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Student Practice Book

Sample Booklet

Grade 4
Mathematics



Lori Mammen
Editorial Director

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- assessment of process skills within context (mathematics, science, and social studies)

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Reading, Grade 3	Math, Grade 3
Reading, Grade 4	Math, Grade 4
Reading, Grade 5	Math, Grade 5

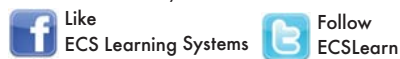
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Selected pages from
STAAR MASTER™

**Student Practice Book
Mathematics, Grade 4**

for the State of Texas Assessments
of Academic Readiness

Teacher Guide



Lori Mammen
Editorial Director

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What’s Inside the Student Practice Book?

The *STAAR MASTER™ Student Practice Book* provides practice and review material for the Grade 4 Mathematics portion of the State of Texas Assessments of Academic Readiness (STAAR™).

- The practice items reflect the kinds of problems students might encounter on the actual STAAR assessment.
- The practice items cover a broad range of topics and ideas of interest to fourth-grade students.
- The practice items focus on the 2009–2010 STAAR-eligible Mathematics Texas Essential Knowledge and Skills (Texas Education Agency, 2010b) standards.
- Each exercise is labeled for easy identification of the TEKS-based reporting category, standard, and expectation addressed in the practice items.
- Several exercises address the same standard/expectation, providing repeated practice for students in a variety of contexts.
- Selected problems are “griddable items” (see Figure 2), which reflects the format used randomly throughout the actual STAAR assessment.

Items in the *STAAR MASTER Student Practice Book* address the following mathematical concepts:

- Numbers, operations, and quantitative reasoning
- Patterns, relationships, and algebraic reasoning
- Geometry and spatial reasoning
- Measurement
- Probability and statistics
- Underlying processes and mathematical tools (not a separate reporting category)

Exercise Skills Tags

Each exercise is labeled with a “skills tag” (see Figure 1, below) for easy identification of the TEKS-based reporting category, standard, and expectation addressed in the problems.

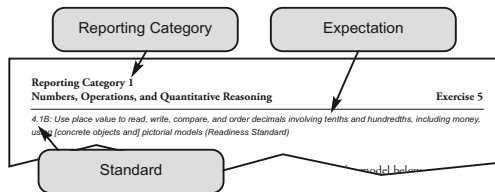


Figure 1: Exercise Skills Tag

Griddable Items

In addition to multiple-choice items, STAAR Mathematics assessments will also use open-ended questions known as “griddable items” (Texas Education Agency, 2010d). This type of assessment question allows students to reach the answer without the influence of given answer choices. The fourth-grade STAAR Mathematics assessment will likely include three griddable items. The answer grid will have four columns, with one column designated for a fixed decimal point (see Figure 2, below). Correct answers are positive numbers that range from 0 to 999. To indicate their answer, students must appropriately enter the number in the boxes and then fill in the corresponding bubbles. Students will not grid the units (e.g., ft). It is acceptable to grid extra zeroes that do not affect the value of the correct answer.

(4.14)
5. A city worker used 981 gallons of water to fill a fountain in the park. It took 9 hours to fill the fountain. If the worker filled the fountain at a steady rate, how many gallons of water went into the fountain each hour?

Record your answer in the boxes. Then fill in the bubbles. Be sure to use the correct place value.

			.
⊙	⊙	⊙	⊙
⊙	⊙	⊙	⊙
⊙	⊙	⊙	⊙
⊙	⊙	⊙	⊙
⊙	⊙	⊙	⊙
⊙	⊙	⊙	⊙
⊙	⊙	⊙	⊙

Figure 2: Griddable Item for Fourth-Grade Mathematics

This Teacher Guide includes—

- an overview of the Student Practice Book and key characteristics of the STAAR program
- descriptions of *STAAR MASTER* complexity levels
- strategies for test preparation and mathematics instruction
- a master list of STAAR-eligible standards and expectations addressed in the Mathematics TEKS
- a complete answer key (with corresponding complexity levels for the practice items)

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Readiness vs. Supporting Standards

The eligible, or tested, TEKS are divided into “readiness standards” and “supporting standards,” with greater emphasis on the former. Readiness standards address broader, deeper ideas and are deemed more critical for students to know. Supporting standards address more narrowly defined ideas and will still be assessed, although not emphasized. The STAAR MASTER™ Student Practice Book mirrors this balance of readiness and supporting standards to provide meaningful, authentic student practice for the STAAR™ assessment.

