$.

Item Specifications
- Numbers must be less than 100
- Variables, boxes or blanks may be used to represent unknown numbers
- Vocabulary allowed in items: variable and vocabulary given at previous grades

DOK: 2
Calculator: NC
Answer: D

A	Used 54 pencils in each box and 24 in each package. Used *p* for total pencils instead of the number in each package.
B	Mixed up 24 and 54.
C	Mixed up 3 and 24.
D	Correct. Total pencils = amount in box + number of packages × amount in each package.

Question Number 19

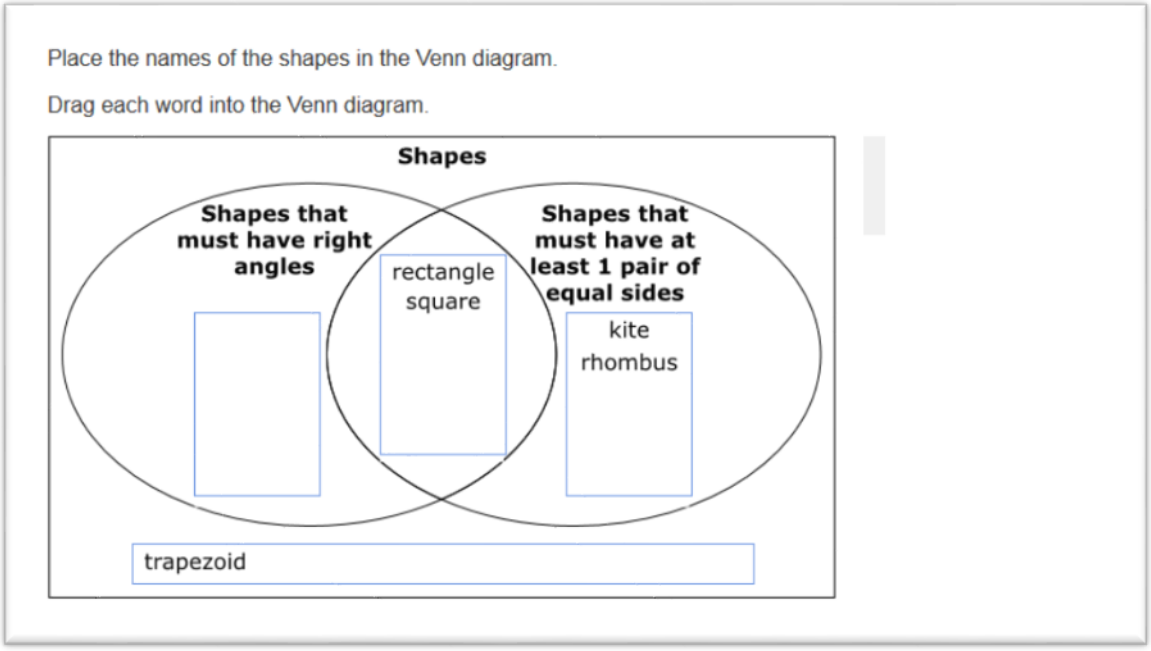


Benchmark: 4.3.1.2
Describe, classify and draw quadrilaterals, including squares, rectangles, trapezoids, rhombuses, parallelograms and kites. Recognize quadrilaterals in various contexts.

Item Specifications
- Naming of quadrilaterals is limited to quadrilateral, square, rectangle, trapezoid, rhombus, parallelogram and kite
- Allowable notation: 90°
- Vocabulary allowed in items: vertex, congruent, and vocabulary given at previous grades

