

Grade 3  
Mathematics MCA-III  
Item Sampler Teacher Guide

## Grade 3 Mathematics MCA Item Sampler Parent/Teacher Guide



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<sup>1</sup> 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.

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<sup>1</sup> 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 3 Mathematics MCA Item Sampler  
Answer Key**

<b>Item #</b>	<b>Correct Answer</b>	<b>Item Type</b>	<b>Benchmark</b>	<b>Calculator</b>
1	B	MC	3.1.1.5	CL
2	C	MC	3.1.3.1	CL
3	B	MC	3.1.3.3	CL
4	D	MC	3.1.1.2	CL
5	B	MC	3.2.2.2	CL
6	N/A	TE	3.3.1.1	CL
7	A	MC	3.3.2.2	CL
8	D	MC	3.3.3.1	CL
9	C	MC	3.3.3.2	CL
10	N/A	TE	3.4.1.1	CL
11	N/A	TE	3.1.2.1	NC
12	N/A	TE	3.3.3.3	NC
13	C	MC	3.1.1.1	NC
14	C	MC	3.1.1.3	NC
15	D	MC	3.1.1.4	NC
16	N/A	TE	3.1.2.1	NC
17	B	MC	3.1.2.1	NC
18	D	MC	3.1.2.3	NC
19	C	MC	3.1.2.4	NC
20	C	MC	3.1.2.5	NC
21	B	MC	3.3.1.1	NC
22	N/A	TE	3.1.1.1	CL
23	C	MC	3.1.2.2	CL
24	A	MC	3.1.3.2	CL
25	C	MC	3.2.1.1	CL
26	B	MC	3.2.2.1	CL
27	D	MC	3.3.1.2	CL
28	N/A	TE	3.3.2.2	CL
29	D	MC	3.3.3.4	CL
30	A	MC	3.3.3.3	CL
31	C	MC	3.4.1.1	CL
32	N/A	TE	3.1.3.1	CL
33	N/A	TE	3.3.3.4	CL

### Question Number 1

Connie lists her scores from a video game.

14,087 13,345 14,613 14,301

Which list shows the scores listed from greatest to least?

- ☐ A. 14,613 13,345 14,301 14,087
- ☐ B. 14,613 14,301 14,087 13,345
- ☐ C. 14,087 14,613 14,301 13,345
- ☐ D. 13,345 14,087 14,301 14,613

### Benchmark: 3.1.1.5

Compare and order whole numbers up to 100,000.

#### Item Specifications

- $<$  *and*  $>$  symbols are not allowed
- Vocabulary allowed in items: least, greatest, compare, order, value

DOK: 1

Calculator: CL

Answer: B

A	Made comparisons based on hundreds place.
B	Correct.
C	Made comparisons based on tens place for the numbers in the 14,000s.
D	Ordered least to greatest instead of greatest to least.

## Question Number 2

Cory has 2 red crayons and 1 blue crayon.

What fraction of Cory's crayons is red?

- ☐ A.  $\frac{1}{3}$
- ☐ B.  $\frac{1}{2}$
- ☐ C.  $\frac{2}{3}$
- ☐ D.  $\frac{3}{2}$

### Benchmark: 3.1.3.1

Read and write fractions with words and symbols. Recognize that fractions can be used to represent parts of a whole, parts of a set, points on a number line or distances on a number line.

*For example:* Parts of a shape ( $\frac{3}{4}$  of a pie), parts of a set (3 out of 4 people), and measurements ( $\frac{3}{4}$  of an inch).

#### Item Specifications

- Denominators are limited to 2, 3, 4, 6 and 8
- Sets may contain no more than 12 objects
- Vocabulary allowed in items: fraction, plot, locate, point

DOK: 1

Calculator: CL

Answer: C

A	Found fraction of crayons that are blue.
B	Compared blue crayons to red crayons.
C	Correct. Compared number of red crayons to total number of crayons.
D	Inverted. Compared total number of crayons to number of red crayons.

### Question Number 3

Ellen has a vase of flowers.

- $\frac{1}{8}$  are red.
- $\frac{1}{3}$  are blue.
- $\frac{1}{6}$  are purple.
- $\frac{1}{4}$  are yellow.

Which is the greatest fraction?

- ☐ A.  $\frac{1}{8}$
- ☐ B.  $\frac{1}{3}$
- ☐ C.  $\frac{1}{6}$
- ☐ D.  $\frac{1}{4}$

#### Benchmark: 3.1.3.3

Order and compare unit fractions and fractions with like denominators by using models and an understanding of the concept of numerator and denominator.

#### Item Specifications

- Denominators are limited to 2, 3, 4, 6 and 8
- Sets may contain no more than 12 objects
- Vocabulary allowed in items: fraction, equal, least, greatest

DOK: 1

Calculator: CL

Answer: B

A	Chose fraction with greatest denominator.
B	Correct.
C	Chose fraction that is not greater than $\frac{1}{3}$ .
D	Chose fraction that is not greater than $\frac{1}{3}$ .

#### Question Number 4

Which number has a 5 in the ten thousands place?

