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Student Practice Book

Sample Booklet

Grade 8
Mathematics



Lori Mammen
Editorial Director

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- targeted practice in a variety of contexts

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Reading, Grade 8	Math, Grade 8	

Spanish

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

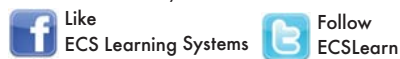
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Selected pages from
STAAR MASTER™

**Student Practice Book
Mathematics, Grade 8**

for the State of Texas Assessments
of Academic Readiness

Teacher Guide



Lori Mammen
Editorial Director

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ISBN: 978-1-60539-739-9

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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 8 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 eighth-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 standard and expectation addressed in the problems.

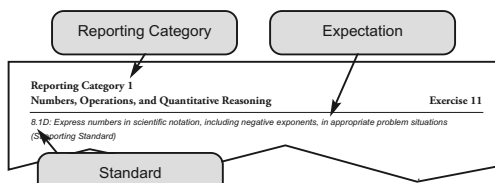


Figure 1: Exercise Skills Tag

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 eighth-grade STAAR Mathematics assessment will likely include four griddable items. The answer grid will have seven columns, with one column designated for a fixed decimal point (see Figure 2, below). Correct answers are positive numbers that range from 0 to 9999.99. 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.

(8.14)
2. Sanjay's grandparents deposited \$1,800 in a savings account for him several years ago. The account has earned a simple interest rate of 2.5% each year and now contains \$2,475. How many years has Sanjay had the account?

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

				.		
Ⓐ	Ⓑ	Ⓒ	Ⓓ		Ⓔ	Ⓕ
Ⓖ	Ⓗ	Ⓘ	Ⓚ		Ⓛ	Ⓜ
Ⓙ	Ⓚ	Ⓛ	Ⓜ		Ⓝ	Ⓟ
Ⓝ	Ⓟ	Ⓡ	Ⓢ		Ⓣ	Ⓤ
Ⓡ	Ⓢ	Ⓣ	Ⓤ		Ⓡ	Ⓢ
Ⓣ	Ⓤ	Ⓡ	Ⓢ		Ⓣ	Ⓤ
Ⓤ	Ⓡ	Ⓢ	Ⓣ		Ⓤ	Ⓡ
Ⓡ	Ⓢ	Ⓣ	Ⓤ		Ⓡ	Ⓢ
Ⓢ	Ⓣ	Ⓤ	Ⓡ		Ⓢ	Ⓣ
Ⓣ	Ⓤ	Ⓡ	Ⓢ		Ⓣ	Ⓤ
Ⓤ	Ⓡ	Ⓢ	Ⓣ		Ⓤ	Ⓡ

Figure 2: Griddable Item for Eighth-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).

(8.16)

3. The expression $3n - 10$ can be used to determine the n th term in a sequence. What is the 10th term in this sequence?

A -10

B -7

C 20

D 35

(8.16) Underlying processes and mathematical tools. The student uses logical reasoning to make conjectures and verify conclusions.

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.

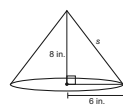
Descriptions of STAAR MASTER™ Complexity Levels

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.

(8.15)
4. Look at the cone below.



What is the length of s ?

A 5 in.
B 10 in.
C 14 in.
D 100 in.

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.

(8.14.8.16)
1. When Keyana opens a package of 10 candies, she finds that 20% of the candies are red. Keyana decides that if there are 1,000 candies in a large package, 200 of them will be red. Which of the following might make her conclusion misleading?

A Keyana's original sample is not large enough.
B The large packages do not have 1,000 candies in them.
C Keyana records all of the colors she finds in the package.
D Keyana counts only the red candies and does not check the other colors.

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.

(8.14.8.16)
4. Bruce pays \$11 for a 3.5-pound bag of cat food every 3 weeks. The same cat food comes in 14-pound bags for \$27. About how much money could Bruce save in 36 weeks if he buys the larger bag?

A Less than \$25
B Between \$25 and \$45
C Between \$45 and \$65
D More than \$65

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 activities 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. A (M) 2. B (M) 3. B (M) 4. D (M)
5. C (M) 6. B (M)

Exercise 2

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

Exercise 3

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

Exercise 4

1. B (L) 2. 350 (M) 3. 201 (M) 4. C (M)

Exercise 5

1. C (M) 2. 1,255.20 (H) 3. A (L) 4. B (L)

Exercise 6

Exercise 18

1. C (M) 2. 40 (M) 3. C (M) 4. C (M)

Exercise 19

1. B (M) 2. B (M) 3. C (M) 4. 13 (M)

Exercise 20

1. C (H) 2. B (L) 3. D (M) 4. 56.25 (M)

Exercise 21

1. C (M) 2. C (M) 3. C (M) 4. 3.6 (L)

Exercise 22

1. C (M) 2. 15 (M) 3. D (M) 4. C (M)
5. B (M)

Exercise 23

1. 58 (L) 2. C (M) 3. D (M)

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*All Web sites listed were active at time of publication.