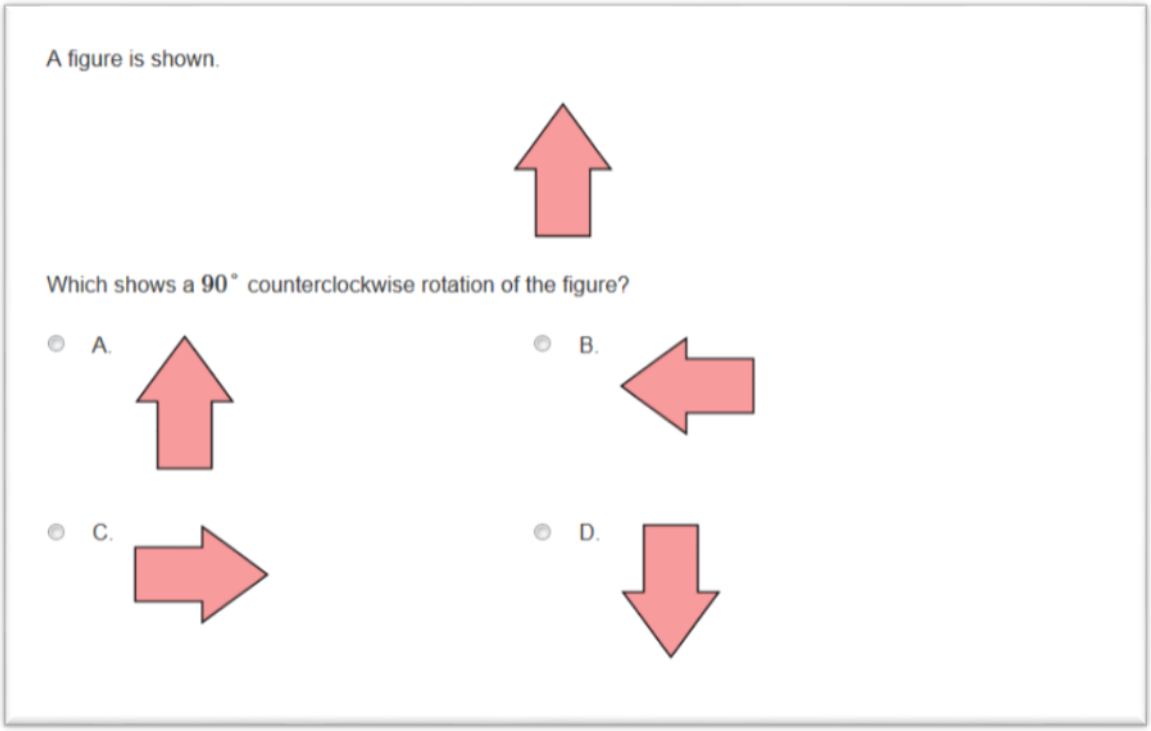
DOK: 2
Calculator: NC
Answer:

This is a technology-enhanced item. The correct answer is shown. A student must correctly place the words in the Venn diagram in order to receive 1 point.



Note: Students may be familiar with using Venn diagrams as organizers. This example helps them answer the question, "What if all of the information doesn't fit in the diagram? Where do we put the things that don't fit in the circles?"

Question Number 20



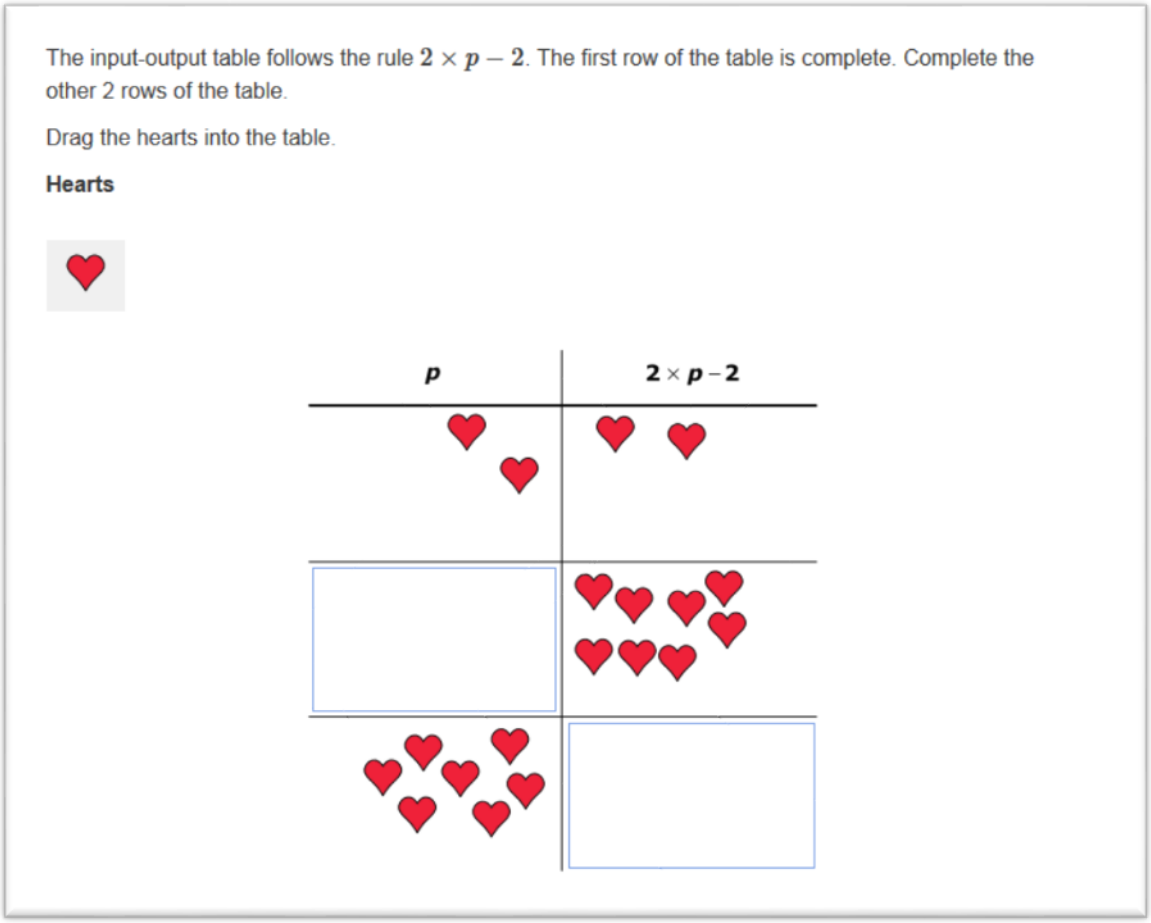
Benchmark: 4.3.3.3
Apply rotations (turns) of 90° clockwise or counterclockwise.