- ☐ A. 104,352
- ☐ B. 365,971
- ☐ C. 582,607
- ☐ D. 951,480

#### Benchmark: 3.1.1.2

Use place value to describe whole numbers between 1000 and 100,000 in terms of ten thousands, thousands, hundreds, tens and ones.

*For example:* Writing 54,873 is a shorter way of writing the following sums:

5 ten thousands + 4 thousands + 8 hundreds + 7 tens + 3 ones

54 thousands + 8 hundreds + 7 tens + 3 ones.

#### Item Specifications

- Allowable expanded forms:  $300 + 60 + 5$ , 3 hundreds+6 tens+5 ones
- Items may ask to identify a place a digit is in or the value of the digit in a place
- Vocabulary allowed in items: digits, value, equal

DOK: 1

Calculator: CL

Answer: D

A	Chose number with 5 in the tens place instead of the ten thousands place.
B	Chose number with 5 in the thousands place instead of the ten thousands place.
C	Chose number with 5 in the hundred thousands place instead of the thousands place.
D	Correct. The number has a 5 in the ten thousands place.



### Question Number 5

An equation is shown.

$$3 \times 7 = \underline{\quad} + 7$$

What number makes the number sentence true?

- ☐ A. 3
- ☐ B. 14
- ☐ C. 21
- ☐ D. 28

#### Benchmark: 3.2.2.2

Use multiplication and division basic facts to represent a given problem situation using a number sentence. Use number sense and multiplication and division basic facts to find values for the unknowns that make the number sentences true.

*For example:* Find values of the unknowns that make each number sentence true

$$6 = p \div 9$$

$$24 = a \times b$$

$$5 \times 8 = 4 \times t.$$

*Another example:* How many math teams are competing if there is a total of 45 students with 5 students on each team? This situation can be represented by

$$5 \times n = 45 \text{ or } 45/5 = n \text{ or } 45/n = 5.$$

#### Item Specifications

- Variables, boxes or blanks may be used to represent unknown numbers
- Vocabulary allowed in items: number sentence, equation, value, represent

DOK: 2

Calculator: CL






Answer: B

A	Used the same numbers as on the left side of the equation.
B	Correct.
C	Calculated $3 \times 7$ . Ignored "+ 7" on the right side of the equation.
D	Found $3 \times 7 + 7$ . Ignored "= <u>    </u> ".

### Question Number 6

Which shapes have parallel sides?

Select the shapes you want to choose.



#### Benchmark: 3.3.1.1

Identify parallel and perpendicular lines in various contexts, and use them to describe and create geometric shapes, such as right triangles, rectangles, parallelograms and trapezoids.

#### Item Specifications

- When identifying shapes by the attribute of parallel or perpendicular lines, shapes are limited to triangle, parallelogram, rectangle, rhombus, square and trapezoid
- Allowable notation: right angle symbol (square in corner)
- Items will not require students to identify right triangles by name
- Vocabulary allowed in items: parallel, perpendicular, right, figure

DOK: 1






Calculator: CL

Answer:

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

Which shapes have parallel sides?

Select the shapes you want to choose.



Shape 1	Correct. The trapezoid has 1 set of parallel sides.
Shape 2	The right triangle has no parallel sides.
Shape 3	Correct. The hexagon has 3 sets of parallel sides.
Shape 4	Correct. The rectangle has 2 sets of parallel sides.
Shape 5	The pentagon has no parallel sides.

### Question Number 7

The perimeter of a rectangle is 16 inches.

Its length is 5 inches.

What is its width?

- ☐ A. 3 inches
- ☐ B. 6 inches
- ☐ C. 11 inches
- ☐ D. 21 inches

### Benchmark: 3.3.2.2

Find the perimeter of a polygon by adding the lengths of the sides.

#### Item Specifications

- Polygons may have 6 sides, at most
- Items may require finding the length of an unknown side given the lengths of the other sides and the perimeter
- Units are limited to inches, feet, yards, centimeters and meters
- Vocabulary allowed in items: perimeter, length, width, side, figure

DOK: 3

Calculator: CL

Answer: A

A	Correct. $16 - 2 \times 5 = 6$ ; $6/2 = 3$
B	Calculated 2 times the width. Did not divide result by 2.
C	Subtracted 5 from 16.
D	Added 5 and 16.

Notes on grade expectations: This item is DOK level 3 because the student must use the concept of decomposing perimeter and the attributes of a rectangle to solve the problem. The student has all of the background knowledge but must make decisions about how to approach solving the problem since scaffolding is not included.

### Question Number 8

Mai Ka starts reading a book at the time shown on the clock.



She stops reading 1 hour and 12 minutes later.

What time does Mai Ka stop reading?

- ☐ A. 4:08
- ☐ B. 4:44
- ☐ C. 5:04
- ☐ D. 5:08

#### Benchmark: 3.3.3.1

Tell time to the minute using digital and analog clocks. Determine elapsed time to the minute.

*For example:* Your trip began at 9:50 a.m. and ended at 3:10 p.m. How long were you traveling?

#### Item Specifications

- Elapsed time must be within a two-hour span
- Vocabulary allowed in items: a.m., p.m.