Underlying Processes and Mathematical Tools

In the STAAR program, underlying processes and mathematical tools are not tested in isolation under a separate reporting category. These critical skills, which were once identified under TAKS Objective 6, are now incorporated into at least 75% of the practice items from eligible TEKS and are reported along with those content standards (Texas Education Agency, 2010c). Similarly, in the STAAR MASTER Student Practice Book, students are asked to demonstrate processes and tools used in problem solving within the context of practice items for other standards. When one of these skills is incorporated into a practice item, the standard and expectation are identified above the practice item (see Figure 3, below).

(4.16)

3. Look at the pattern below, and choose the sentence that describes it.

26 260 2,600 26,000 260,000

A Add 10 to each number to get the next number in the sequence.

B Add 100 to each number to get the next number in the sequence.

C Multiply each number by 10 to get the next number in the sequence.

D Multiply each number by 100 to get the next number in the sequence.

(4.16) Underlying processes and mathematical tools. The student uses logical reasoning.

Figure 3: Practice Item Testing Underlying Processes and Mathematical Tools

Increased Rigor

The STAAR program is described as “significantly more rigorous” (Texas Education Agency, 2010a) than the Texas Assessment of Knowledge and Skills (TAKS). But what does *rigor* mean in assessment? For the STAAR program, it means the cognitive complexity of items will increase to assess skills at a greater depth.

Also, the test will include more griddable items, allowing students to arrive at answers independently through open-ended response. The STAAR MASTER Student Practice Book provides items written at varying levels of complexity to accommodate this increase in rigor. (Refer to the “Depth of Knowledge” section on this page and Box 1 on page 5 for more information about the levels of complexity in practice items.)

Alignment

According to the mandate of No Child Left Behind (2001), states are required to develop assessments that tightly align to their content standards. To ensure that this requirement is met, states and districts often conduct alignment studies. In such a study, an assessment is compared to the state’s content standards. If an assessment is rigorous, the study will not yield large disparities between the cognitive demands of the expectations and those of the assessment.

Depth of Knowledge

Norman Webb’s (2002) “depth of knowledge” model is currently one of the most influential alignment models in the field of education. “Depth of knowledge” describes the degree of complexity of knowledge a curricular item requires. Webb identifies four levels of depth of knowledge: recall (Level 1), skill or concept (Level 2), strategic thinking (Level 3), and extended thinking (Level 4). Distinct cognitive demands occur during each activity, or thinking process, level. The items in the STAAR MASTER Student Practice Book were aligned to the TEKS using a modified version of the “depth-of-knowledge” model (see Box 1, “Descriptions of STAAR MASTER™ Complexity Levels,” page 5). During the alignment process, the complexity level of each item (designated “Low,” “Moderate,” or “High”) was determined. The level of each practice item can be found in the Answer Key.

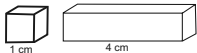
Descriptions of STAAR MASTER™ Complexity Levels

The following descriptions provide an overview of the three complexity levels used to align the STAAR MASTER™ Student Practice Book items to the eligible Mathematics TEKS. Each explanation details the kinds of activities that occur within each level. However, they do not represent all of the possible thought processes for each level.

Low Complexity (L)

Low-complexity items align with the TEKS at Level 1 of the Webb (2002) model. Items of low complexity involve recall and reproduction. Activities and problems at this level require routine, single-step methods. An item may ask students to recognize or restate a fact, definition, or term. For example, students may need to identify attributes of a geometric figure. Items of this complexity may require students to follow a basic procedure with clearly defined steps. At this cognitive level, students may need to apply a formula or perform a simple algorithm. Some major concepts represented at this level include arithmetic facts, perimeter, and converting units of measure. A low-complexity item may ask students to identify, recognize, use, or measure information and concepts.

(4.15)
1. A game cube is 1 centimeter wide. About how many game cubes will fit inside a box that is 4 centimeters wide?



A 1 cm cube is shown next to a rectangular box with a width of 4 cm. The question asks how many such cubes can fit inside the box.

A 4 cm box

A 1 cm cube

A 4 cm

A 8

A 40

A 64

Low Complexity

Moderate Complexity (M)

Moderate-complexity items align with the TEKS at Level 2 of the Webb model. Items of moderate complexity involve both comprehension and the subsequent processing of information. Activities at this level demand more than one step in the reasoning process. Students are asked to determine how to best solve the problem. An item may ask students to generate a table of paired numbers based on a real-life situation. Items may involve using a model to solve a problem. At this cognitive level, students will need to visualize for tasks such as extending patterns and determining nonexamples. Items may involve interpreting information from a simple graph, table, or diagram. Some major concepts represented at this level include classifying geometric figures, determining probability, and using strategies to estimate. Items of this complexity may ask students to classify, organize, observe,

collect and display data, or compare data. Some items also require students to apply low-complexity skills and concepts.