Item Specifications
- Vocabulary allowed in items: translation, reflection, rotation, symmetry, congruent, clockwise, counterclockwise, transformation, image, and vocabulary given at previous grades

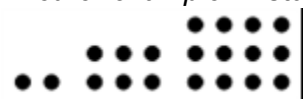
DOK: 2
Calculator: NC
Answer: B

A	Mixed up 90 degrees with 360 degrees.
B	Correct.
C	Mixed up counterclockwise with clockwise.
D	Mixed up 90 degrees with 180 degrees.

Question Number 21



Benchmark: 4.2.1.1
Create and use input-output rules involving addition, subtraction, multiplication and division to solve problems in various contexts. Record the inputs and outputs in a chart or table.
For example: If the rule is "multiply by 3 and add 4," record the outputs for given inputs in a table.
Another example: A student is given these three arrangements of dots:



Identify a pattern that is consistent with these figures, create an input-output rule that describes the pattern, and use the rule to find the number of dots in the 10th figure.

Item Specifications
- When creating a rule from pairs, 3 input-output pairs must be given; pairs are not required to be consecutive
- Output should not exceed 100
- Vocabulary allowed in items: vocabulary given at previous grades

DOK: 2

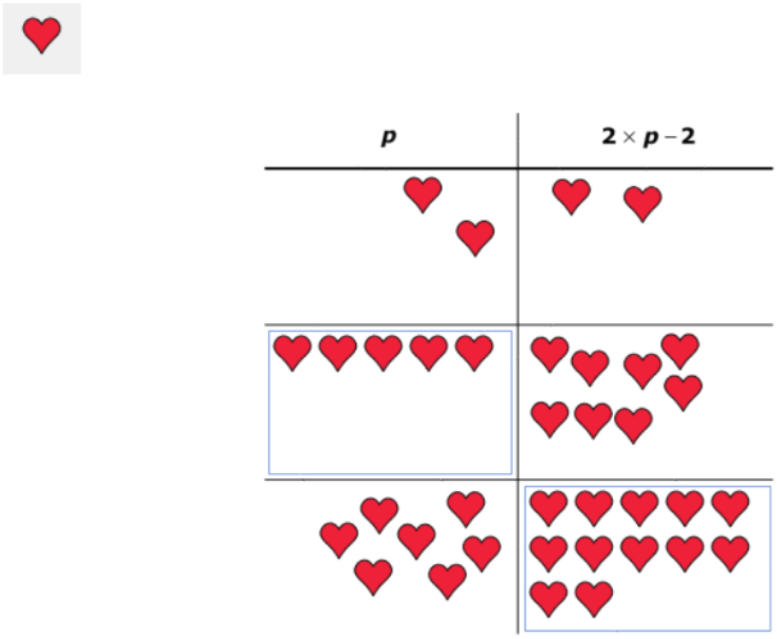
Calculator: CL
Answer:

This is a technology-enhanced item. The correct answer is shown. A student must correctly place the hearts in the table in order to receive 1 point.

The input-output table follows the rule $2 \times p - 2$. The first row of the table is complete. Complete the other 2 rows of the table.

Drag the hearts into the table.

Hearts



Question Number 22

A camping group bought 15 sleeping bags that cost $42 each and a tent that cost $160. What was the total cost of the sleeping bags and the tent?

- A. $217
- B. $630
- C. $790
- D. $2,442

Benchmark: 4.1.1.5
Solve multi-step real-world and mathematical problems requiring the use of addition, subtraction and multiplication of multi-digit whole numbers. Use various strategies, including the relationship between operations, the use of technology, and the context of the problem to assess the reasonableness of results.