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ISBN: 978-1-60539-725-2

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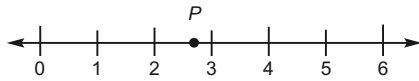
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**Reporting Category 1
Numbers, Operations, and Quantitative Reasoning**

Exercise 9

8.1C: Approximate (mentally and with calculators) the value of irrational numbers as they arise from problem situations, such as π and $\sqrt{2}$ (Supporting Standard)

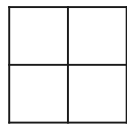
1. Look at the number line below.



Which irrational number is best represented by Point P?

- A $\sqrt{3}$
- B $\sqrt{5}$
- C $\sqrt{8}$
- D $\sqrt{10}$

(8.14)
2. Ling drew a four-square grid for her younger sister on the sidewalk. The grid had an area of 26 square feet.



$A = 26 \text{ ft}^2$

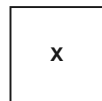
What is the approximate side length of one of the smaller squares?

- A 13 ft
- B 6.5 ft
- C 5.1 ft
- D 2.5 ft

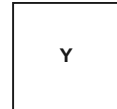
(8.14)
3. Tom's Grocery is stocking cans of tuna. The best-selling can of tuna has a volume of 7.07 cubic inches, found by using the formula $V = (\pi r^2)h$. If the radius of the can is 1.5 inches and the height is 1 inch, what is the approximate value of π , rounded to three decimal places?

- A 3.140
- B 3.142
- C 3.147
- D 3.149

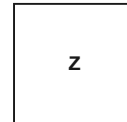
4. Look at the squares below.



$A = 16 \text{ cm}^2$
 $s = 4 \text{ cm}$



$A = 20 \text{ cm}^2$
 $s = \square \text{ cm}$



$A = 25 \text{ cm}^2$
 $s = 5 \text{ cm}$

What is the best approximation for the length of the side of Square Y, rounded to two decimal places?

- A 4.47 cm
- B 4.75 cm
- C 6.52 cm
- D 9.00 cm

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Reporting Category 2
Patterns, Relationships, and Algebraic Reasoning

Exercise 3

8.3A: Compare and contrast proportional and non-proportional linear relationships (Supporting Standard)

- (8.14)
1. A store carries boxes of pens with a different number of pens in each box. The table below shows the number of pens in a box and the cost of each box.

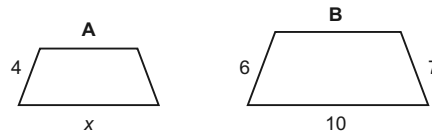
Pen Costs

Number of Pens in Box	Cost (in dollars)
4	6
7	10.5
8	12
10	15
12	18

Which statement explains the type of relationship shown in the table for the number of pens in a box and the cost?

- A It is a proportional linear relationship because the cost per pen is \$1.50 for each box.
- B It is a non-proportional linear relationship because the cost per pen cannot be determined.
- C It is a proportional linear relationship because the difference between each cost shown in the table is not constant.
- D It is a non-proportional linear relationship because the difference between each cost shown in the table is not constant.

- (8.16)
2. Trapezoid A is similar to Trapezoid B.



Which proportion can be used to determine the length of x on Trapezoid A?

- A $4x = 60$
- B $\frac{3}{10} = \frac{x}{4}$
- C $\frac{6}{10} = \frac{4}{x}$
- D $\frac{6}{10} = \frac{x}{4}$

- (8.14)
3. It takes Billy 30 minutes to cut Mr. Jones's lawn, which is 0.5 acres in size. Which proportion can be used to determine x , the number of minutes it should take Billy to cut Mr. Smith's 2-acre lawn?