(4.14)
2. Jeff is wrapping 6 gifts. He needs 8 inches of ribbon for each gift. How many total feet of ribbon does Jeff need?

A 48 feet

B 14 feet

C 4 feet

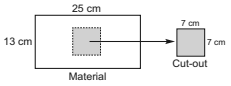
D 2 feet

Moderate Complexity

High Complexity (H)

High-complexity items align with the TEKS at Level 3 and/or Level 4 of the Webb model*. Items of high complexity require students to use strategic, multi-step thinking; develop a deeper understanding of the information; and extend thinking. The problems at this level are non-routine and more abstract. Students are asked to demonstrate more flexible thinking, apply prior knowledge, make and test conjectures, and support their responses. High-complexity items may require students to make generalizations from patterns. Items may involve interpreting information from a complex graph, table, or diagram. At this cognitive level, students will need to justify the reasonableness of a solution process when more than one solution exists. Students will use concepts to solve and explain problems, such as how changes in dimensions affect the volume of a figure. A high complexity item may ask students to plan, reason, explain, compare, differentiate, draw conclusions, cite evidence, analyze, synthesize, apply, or prove. Some items also require students to apply low- and/or moderate-complexity skills and concepts.

(4.14, 4.15)
3. Scott cut out a pattern for a sewing project. The cut material is shown below.



Material: 25 cm by 13 cm. Cut-out: 7 cm by 7 cm.

What is the area of the remaining material?

A 376 square centimeters

B 325 square centimeters

C 276 square centimeters

D 49 square centimeters

High Complexity

*Note: Although state standards may include expectations that require extended thinking, many large-scale assessment activities are not classified as Level 4. Performance and open-ended assessment may require activities at Level 4.

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Box 1: Descriptions of STAAR MASTER™ Complexity Levels

How to Use This Book

Effective Test Preparation

What is the most effective way to prepare students for any mathematics competency test? Experienced educators know that the best test preparation includes three critical components—

- a strong curriculum that is aligned with the content and skills to be assessed
- effective, relevant, and varied instructional methods that allow students to learn content and skills in many different ways
- targeted practice that familiarizes students with the specific content and format of the test

Obviously, a strong curriculum and effective, relevant, and varied instructional methods provide the foundation for all appropriate test preparation. Contrary to what some might believe, merely “teaching the test” performs a great disservice to students. Students must acquire knowledge, practice skills, and have specific educational experiences that can never be included on tests limited by time and in scope. For this reason, resources like the *STAAR MASTER™ Student Practice Book* should never become the heart of the curriculum or replace strong instructional methods.

Targeted Practice

The *STAAR MASTER Student Practice Book* does, however, address the final element of effective test preparation (targeted test practice). This book familiarizes students with—

- the specific content of Texas’ competency test
- the general format of competency tests

When students become familiar with both the content and the format of a test, they know what to expect on the actual test. This, in turn, improves their chances for success.

Using STAAR MASTER™ Products

Used as part of the regular curriculum, the *STAAR MASTER Student Practice Book* allows teachers to—

- pretest skills students need for the actual test
- determine students’ areas of strength and/or weakness
- provide meaningful test-taking practice for students
- ease students’ test anxiety
- communicate test expectations and content to parents

Other Suggestions for Instruction

The *STAAR MASTER Student Practice Book* can serve as a springboard for other effective instructional strategies that help with test preparation.

Group Work

Teachers and students can work through selected practice exercises together, noting the kinds of problems and range of problem-solving techniques. They should discuss common errors for each kind of question and strategies for avoiding these errors.

Formulating Answers

Teachers may encourage students to use scratch work to formulate their own answers on paper rather than simply using mental math or guessing based on the given answer choices. After solving a problem on their own, students can read the given answer choices and determine which one, if any, matches the answer they have recorded. If they cannot find their solution among the given answer choices, they can refer to their scratch work and determine their error.

Developing Test Problems

Teachers may create additional problems that cover skills in a different way than those provided in the exercises. Teachers and students can also select “test-type” problems from other assigned math exercises.

Developing Fundamental Understanding

Teachers can promote the recognition of mathematics in everyday life by developing problems relevant to students’ daily experiences in the classroom and at home. Working through problems that relate directly to students’ experiences fosters understanding of underlying processes and mathematical tools.