Item Specifications
- Solutions must be less than 100,000
- Vocabulary allowed in items: operation, strategy, solve and vocabulary given at previous grades

DOK: 2
Calculator: CL
Answer: C

A	Mixed up multiplication with addition; $15 + 42 + 160 = 217$.
B	Did not include the cost of the tent; $15 \times 42 + 630$.
C	Correct. $15 \times 42 + 160 + 790$.
D	Mixed up 42 (price of sleeping bag) with 160 (price of tent); $15 \times 160 + 42 + 2{,}442$.

Question Number 23

Jason has 8 cupcakes.

He eats $\frac{1}{8}$ of the cupcakes and gives $\frac{2}{8}$ of the cupcakes to his friends. What fraction of the cupcakes are left?

A. $\frac{1}{8}$

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

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

D. $\frac{3}{5}$

Benchmark: 4.1.2.3
Use fraction models to add and subtract fractions with like denominators in real-world and mathematical situations. Develop a rule for addition and subtraction of fractions with like denominators.

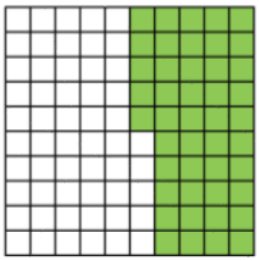
Item Specifications
- Denominators are limited to 2, 3, 4, 5, 6, 8, 10 and 12
- Vocabulary allowed in items: numerator, denominator and vocabulary given at previous grades

DOK: 2
Calculator: CL
Answer: C

A	Ignored context; $\frac{2}{8} - \frac{1}{8} = \frac{1}{8}$.
B	Found fraction of missing cupcakes instead of fraction remaining; $\frac{1}{8} + \frac{2}{8} = \frac{3}{8}$.
C	Correct. $\frac{8}{8} - \frac{1}{8} - \frac{2}{8} = \frac{5}{8}$
D	Used (number of missing cupcakes)/(number of remaining cupcakes); $\frac{3}{5}$.

Question Number 24

A decimal number is shown on a grid.



Which number is less than the number shown on the grid?

- A. 0.9
- B. 0.48
- C. 0.450
- D. 0.275

Benchmark: 4.1.2.5
Compare and order decimals and whole numbers using place value, a number line and models such as grids and base 10 blocks.

Item Specifications
- Numbers used are from thousands to thousandths
- Allowable symbols: < and >
- Vocabulary allowed in items: decimal and vocabulary given at previous grades

DOK: 2
Calculator: CL
Answer: D

A	0.9 is greater than 0.45, not less than.
B	0.48 is greater than 0.45, not less than.
C	0.45 is equal to 0.45, not less than.
D	Correct. 0.275 is less than 0.45.

Question Number 25

Which fraction is equivalent to 0.23?

A. $\frac{1}{23}$

B. $\frac{23}{10}$

C. $\frac{23}{100}$

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

Benchmark: 4.1.2.6
Read and write tenths and hundredths in decimal and fraction notations using words and symbols; know the fraction and decimal equivalents for halves and fourths.
For example: $\frac{1}{2} = 0.5 = 0.50$ and $\frac{7}{4} = 1\frac{3}{4} = 1.75$, which can also be written as one and three-fourths or one and seventy-five hundredths.

Item Specifications
- Vocabulary allowed in items: decimal, equivalent and vocabulary given at previous grades

DOK: 1
Calculator: CL
Answer: C

A	Used the 2 and 3 from 0.23 to make the fraction $\frac{1}{23}$.
B	Used 10 instead of 100 for denominator; $\frac{23}{10}$ = 2.3.
C	Correct. 0.23 is equal to $\frac{23}{100}$.
D	Used 2 and 3 from 0.23 to make the fraction $\frac{2}{3}$.

Question Number 26

A table is shown.

f	g
4	2
8	4
16	8

What rule was used to make the table?

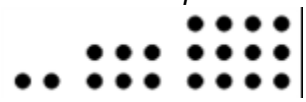
A. $g = 2 \times f$

B. $g = f \div 2$

C. $g = f + 2$

D. $g = 2 \times f + 2$

Benchmark: 4.2.1.1
Create and use input-output rules involving addition, subtraction, multiplication and division to solve problems in various contexts. Record the inputs and outputs in a chart or table.
For example: If the rule is "multiply by 3 and add 4," record the outputs for given inputs in a table.
Another example: A student is given these three arrangements of dots:



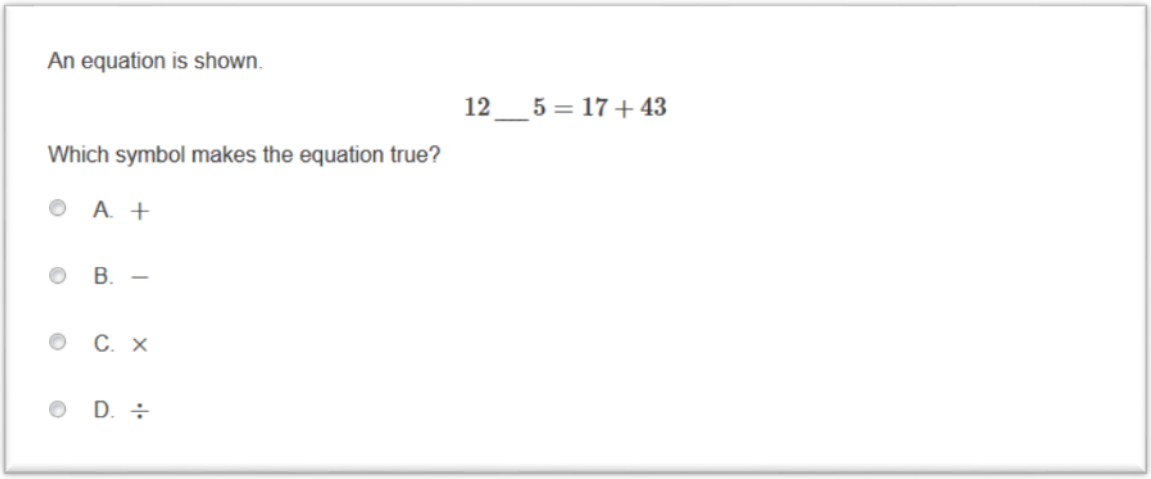
Identify a pattern that is consistent with these figures, create an input-output rule that describes the pattern, and use the rule to find the number of dots in the 10th figure.

Item Specifications
- When creating a rule from pairs, 3 input-output pairs must be given; pairs are not required to be consecutive
- Output should not exceed 100
- Vocabulary allowed in items: vocabulary given at previous grades

DOK: 2
Calculator: CL
Answer: B

A	Mixed up input and output columns or mixed up division with multiplication.
B	Correct.
C	Mixed up division with addition; used $g = f + 2$ instead of $g = f \div 2$.
D	Found incorrect rule.

Question Number 27



Benchmark: 4.2.2.1
Understand how to interpret number sentences involving multiplication, division and unknowns. Use real-world situations involving multiplication or division to represent number sentences.
For example: The number sentence $a \times b = 60$ can be represented by the situation in which chairs are being arranged in equal rows and the total number of chairs is 60.

Item Specifications
- Numbers must be less than 100
- Variables, boxes or blanks may be used to represent unknown numbers
- Vocabulary allowed in items: variable and vocabulary given at previous grades

DOK: 2
Calculator: CL
Answer: C

A	Ignored 43; $12 + 15 = 17$.
B	Chose incorrect symbol.
C	Correct.
D	Chose incorrect symbol.

Question Number 28

Which statement is true about an obtuse triangle?

A. It has 2 acute angles.

B. It has 2 obtuse angles.

C. It can be a right triangle.

D. It can be an acute triangle.

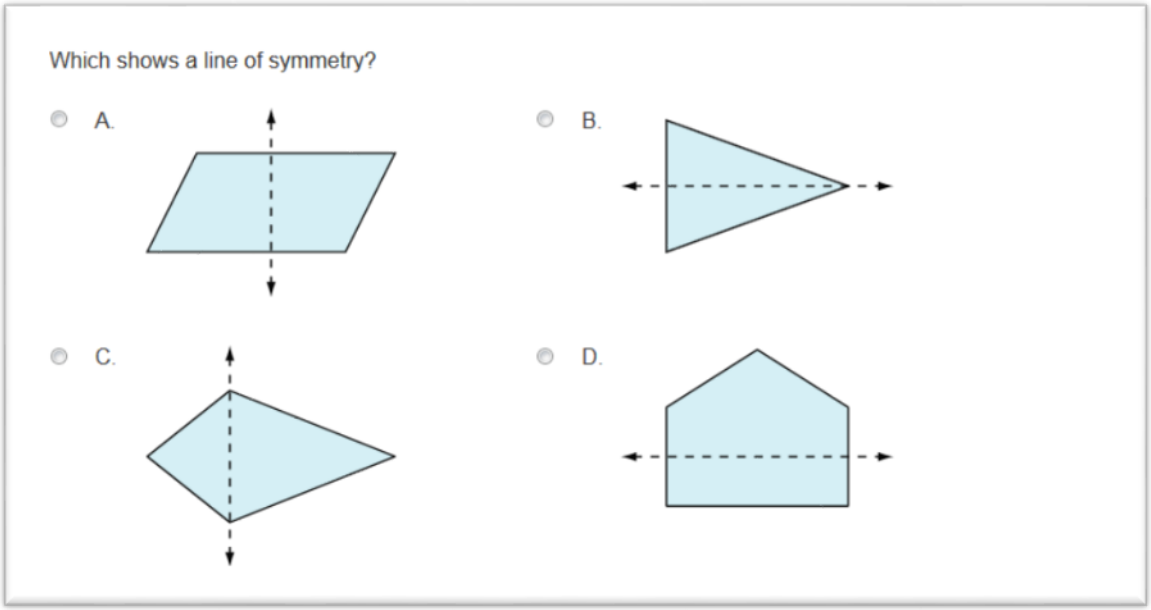
Benchmark: 4.3.1.1
Describe, classify and sketch triangles, including equilateral, right, obtuse and acute triangles. Recognize triangles in various contexts.