- A $\frac{2}{0.5} = \frac{30}{x}$
- B $\frac{0.5}{30} = \frac{2}{x}$
- C $\frac{0.5}{2} = \frac{x}{30}$
- D $\frac{30}{2} = \frac{x}{0.5}$

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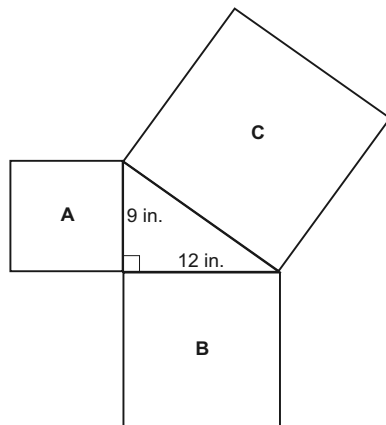
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**Reporting Category 3
Geometry and Spatial Reasoning**

Exercise 21

8.7C: Use pictures or models to demonstrate the Pythagorean Theorem (Supporting Standard)

- (8.15)
1. A right triangle can be formed by joining three squares at their vertices.

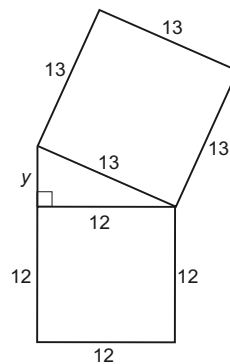




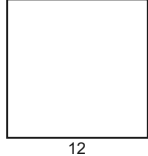
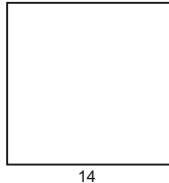
What is the area of Square C, in square inches?

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

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

- (8.15)
2. Which of the following figures can be placed along y to make a correct model of the Pythagorean Theorem?



- A  5
- B  5
- C  12
- D  14

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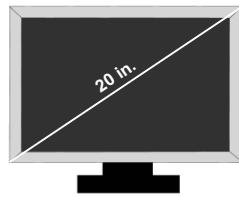
**Reporting Category 4
Measurement**

Exercise 12

8.9A: Use the Pythagorean Theorem to solve real-life problems (Readiness Standard)

(8.14; 8.15)

1. Tyrone built an entertainment unit for the television below.

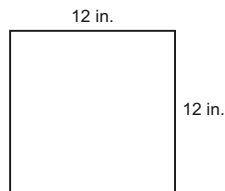


Which of the following could be the length and width of the opening for the television?

- A 16 in. x 10 in.
- B 16 in. x 12 in.
- C 20 in. x 10 in.
- D 20 in. x 20 in.

(8.14; 8.15)

2. The tile below will be cut diagonally to create two identical tiles.

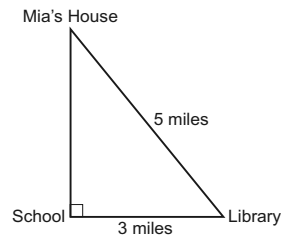


What will be the approximate dimensions of each new tile?

- A 12 in. x 12 in. x 17 in.
- B 12 in. x 12 in. x 24 in.
- C 12 in. x 17 in. x 17 in.
- D 12 in. x 17 in. x 24 in.

(8.14; 8.15)

3. The roads between the library, school, and Mia's house form a right triangle, as shown below.



How far is Mia's house from the school?

- A 2 mi
- B 3 mi
- C 4 mi
- D 8 mi

(8.14)

4. A landscaper used a 15-foot wire to secure a tree. The wire was tied to the exact middle of the tree's trunk and secured to the ground 9 feet out from the bottom of the tree. What was the height of the tree, in feet?

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

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

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**Reporting Category 5
Probability and Statistics**

Exercise 5

8.11B: Use theoretical probabilities and experimental results to make predictions and decisions (Supporting Standard)

(8.14; 8.15)

1. A standard die is rolled 20 times, and the results are shown in the table below.

Results of 20 Rolls

Number	Number of Times Rolled
Even number	8
Odd number	12

Which of these statements accurately compares the theoretical probability to the actual results recorded in the table?

- A The theoretical probability of getting an odd number is equal to the actual results.
- B The theoretical probability of getting an even number is equal to the actual results.
- C The theoretical probability of getting an odd number is greater than the actual results.
- D The theoretical probability of getting an even number is greater than the actual results.

(8.14)

2. Kieran is playing a computer game. He answered 12 out of 15 questions correctly. At this rate, about how many questions is Kieran likely to answer correctly if he answers 100 questions on his computer game?
 - A 60
 - B 70
 - C 80
 - D 90

(8.14)

3. At a clothing factory, the probability of a pair of jeans being defective is $\frac{1}{30}$. About how many pairs of jeans would be defective each week if the factory produces 2,000 pairs of blue jeans per week?
 - A 30
 - B 70
 - C 600
 - D 1,970

(8.14)

4. Megan sold tickets to a school raffle. She sold 12 tickets to the first 20 people she asked. How many tickets is Megan likely to sell if she asks 300 people?

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

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

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