Answer Key

Note: Complexity levels appear in parentheses. L = Low, M = Moderate, H = High

Reporting Category 1

Exercise 1

1. D (M) 2. B (L) 3. A (M) 4. B (M)

Exercise 2

1. B (M) 2. D (M) 3. D (M) 4. D (L)

Exercise 3

1. C (L) 2. C (M) 3. A (M) 4. D (M)

Exercise 4

1. C (L) 2. B (M) 3. C (M)

Exercise 5

1. D (M) 2. C (M) 3. A (M) 4. A (M)

Exercise 6

1. C (M) 2. A (M) 3. B (L) 4. A (M)

Exercise 20

1. D (M) 2. B (M) 3. C (M) 4. B (M)

Exercise 21

1. C (M) 2. A (M) 3. C (M)

Exercise 22

1. C (M) 2. C (M) 3. B (M) 4. A (M)

Exercise 23

1. C (M) 2. B (M) 3. A (M) 4. D (M)

Exercise 24

1. B (M) 2. D (M) 3. C (M) 4. C (M)

Exercise 25

1. C (M) 2. D (M) 3. C (M)

Exercise 26

STAAR MASTER™ Student Practice Book, Teacher Guide—Mathematics, Grade 4

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**Reporting Category 1
Numbers, Operations, and Quantitative Reasoning**

Exercise 31

4.4D: Use multiplication to solve problems (no more than two digits times two digits without technology)
(Readiness Standard)

- (4.14)
- Mr. Alexander is purchasing tickets to a play for his family. The costs of the tickets are shown on the table below.

Play Tickets

Play	Cost per Ticket
<i>Peter Pan</i>	\$29
<i>Snow White</i>	\$32
<i>Cinderella</i>	\$36

How much will the tickets cost if Mr. Alexander buys 7 tickets to see *Peter Pan*?

- \$36
- \$143
- \$203
- \$1,463

- (4.14)
- On Monday, 3 students used the library computer in the morning and 4 students used the library computer in the afternoon. Each student used the computer for 25 minutes. What was the total number of minutes the students used the library computer?

- 75 minutes
- 100 minutes
- 145 minutes
- 175 minutes

- (4.14)
- A restaurant can serve 48 people in one hour. If the restaurant is open 12 hours each day, what is the greatest number of people that can be served?

- 144
- 566
- 576
- 586

- (4.14)
- A factory ships 52 cartons of toys to stores every day. How many cartons would the factory ship in 24 days?

- 1,258
- 1,248
- 312
- 76

- (4.14)
- Monica uses 36 inches of ribbon to make 1 bow. How many inches of ribbon would she use to make 16 bows?

Record your answer in the boxes. Then fill in the bubbles. Be sure to use the correct place value.

			.
0	0	0	
1	1	1	
2	2	2	
3	3	3	
4	4	4	
5	5	5	
6	6	6	
7	7	7	
8	8	8	
9	9	9	

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Reporting Category 2
Patterns, Relationships, and Algebraic Reasoning

Exercise 10

4.6B: Use patterns to multiply 10 and 100 (Supporting Standard)

- (4.16)
 1. Which pair of numbers best completes the table below?

X	Y
3,024	302,400
1,500	150,000
2,310	231,000

- A

5,120	51,200
-------	--------
- B

6,020	620,000
-------	---------
- C

1,120	112,000
-------	---------
- D

7,025	72,500
-------	--------

- (4.16)
 2. How many hours are in 100 days?



- A 240 C 2,400
 B 1,200 D 12,000

- (4.16)
 3. Look at the pattern below, and choose the sentence that describes it.

26 260 2,600 26,000 260,000

- A Add 10 to each number to get the next number in the sequence.
 B Add 100 to each number to get the next number in the sequence.
 C Multiply each number by 10 to get the next number in the sequence.
 D Multiply each number by 100 to get the next number in the sequence.

- (4.16)
 4. Which number makes the following equation true?

$$\underline{\hspace{2cm}} \times 6,870 = 68,700$$

- A 1
 B 10
 C 100
 D 1,000

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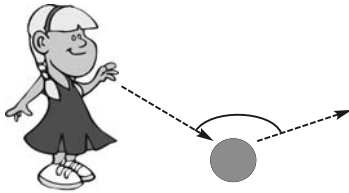
**Reporting Category 3
Geometry and Spatial Reasoning**

Exercise 2

4.8A: Identify and describe right, acute, and obtuse angles (Supporting Standard)

- (4.15)
1. What is the sum of the degrees of the 4 right angles in a square?
 A 90°
 B 180°
 C 270°
 D 360°

- (4.14; 4.15)
2. Morgan bounced a ball on the floor as shown in the picture below.