Item Specifications
- Naming of triangles is limited to equilateral, right, obtuse and acute
- Allowable notation: 90°
- Vocabulary allowed in items: vertex and vocabulary given at previous grades

DOK: 2
Calculator: CL
Answer: A

A	Correct. The sum of the interior angles of a triangle is 180, so if one angle is greater than 90, the sum of the other two angles must be less than 90.
B	An obtuse triangle has only one obtuse (greater than 90 degree) angle.
C	A right triangle has one 90 degree angle, so the other two angles must sum to exactly 90.
D	An acute triangle has all acute angles; it cannot include an obtuse angle.

Question Number 29



Benchmark: 4.3.3.2
Apply reflections (flips) to figures by reflecting over vertical or horizontal lines and relate reflections to lines of symmetry.

Item Specifications
- Vocabulary allowed in items: translation, reflection, rotation, symmetry, congruent, vertical, horizontal, transformation, image, and vocabulary given at previous grades

DOK: 2
Calculator: CL
Answer: B

A	This shape (parallelogram) is not reflection-symmetric.
B	Correct. When folded along the dotted line, the sides of the triangle match up with no overlap.
C	The line of symmetry for this shape (kite) is horizontal, not vertical.
D	The line of symmetry for this shape (pentagon) is vertical, not horizontal.

Question Number 30

Kira is using 1-inch square tiles to cover a table top. The table top is 24 inches long and 18 inches wide. She lays the tiles into strips of 6.

How many strips of tiles will Kira need to cover the table with no gaps or overlaps?

- A. 14
- B. 18
- C. 72
- D. 432

Benchmark: 4.3.2.3
Understand that the area of a two-dimensional figure can be found by counting the total number of same size square units that cover a shape without gaps or overlaps. Justify why length and width are multiplied to find the area of a rectangle by breaking the rectangle into one unit by one unit squares and viewing these as grouped into rows and columns.
For example: How many copies of a square sheet of paper are needed to cover the classroom door? Measure the length and width of the door to the nearest inch and compute the area of the door.

Item Specifications
- Vocabulary allowed in items: area, and vocabulary given at previous grades

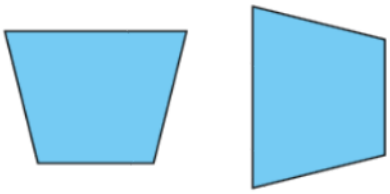
DOK: 3
Calculator: CL
Answer: C

A	Used perimeter of the table divided by 6; $(24+24+18+18)/6 = 84/6 = 14$
B	Used the width; 18.
C	Correct. $(24 \times 18)/6 = 72$
D	Found the number of tiles needed instead of the number of strips; $24 \times 18 = 432$.

Notes on grade expectations: Students may approach this item in one of several ways. They may choose to find the total area in square inches, then figure out how many strips will cover it; they may break one of the dimensions into 6-tile strips, and then calculate the number of strips needed to span the other dimension; or they may make a drawing, sketch in the strips, and count them. This item is DOK 3 because the student must revise thinking about the unit of measure, first seeing the individual squares as units and then seeing the 6-tile strip as a unit.

Question Number 31

Ron draws a trapezoid, then rotates it $90°$.



Which statement is true about the 2 trapezoids?

A. They are congruent because all trapezoids are congruent.

B. They are congruent because rotating a trapezoid does not change its size and shape.

C. They are not congruent because rotating the trapezoid changes its side lengths.

D. They are not congruent because rotating the trapezoid changes its angle measures.

Benchmark: 4.3.3.4
Recognize that translations, reflections and rotations preserve congruency and use them to show that two figures are congruent.

Item Specifications
- Vocabulary allowed in items: translation, reflection, rotation, symmetry, congruent, transformation, image, and vocabulary given at previous grades

DOK: 2
Calculator: CL
Answer: B

A	All trapezoids are not congruent.
B	Correct. Congruent shapes are congruent regardless of orientation.
C	Rotating a figure changes its orientation, not its size or shape.
D	Rotating a figure changes its orientation, not its size or shape.

Question Number 32

A pictograph shows the number of animals Jeff saw at a farm.