DOK: 2

Calculator: CL

Answer: D

A	Added 12 minutes, but did not add 1 hour.
B	Added 1 hour, but subtracted 12 minutes instead of adding.
C	Read 4 minutes to the right side of the 12 instead of the left; added 1 hour for passing 12.
D	Correct.

### Question Number 9

A movie is 2 hours and 28 minutes long.

How many minutes long is the movie?

- ☐ A. 88 minutes
- ☐ B. 120 minutes
- ☐ C. 148 minutes
- ☐ D. 228 minutes

#### Benchmark: 3.3.3.2

Know relationships among units of time.

*For example:* Know the number of minutes in an hour, days in a week and months in a year.

#### Item Specifications

- Allowable conversions: minutes to hours, hours to minutes, hours to days, days to hours, days to weeks, weeks to days, months to years, years to months
- Items may require finding a conversion with mixed units in the answer (e.g., **12 days = 1 week** and 5 days)
- Vocabulary allowed in items: unit

DOK: 2

Calculator: CL

Answer: C

A	Used 30 minutes for 1 hour.
B	Found 2 hours, but did not add 28 minutes.
C	Correct. <b><math>60 \times 2 + 28</math></b>
D	Used 100 minutes for 1 hour.

### Question Number 10

Kayla asked her classmates how many video games they have.

She put the information in a line plot.

Then 2 students joined the class.

- James has 3 video games.
- Theo has 5 video games.

Complete the line plot to show the information for James and Theo.

Select a location above the line plot where you want to place each x.



#### Benchmark: 3.4.1.1

Collect, display and interpret data using frequency tables, bar graphs, picture graphs and number line plots having a variety of scales. Use appropriate titles, labels and units.

#### Item Specifications

- Scale increments will not exceed 5
- Pictograph keys will not exceed 5
- Total number on graph or chart will not exceed 500
- Vocabulary allowed in items: pictograph, tally chart, bar graph, line plot, table, data, title, label, key, represent, scale

DOK: 2

Calculator: CL

Answer:

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

Kayla asked her classmates how many video games they have.

She put the information in a line plot.

Then 2 students joined the class.

- James has 3 video games.
- Theo has 5 video games.

Complete the line plot to show the information for James and Theo.

Select a location above the line plot where you want to place each x.



Notes on grade expectations: Student should add an x above "3" to record the number of video games James has. Add an x above "5" to record the number of video games Theo has.

### Question Number 11

Subtract.

$$\begin{array}{r} 2,584 \\ - 169 \\ \hline \end{array}$$

Drag a number into each box.

0	1	2	3	4
5	6	7	8	9

,

#### Benchmark: 3.1.2.1

Add and subtract multi-digit numbers using efficient and generalizable procedures based on knowledge of place value, including standard algorithms.

#### Item Specifications

- Addition items may contain 3 whole number addends, at most
- Numbers used may contain 4 digits each, at most
- Items must not have context
- Vocabulary allowed in items: add, subtract, sum, difference, result

DOK: 1

Calculator: NC

Answer:



This is a technology-enhanced item. The correct answer is shown. A student must drag the correct numbers into the boxes in order to receive 1 point.

Subtract.

$$\begin{array}{r} 2,584 \\ - 169 \\ \hline \end{array}$$

Drag a number into each box.

0	1	2	3	4
5	6	7	8	9

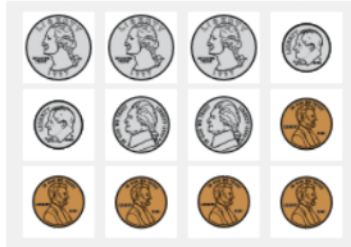
2 4 1 5

### Question Number 12

Stephanie needs exactly \$0.65 to buy a bag of corn chips.

Which coins can she use to buy the corn chips?

Drag the coins into the box.



#### Benchmark: 3.3.3.3

Make change up to 1 dollar in several different ways, including with as few coins as possible.

#### Item Specifications

- Allowable coins: penny, nickel, dime, quarter
- Allowable notation: ~~\$5~~, ~~\$0.75~~, ~~75c~~
- When calculating change, the amount tendered is ~~\$10~~, at most
- Vocabulary allowed in items: greatest, least, fewest, most, value

DOK: 1

Calculator: NC

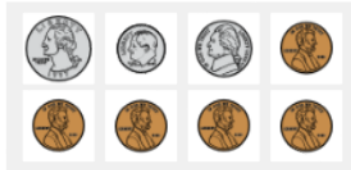
Answer:

This is a technology-enhanced item. Two correct answers are shown. A student must select a complete set of correct coins in order to receive 1 point.

Stephanie needs exactly \$0.65 to buy a bag of corn chips.

Which coins can she use to buy the corn chips?

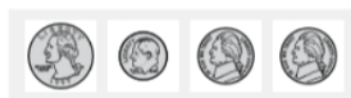
Drag the coins into the box.



Stephanie needs exactly \$0.65 to buy a bag of corn chips.

Which coins can she use to buy the corn chips?

Drag the coins into the box.



### Question Number 13

What is another way to show 4,608?