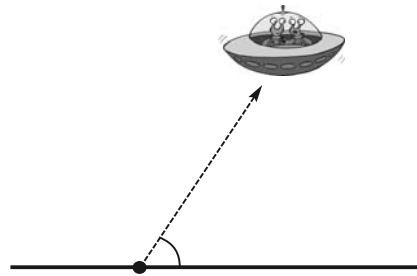


The path of the bounced ball forms a(n) —

- A acute angle
- B obtuse angle
- C right angle
- D straight angle

- (4.15)
3. Which angle has the greatest number of degrees?
 A An obtuse angle
 B An acute angle
 C A right angle
 D A 45° angle

- (4.14; 4.15)
4. Toni played a video game and “zapped” the space invader. She aimed her laser beam and shot, as shown below.



What kind of angle was formed when Toni zapped the space invader?

- A Acute angle
- B Obtuse angle
- C Right angle
- D Straight angle

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**Reporting Category 4
Measurement**

Exercise 3

4.11A: Estimate and use measurement tools to determine length (including perimeter), area, capacity, and weight/mass using standard and customary units (Readiness Standard)

(4.14; 4.15)

1. Felix has the used pencil shown below. Use a ruler to measure the pencil to the nearest centimeter.

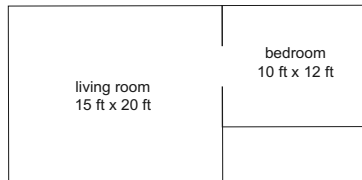


Felix buys a new pencil that is 3 times as long as his used pencil. About how long is the new pencil?

- A 6 centimeters
- B 12 centimeters
- C 18 centimeters
- D 24 centimeters

(4.14; 4.15)

2. Tanya is buying carpet for her bedroom and living room. The two rooms are shown below.

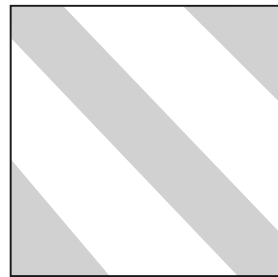


How much total carpet does Tanya need to purchase?

- A 114 square feet
- B 120 square feet
- C 300 square feet
- D 420 square feet

(4.14; 4.15)

3. Dannica made a square coaster for her grandfather in art class, as shown below. Use a ruler to measure the sides of the coaster to the nearest centimeter.



What is the perimeter of the coaster in centimeters?

Record your answer in the boxes. Then fill in the bubbles. Be sure to use the correct place value.

			.
0	0	0	
1	1	1	
2	2	2	
3	3	3	
4	4	4	
5	5	5	
6	6	6	
7	7	7	
8	8	8	
9	9	9	

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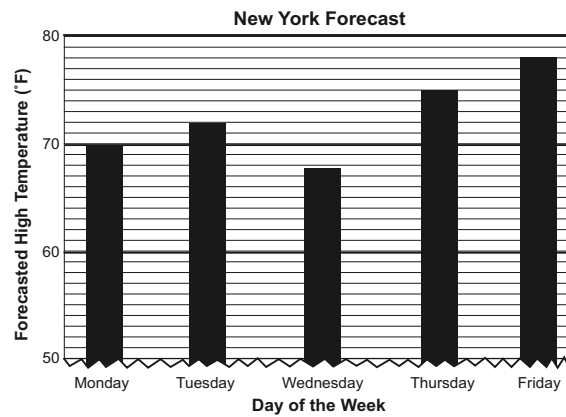
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Reporting Category 5
Probability and Statistics

Exercise 10

4.13B: Interpret bar graphs (Readiness Standard)

Cathy is going to New York and looked up the forecast for the week she will be there. She recorded the information on the graph below. Use the graph to answer questions 1–3.



(4.14; 4.15)

1. How much cooler will it be on the coolest day than on the warmest day shown on the graph?
- A 2°F C 8°F
 B 4°F D 10°F

(4.14; 4.15)

2. What will be the difference in temperature on Monday and Friday?
- A 6°F C 9°F
 B 8°F D 10°F

(4.14; 4.15)

3. For which two days will the difference in temperature be the least?
- A Monday and Tuesday
 B Thursday and Friday
 C Tuesday and Thursday
 D Monday and Wednesday

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