Farm Animals

Type of Animal	Number of Animals
Cow	
Goat	
Horse	
Pig	

= 4 animals

How many horses did Jeff see?

Enter your answer in the box.

Benchmark: 4.4.1.1
Use tables, bar graphs, timelines and Venn diagrams to display data sets. The data may include fractions or decimals. Understand that spreadsheet tables and graphs can be used to display data.

Item Specifications
- Denominators are limited to 2, 3, 4, 5, 6, 8, 10 and 12
- Decimals are limited to hundredths
- When interpreting data, displays may include tables, bar graphs, timelines, Venn diagrams, line plots and pictographs
- Vocabulary allowed in items: timeline, Venn diagram, survey, and vocabulary given at previous grades

DOK: 2
Calculator: CL
Answer:

This is a technology-enhanced item. The correct answer is shown. A student must type the correct answer in the box in order to receive 1 point.

A pictograph shows the number of animals Jeff saw at a farm.

Farm Animals

Type of Animal	Number of Animals
Cow	● ● ● ● ●
Goat	● ● ●
Horse	● ● ● ● ◗
Pig	● ● ● ● ● ● ● ◗

● = 4 animals

How many horses did Jeff see?

Enter your answer in the box.

18

Note: The allowable characters that can be entered in the answer box are digits 0-9, fraction bar (/) and decimal point (.). Students cannot enter a comma in numbers with more than 3 digits. Familiarity with calculators will help the students with this concept.

Question Number 33

Which numbers are equivalent to two and seven tenths?

Select the numbers you want to choose.

- ☐ 2.07
- ☐ 2.7
- ☐ $\frac{2}{7}$
- ☐ $\frac{27}{10}$
- ☐ $\frac{27}{100}$
- ☐ $2\frac{7}{10}$
- ☐ $2\frac{7}{100}$
- ☐ $2\frac{70}{100}$

Benchmark: 4.1.2.6
Read and write tenths and hundredths in decimal and fraction notations using words and symbols; know the fraction and decimal equivalents for halves and fourths.
For example: $\frac{1}{2} = 0.5 = 0.50$ and $\frac{7}{4} = 1\frac{3}{4} = 1.75$, which can also be written as one and three-fourths or one and seventy-five hundredths.

Item Specifications
- Vocabulary allowed in items: decimal, equivalent and vocabulary given at previous grades

DOK: 1
Calculator: CL
Answer:

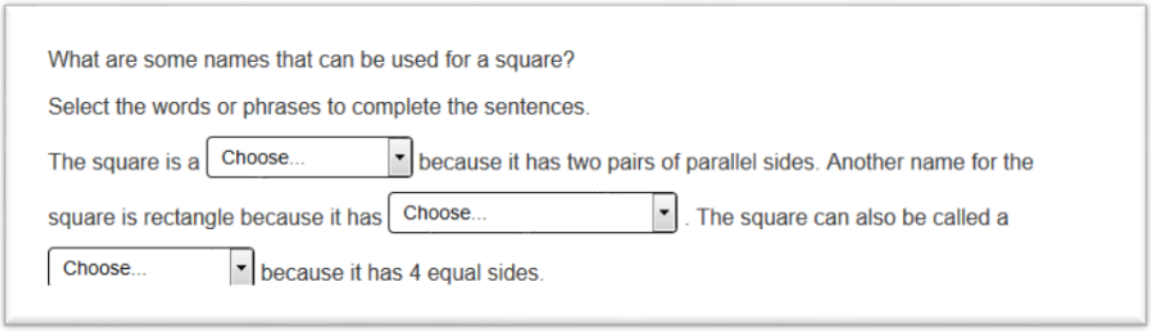
This is a technology-enhanced item. The correct answer is shown. A student must choose all 4 correct answers in order to receive 1 point.

Which numbers are equivalent to two and seven tenths?

Select the numbers you want to choose.

- [ ] 2.07
- [x] 2.7
- [ ] $\frac{2}{7}$
- [x] $\frac{27}{10}$
- [ ] $\frac{27}{100}$
- [x] $2\frac{7}{10}$
- [ ] $2\frac{7}{100}$
- [x] $2\frac{70}{100}$