- ☐ A.  $46 + 8$
- ☐ B.  $4,000 + 60 + 8$
- ☐ C.  $4,000 + 600 + 8$
- ☐ D.  $4,000 + 600 + 80$

#### Benchmark: 3.1.1.1

Read, write and represent whole numbers up to 100,000. Representations may include numerals, expressions with operations, words, pictures, number lines, and manipulatives such as bundles of sticks and base 10 blocks.

#### Item Specifications

- Vocabulary allowed in items: digits, value, plot, locate, point

DOK: 1

Calculator: NC

Answer: C

A	Interpreted 0 as a space; added 46 and 8.
B	Used tens place instead of hundreds place for 6 to get 60 instead of 600.
C	Correct. $4608 = 4,000 + 600 + 8$
D	Used tens place instead of ones place for 8 to get 80 instead of 8.

### Question Number 14

There are 23,650 people in a stadium. The stadium can hold 1,000 more people. How many people can the stadium hold?

- ☐ A. 22,650
- ☐ B. 23,750
- ☐ C. 24,650
- ☐ D. 33,650

#### Benchmark: 3.1.1.3

Find 10,000 more or 10,000 less than a given five-digit number. Find 1000 more or 1000 less than a given four- or five-digit number. Find 100 more or 100 less than a given four- or five-digit number.

#### Item Specifications

- Vocabulary allowed in items: fewer, more, less, greater

DOK: 2

Calculator: NC

Answer: C

A	Subtracted 1,000 instead of adding 1,000.
B	Added 100 instead of 1,000.
C	Correct. $23,650 + 1,000 = 24,650$
D	Added 10,000 instead of 1,000.

### Question Number 15

What is 153,924 rounded to the nearest thousand?

- ☐ A. 150,000
- ☐ B. 153,000
- ☐ C. 153,900
- ☐ D. 154,000

#### Benchmark: 3.1.1.4

Round numbers to the nearest 10,000, 1000, 100 and 10. Round up and round down to estimate sums and differences.

*For example:* 8726 rounded to the nearest 1000 is 9000, rounded to the nearest 100 is 8700, and rounded to the nearest 10 is 8730.

*Another example:*  $473 - 291$  is between  $400 - 300$  and  $500 - 200$ , or between 100 and 300.

#### Item Specifications

- Vocabulary allowed in items: estimate, round, nearest, closest

DOK: 1

Calculator: NC

Answer: D

A	Rounded to the nearest ten-thousand instead of the nearest thousand.
B	Rounded down to the thousands.
C	Rounded to the nearest hundred instead of the nearest thousand.
D	Correct. Rounded 3,000 up to 4,000 because the numeral in the hundreds place is 5 or greater.

### Question Number 16

Subtract.

$$4,500 - 612$$

Enter your answer in the box.

#### Benchmark: 3.1.2.1

Add and subtract multi-digit numbers using efficient and generalizable procedures based on knowledge of place value, including standard algorithms.

#### Item Specifications

- Addition items may contain 3 whole number addends, at most
- Numbers used may contain 4 digits each, at most
- Items must not have context
- Vocabulary allowed in items: add, subtract, sum, difference, result

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.

Subtract.

$$4,500 - 612$$

Enter your answer in the box.

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 17

Subtract.

$$6,905 - 37$$

- ☐ A. 3,205
- ☐ B. 6,868
- ☐ C. 6,932
- ☐ D. 6,968

#### Benchmark: 3.1.2.1

Add and subtract multi-digit numbers using efficient and generalizable procedures based on knowledge of place value, including standard algorithms.

#### Item Specifications

- Addition items may contain 3 whole number addends, at most
- Numbers used may contain 4 digits each, at most
- Items must not have context
- Vocabulary allowed in items: add, subtract, sum, difference, result

DOK: 1

Calculator: NC


Answer: B


A	Incorrectly aligned the numbers before subtracting; subtracted 3,700 from 6,905.
B	Correct.
C	Subtracted lesser from greater numeral. Ones: $7 - 5 = 2$ ; tens: $3 - 0 = 3$ .
D	Did not regroup 9 in 6,905.

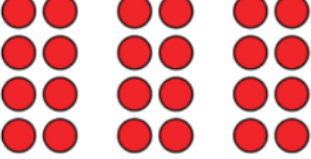



### Question Number 18

Which model shows  $6 \times 3$ ?

☐ A. 

☐ B. 

☐ C. 

☐ D. 

#### Benchmark: 3.1.2.3

Represent multiplication facts using a variety of approaches, such as repeated addition, equal-sized groups, arrays, area models, equal jumps on a number line and skip counting. Represent division facts by using a variety of approaches, such as repeated subtraction, equal sharing and forming equal groups. Recognize the relationship between multiplication and division.

#### Item Specifications

- Factors are limited to 1–12
- Variables are not used
- Vocabulary allowed in items: multiply, divide

DOK: 1

Calculator: NC

Answer: D

A	Modeled $6 + 3$ instead of $6 \times 3$ .
B	Found correct number of rows and columns, but did not complete array.
C	Modeled $(2 \times 4)3$ instead of $(2 + 4)3$ .
D	Correct. 6 columns by 3 rows = $6 \times 3$

### Question Number 19

Malik has 64 marbles.

He puts an equal number of marbles into each of 4 jars.

How many marbles are in each jar?