Question Number 34

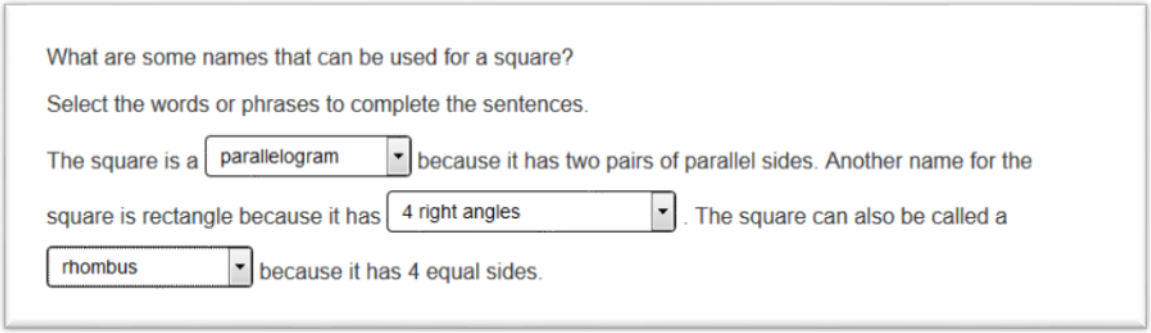


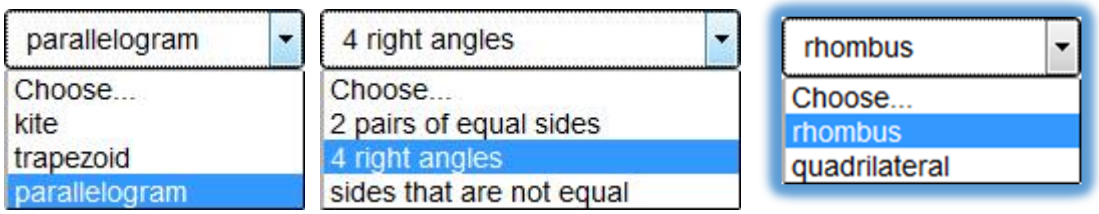
Benchmark: 4.3.1.2
Describe, classify and draw quadrilaterals, including squares, rectangles, trapezoids, rhombuses, parallelograms and kites. Recognize quadrilaterals in various contexts.

Item Specifications
- Naming of quadrilaterals is limited to quadrilateral, square, rectangle, trapezoid, rhombus, parallelogram and kite
- Allowable notation: 90°
- Vocabulary allowed in items: vertex, congruent, and vocabulary given at previous grades

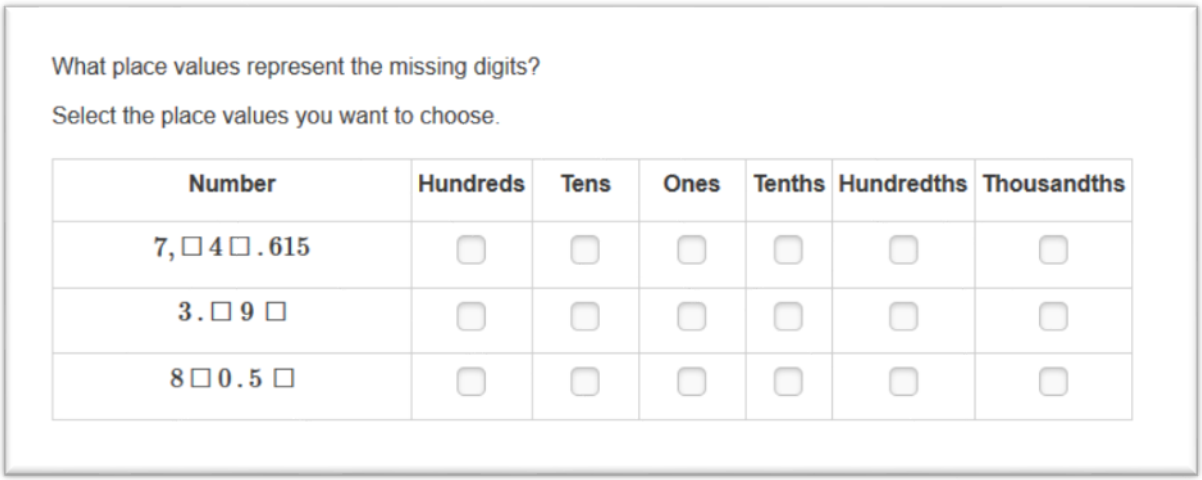
DOK: 2
Calculator: CL
Answer:

This is a technology-enhanced item. The correct answer is shown. The answer choices for each blank are shown below the answer. A student must choose all 3 correct answers in order to receive 1 point.





Question Number 35



Benchmark: 4.1.2.4
Read and write decimals with words and symbols; use place value to describe decimals in terms of thousands, hundreds, tens, ones, tenths, hundredths and thousandths.
For example: Writing 362.45 is a shorter way of writing the sum:
3 hundreds + 6 tens + 2 ones + 4 tenths + 5 hundredths,
which can also be written as:
three hundred sixty-two and forty-five hundredths.

Item Specifications
- Vocabulary allowed in items: decimal and vocabulary given at previous grades

DOK: 1
Calculator: CL
Answer:

This is a technology-enhanced item. A correct answer is shown. A student must select all of the correct boxes in order to receive 1 point.