- ☐ A. 14
- ☐ B. 15
- ☐ C. 16
- ☐ D. 18

#### Benchmark: 3.1.2.4

Solve real-world and mathematical problems involving multiplication and division, including both "how many in each group" and "how many groups" division problems.

*For example:* You have 27 people and 9 tables. If each table seats the same number of people, how many people will you put at each table?

*Another example:* If you have 27 people and tables that will hold 9 people, how many tables will you need?

#### Item Specifications

- Factors are limited to 1–20; 1 factor must have only 1 digit
- Dividend is no greater than 100
- Vocabulary allowed in items: multiply, divide, product

DOK: 2

Calculator: NC

Answer: C

A	Used $(60 + 4)/4$ , but instead of adding $15 + 1$ , subtracted $15 - 1$ to get 14.
B	Used $(60 + 4)/4$ , but calculated $60/4 = 15$ and did not complete division of the ones.
C	Correct. $64/4 = 16$
D	Used $24/4 = 8$ instead of $24/4 = 6$ for ones value in the division problem. $64/4$

## Question Number 20

Multiply.

$$507 \times 6$$

- ☐ A. 342
- ☐ B. 3,002
- ☐ C. 3,042
- ☐ D. 3,102

### Benchmark: 3.1.2.5

Use strategies and algorithms based on knowledge of place value, equality and properties of addition and multiplication to multiply a two- or three-digit number by a one-digit number. Strategies may include mental strategies, partial products, the standard algorithm and the commutative, associative and distributive properties.

For example:  $9 \times 26 = 9 \times (20 + 6) = 9 \times 20 + 9 \times 6 = 180 + 54 = 234$ .

#### Item Specifications

- Items must not have context
- The one-digit factor must be 2–6
- Vocabulary allowed in items: multiply, product

DOK: 1

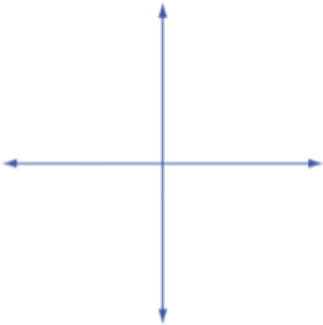
Calculator: NC

Answer: C

A	Ignored the 0; interpreted 507 as 57, then multiplied by 6 to get 342.
B	Multiplied values in ones place to get $6 \times 7 = 42$ , but did not regroup tens in 507.
C	Correct. $507 \times 6 = 3,042$
D	Made regrouping error after multiplying values in ones place.

### Question Number 21

Two lines are shown.



Which describes the relationship between the lines?

- ☐ A. Parallel
- ☐ B. Perpendicular
- ☐ C. Square
- ☐ D. Straight

#### Benchmark: 3.3.1.1

Identify parallel and perpendicular lines in various contexts, and use them to describe and create geometric shapes, such as right triangles, rectangles, parallelograms and trapezoids.

#### Item Specifications

- When identifying shapes by the attribute of parallel or perpendicular lines, shapes are limited to triangle, parallelogram, rectangle, rhombus, square and trapezoid
- Allowable notation: right angle symbol (square in corner)
- Items will not require students to identify right triangles by name
- Vocabulary allowed in items: parallel, perpendicular, right, figure

DOK: 1

Calculator: NC

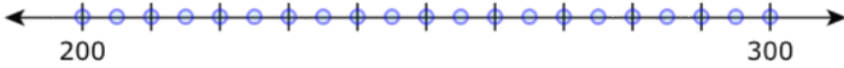
Answer: B

A	Mixed up the definitions of perpendicular and parallel.
B	Correct. Perpendicular lines cross at right angles.
C	Used some of the criteria for squares including equal lengths, right angle.
D	Used criteria for straight, but did not describe the relationship between the lines.

## Question Number 22

Plot the number 205 on the number line.

Select a location on the number line to plot the point.



### Benchmark: 3.1.1.1

Read, write and represent whole numbers up to 100,000. Representations may include numerals, expressions with operations, words, pictures, number lines, and manipulatives such as bundles of sticks and base 10 blocks.

#### Item Specifications

- Vocabulary allowed in items: digits, value, plot, locate, point

DOK: 2

Calculator: CL

Answer:

This is a technology-enhanced item. The correct answer is shown. A student must correctly plot the point on the number line in order to receive 1 point.

Plot the number 205 on the number line.

Select a location on the number line to plot the point.



### Question Number 23

Jeff had 1,350 glass beads and 695 clay beads.

He sold 138 glass beads and 47 clay beads.

How many beads did Jeff have left?

- ☐ A. 470
- ☐ B. 746
- ☐ C. 1,860
- ☐ D. 2,230

#### Benchmark: 3.1.2.2

Use addition and subtraction to solve real-world and mathematical problems involving whole numbers. Use various strategies, including the relationship between addition and subtraction, the use of technology and the context of the problem, to assess the reasonableness of results.

*For example:* The calculation  $117 - 83 = 34$  can be checked by adding 83 and 34.

#### Item Specifications

- Addition items may contain 3 whole number addends, at most
- Numbers used may contain 4 digits each, at most
- Addition and subtraction can be used in the same item
- Vocabulary allowed in items: add, subtract, sum, difference, result

DOK: 2

Calculator: CL

Answer: C

A	Subtracted 695 instead of adding it. $1,350 - 695 - 138 - 47 = 470$
B	Subtracted 695 instead of adding and added 138 instead of subtracting. $1,350 - 695 + 138 - 47 = 746$
C	Correct. $1,350 + 695 - 138 - 47 = 1,860$
D	Added all numbers instead of subtracting 138 and 47. $1,350 + 695 + 138 + 47 = 2,230$ .

### Question Number 24

Gavin has 4 green apples and 4 red apples.

Tara has 4 green apples and 8 red apples.

Who has a greater fraction of green apples?

- ☐ A. Gavin, because  $\frac{4}{8}$  is greater than  $\frac{4}{12}$
- ☐ B. Tara, because  $\frac{4}{12}$  is greater than  $\frac{4}{8}$
- ☐ C. Tara, because 12 is greater than 8
- ☐ D. They both have the same fraction of green apples.

#### Benchmark: 3.1.3.2

Understand that the size of a fractional part is relative to the size of the whole.

*For example:* One-half of a small pizza is smaller than one-half of a large pizza, but both represent one-half.

#### Item Specifications

- Denominators are limited to 2, 3, 4, 6 and 8
- Sets may contain no more than 12 objects
- Vocabulary allowed in items: fraction

DOK: 2

Calculator: CL

Answer: A

A	Correct. $\frac{4}{8}$ is greater than $\frac{4}{12}$ .
B	Incorrectly compared the fractions; $\frac{4}{12}$ is less than $\frac{4}{8}$ because $\frac{1}{3} < \frac{1}{2}$ .
C	Compared the denominators instead of the fractions; $12 > 8$ .
D	Confused the numerator with the value of the fraction; each person has the same number of green apples, but $\frac{1}{2}$ of Gavin's apples are green vs. only $\frac{1}{3}$ of Tara's.

### Question Number 25

A table is shown.

Input	Output
2	12
4	24
8	48

What is the output number when the input number is 12?

- ☐ A. 2
- ☐ B. 60
- ☐ C. 72
- ☐ D. 96

#### Benchmark: 3.2.1.1

Create, describe and apply single-operation input-output rules involving addition, subtraction and multiplication to solve problems in various contexts.

*For example:* Describe the relationship between number of chairs and number of legs by the rule that the number of legs is four times the number of chairs.

#### Item Specifications

- At least 3 iterations of the pattern must be given
- Items may require identification of 3 or fewer terms beyond what is given
- Vocabulary allowed in items: rule, input, output, value

DOK: 2

Calculator: CL

Answer: C

A	Read table backwards; found input of 2 when output is 12 instead of finding output given input.
B	Added 12 to last output number of 48 to get 60.
C	Correct. $12 \times 6 = 72$
D	Followed pattern in output column; saw that $12 \times 2 = 24$ and $24 \times 2 = 48$ , so found $48 \times 2 = 96$ .



## Question Number 26

Which story problem can be solved using the number sentence  $2 \times n = 18$ ?

- ☐ A. Tom had 18 pencils. He gave  $n$  pencils away and had 2 left over. How many pencils did Tom give away?
- ☐ B. Alice bought  $n$  books and spent \$18. Each book cost \$2. How many books did Alice buy?
- ☐ C. Maya had  $n$  rocks and 2 baskets. She put 18 rocks in each basket. How many rocks did Maya have?
- ☐ D. Pedro saw 2 kinds of birds. He saw 18 robins and  $n$  crows. How many crows did Pedro see?

### Benchmark: 3.2.2.1

Understand how to interpret number sentences involving multiplication and division basic facts and unknowns. Create real-world situations to represent number sentences.

*For example:* The number sentence  $8 \times m = 24$  could be represented by the question "How much did each ticket to a play cost if 8 tickets totaled \$24?"

#### Item Specifications

- Variables, boxes or blanks may be used to represent unknown numbers
- Vocabulary allowed in items: number sentence, equation, value, represent

DOK: 1

Calculator: CL

Answer: B

A	Mixed up addition and multiplication. $2 + n = 18$ is not the same as $2 \times n = 18$ .
B	Correct. $2 \times n = 18$
C	Mixed up multiplication and division; $n/2 = 18$ is not the same as $2 \times n = 18$ .
D	Misused 2 from the story problem; the number of crows is $n$ .

### Question Number 27

Which shape has the fewest angles?

- ☐ A. Hexagon
- ☐ B. Octagon
- ☐ C. Pentagon
- ☐ D. Trapezoid

#### Benchmark: 3.3.1.2

Sketch polygons with a given number of sides or vertices (corners), such as pentagons, hexagons and octagons.

#### Item Specifications

- Allowable shapes: triangle, parallelogram, rectangle, rhombus, square, trapezoid, pentagon, hexagon, octagon
- Vocabulary allowed in items: sides, angles, vertices, figure

DOK: 1

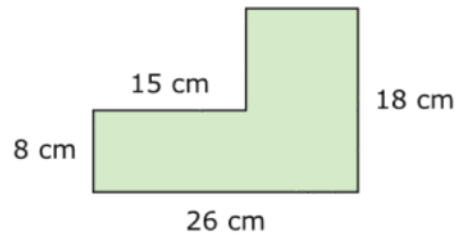
Calculator: CL

Answer: D

A	Did not know a trapezoid has only 4 angles; a hexagon has 6 angles.
B	Did not know a trapezoid has only 4 angles; an octagon has 8 angles.
C	Did not know a trapezoid has only 4 angles; a pentagon has 5 angles.
D	Correct. A trapezoid has 4 angles.

### Question Number 28

What is the perimeter of the shape?



Enter your answer in the box.

### Benchmark: 3.3.2.2

Find the perimeter of a polygon by adding the lengths of the sides.

#### Item Specifications

- Polygons may have 6 sides, at most
- Items may require finding the length of an unknown side given the lengths of the other sides and the perimeter
- Units are limited to inches, feet, yards, centimeters and meters
- Vocabulary allowed in items: perimeter, length, width, side, figure

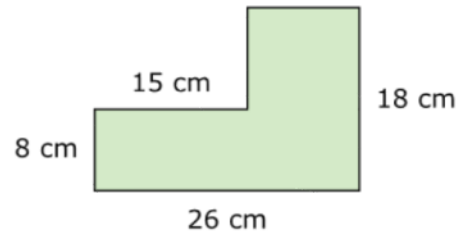
DOK: 2

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.

What is the perimeter of the shape?



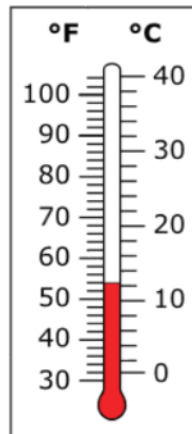
Enter your answer in the box.

Notes on grade expectations: Student should add the lengths of all the sides to find the perimeter of the polygon. Since some side lengths are not labeled, these must be calculated first. The missing top length is found by subtracting  $26 - 15 = 11$ . The missing side length is found by subtracting  $18 - 8 = 10$ . Add all the side lengths to find the perimeter:  $8 + 15 + 10 + 11 + 18 + 26 = 88$ . Common errors involve not including the unlabeled side lengths or incorrectly calculating the unlabeled side lengths.

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 29

A thermometer is shown.



What temperature is shown on the thermometer?

- ☐ A. 11°C
- ☐ B. 12°F
- ☐ C. 54°C
- ☐ D. 54°F

#### Benchmark: 3.3.3.4

Use an analog thermometer to determine temperature to the nearest degree in Fahrenheit and Celsius.

*For example:* Read the temperature in a room with a thermometer that has both Fahrenheit and Celsius scales. Use the thermometer to compare Celsius and Fahrenheit readings.

#### Item Specifications

- Allowable notation: **15°F, 37°C**
- Temperatures must be given in whole numbers
- Vocabulary allowed in items: thermometer, temperature, degrees, increase, decrease

DOK: 1

Calculator: CL

Answer: D

A	Counted tic marks by ones, not twos; right side shows 12 degrees Celsius.
B	Read units from left side and numbers from right side. Thermometer shows 12 degrees Celsius, not Fahrenheit.
C	Read units from right side and numbers from left side. Thermometer shows 54 degrees Fahrenheit, not Celsius.
D	Correct. Left side reads 54 degrees Fahrenheit.

### Question Number 30

Gina buys a snack for 59¢.

She pays with a \$1 bill.

She receives the fewest possible coins in change.

What change does Gina receive?

- ☐ A. 1 quarter, 1 dime, 1 nickel and 1 penny
- ☐ B. 2 quarters and 1 penny
- ☐ C. 2 quarters, 1 nickel and 4 pennies
- ☐ D. 4 dimes and 1 penny

### Benchmark: 3.3.3.3

Make change up to 1 dollar in several different ways, including with as few coins as possible.

*For example:* A chocolate bar costs \$1.84. You pay for it with \$2. Give two possible ways to make change.

#### Item Specifications

- Allowable coins: penny, nickel, dime, quarter
- Allowable notation: \$5, \$0.75, 75¢
- When calculating change, the amount tendered is \$10, at most
- Vocabulary allowed in items: greatest, least, fewest, most, value

DOK: 2

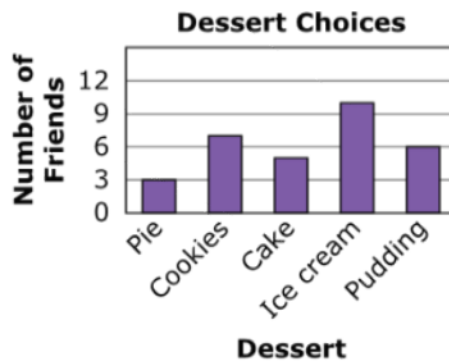
Calculator: CL

Answer: A

A	Correct. $1.00 - 0.59 = 0.41$ ; composed of 1 quarter, 1 dime, 1 nickel and 1 penny.
B	Subtracted incorrectly and made 51 cents in change instead of 41 cents.
C	Made combination totaling 59 cents instead of change from a dollar, or 41 cents.
D	Chose a combination that equals 41 cents, but contains 5 coins; 5 is not the fewest possible number of coins.

### Question Number 31

Leon asked his friends to choose a favorite dessert.



How many more friends chose ice cream than pie?

- ☐ A. 2
- ☐ B. 5
- ☐ C. 7
- ☐ D. 10

#### Benchmark: 3.4.1.1

Collect, display and interpret data using frequency tables, bar graphs, picture graphs and number line plots having a variety of scales. Use appropriate titles, labels and units.

#### Item Specifications

- Scale increments will not exceed 5
- Pictograph keys will not exceed 5
- Total number on graph or chart will not exceed 500
- Vocabulary allowed in items: pictograph, tally chart, bar graph, line plot, table, data, title, label, key, represent, scale

DOK: 2

Calculator: CL

Answer: C

A	Found how many more students chose cake than pie. $5 - 3 = 2$
B	Found how many more students chose ice cream than cake. $10 - 5 = 5$ Or used scale increments of 2 instead of 3.
C	Correct. $10 - 3 = 7$
D	Found the number of students who chose ice cream. 10

### Question Number 32

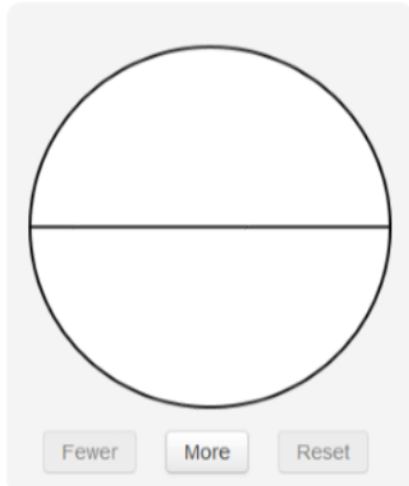
Ling has 8 balloons.

There are 3 green balloons, and the rest are purple.

Make a fraction model to show the fraction of the balloons that are purple.

Divide the figure into equal parts by using the More and Fewer buttons.

Then select the parts you want to shade.



#### Benchmark: 3.1.3.1

Read and write fractions with words and symbols. Recognize that fractions can be used to represent parts of a whole, parts of a set, points on a number line or distances on a number line.

*For example:* Parts of a shape ( $\frac{3}{4}$  of a pie), parts of a set (3 out of 4 people), and measurements ( $\frac{3}{4}$  of an inch).

#### Item Specifications

- Denominators are limited to 2, 3, 4, 6 and 8
- Sets may contain no more than 12 objects
- Vocabulary allowed in items: fraction, plot, locate, point

DOK: 2

Calculator: CL

Answer:

This is a technology-enhanced item. The correct answer is shown. A student must correctly show the fraction  $\frac{5}{8}$  on the fraction model in order to receive 1 point.



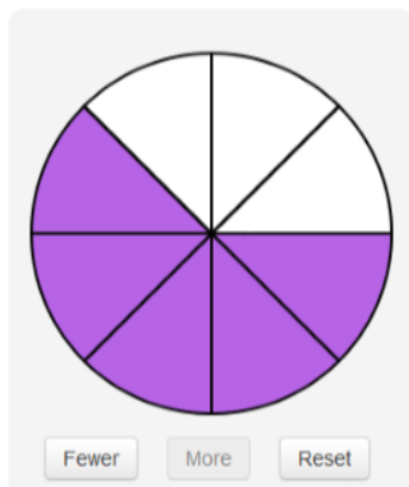
Ling has 8 balloons.

There are 3 green balloons, and the rest are purple.

Make a fraction model to show the fraction of the balloons that are purple.

Divide the figure into equal parts by using the More and Fewer buttons.

Then select the parts you want to shade.



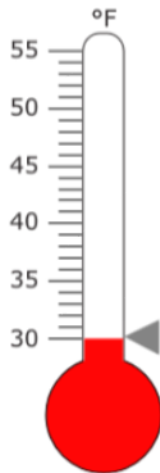
### Question Number 33

The temperature on a thermometer was  $54^{\circ}\text{F}$ .

Then the temperature decreased  $14^{\circ}\text{F}$ .

What is the new temperature on the thermometer?

Drag the top of the bar to the correct height.



#### Benchmark: 3.3.3.4

Use an analog thermometer to determine temperature to the nearest degree in Fahrenheit and Celsius.

*For example:* Read the temperature in a room with a thermometer that has both Fahrenheit and Celsius scales. Use the thermometer to compare Celsius and Fahrenheit readings.

#### Item Specifications

- Allowable notation:  $15^{\circ}\text{F}$ ,  $37^{\circ}\text{C}$
- Temperatures must be given in whole numbers
- Vocabulary allowed in items: thermometer, temperature, degrees, increase, decrease

DOK: 2

Calculator: CL

Answer:

This is a technology-enhanced item. The correct answer is shown. A student must correctly show  $40^{\circ}\text{F}$  on the thermometer in order to receive 1 point.

The temperature on a thermometer was  $54^{\circ}\text{F}$ .

Then the temperature decreased  $14^{\circ}\text{F}$ .

What is the new temperature on the thermometer?

Drag the top of the bar to the correct height.

