

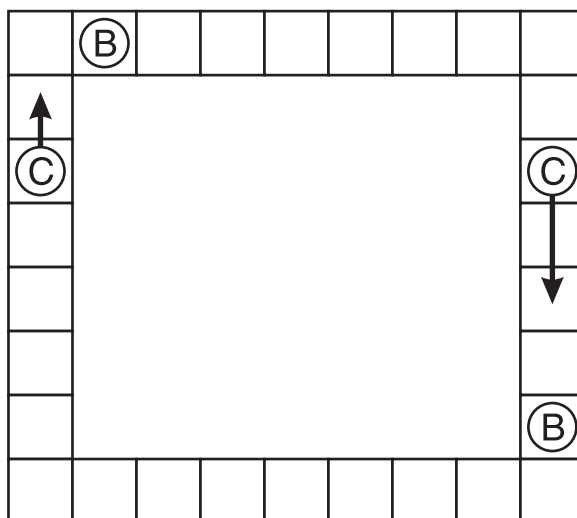
**Grade 8—Mathematics**  
**Multiple-Choice Items**

**Strand:** Data Analysis, Probability, and Discrete Math

**Benchmark D.5:** Comparing experimental probability results with theoretical probability (e.g., representing probabilities of concrete situations as common fractions, investigating single-event and multiple-event probability, using sample spaces, geometric figures, tables, and/or graphs).

**Achievement Level:** *Advanced*

Bruce and Calvin are playing the board game shown below.



It is Calvin's turn to roll a number cube labeled from 1 to 6. If one of Calvin's tokens (C) lands on a space already occupied by one of Bruce's tokens (B), Bruce's token is knocked off. Calvin has the choice of moving either of his tokens. What is the probability that Calvin will be able to knock off one of Bruce's tokens?

- A.  $\frac{1}{36}$
- B.  $\frac{1}{7}$
- C.  $\frac{2}{12}$
- \*D.  $\frac{1}{3}$

\* correct answer

**Strand:** Number and Number Relations

**Benchmark N.3:** Reading, writing, representing, and using rational numbers in a variety of forms (e.g., integers, mixed numbers, and improper fractions).

**Achievement Level:** *Mastery*

Danielle is inviting five girls to her birthday party. For lunch, she and her five friends will eat nine small pizzas. If everybody at the party eats the same amount, how much will each girl eat?

- A.  $\frac{1}{2}$  pizza
- B.  $\frac{2}{3}$  pizza
- \* C.  $1\frac{1}{2}$  pizzas
- D.  $1\frac{2}{3}$  pizzas

\* correct answer

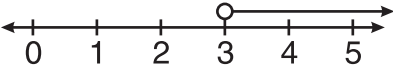
This item would most likely be answered correctly by students who score at the *Mastery* level or above. The item requires 8th-grade students to solve a problem in which a solution is represented as a mixed number. The students must determine the portion of the 9 small pizzas each girl will eat. Since Danielle invited 5 friends to her party, the portion of 9 pizzas eaten by each person is found by dividing 9 by 6 ( $9 \div 6$ ). The answer to this division is 1 with a remainder of 3. Students must express this result as the mixed number,  $1\frac{3}{6}$  pizzas, which is equivalent to  $1\frac{1}{2}$  pizzas or answer option C. As an alternative approach, students may recognize that the portion of the 9 pizzas eaten by each person can be expressed as  $\frac{9}{6}$ . This fraction can also be written as  $1\frac{3}{6}$ , which is equivalent to answer option C. The use of a calculator is not allowed on this item.

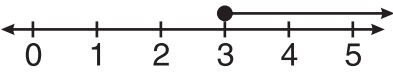
**Strand:** Algebra

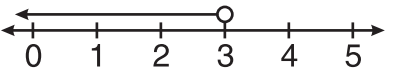
**Benchmark A.2:** Modeling and developing methods for solving equations and inequalities (e.g., using charts, graphs, manipulatives, and/or standard algebraic procedures).

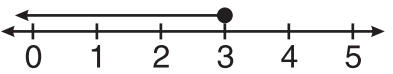
**Achievement Level:** *Basic*

Which graph represents  $x \geq 3$ ?

A. 

\* B. 

C. 

D. 

\* correct answer

This item would most likely be answered correctly by students who score at the *Basic* level or above. The item requires 8th-grade students to represent an inequality as a graph on a number line. The students must know that the solution to the inequality written in the question,  $x \geq 3$ , includes the number 3 and all numbers greater than three. This is represented by the graph in answer option B. The solid circle or dot above the three is necessary to show that the number 3 is included in the solution. The use of a calculator is not allowed on this item.

**Strand:** Patterns, Relations, and Functions

**Benchmark P.1:** Describing, extending, analyzing, and creating a wide variety of numerical, geometrical, and statistical patterns (e.g., skip counting of rational numbers, and simple exponential number patterns).

**Achievement Level:** *Approaching Basic*

Look at this sequence of numbers.

1, 2, 4, 5, 10, 11, 22, 23, 46, . . .

Which of the following could be the next three numbers?

- A. 47, 48, 49
- B. 47, 48, 96
- \* C. 47, 94, 95
- D. 92, 93, 94

\* correct answer

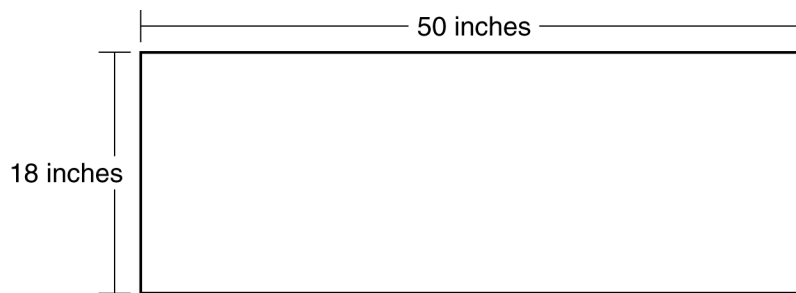
This item would most likely be answered correctly by students who score at the *Approaching Basic* level or above. The item requires 8th-grade students to analyze and continue a numerical pattern. The students must recognize that there are two rules used to create this sequence or pattern. Some students may know this as a two-step sequence or pattern. Beginning with the first term, 1, succeeding terms are found by adding 1 and then multiplying by 2. Following these steps, students will determine the next three numbers in the pattern by first adding 1 to 46 to get 47. That number is then multiplied by 2 ( $47 \cdot 2$ ) to get 94. Finally, the third number is found by adding 1 to 94 to get 95. The correct answer is C. This item does not require the use of a calculator.

**Grade 8 Mathematics—Scoring Rubric  
Constructed-Response Item**

The following pages present a mathematics constructed-response item, a scoring rubric, and examples of student work at scores of 0 to 4. The original item is shown below, and the scoring rubric can be found on page 11. The content standard for this item is **Geometry**. In solving problems for this content standard, students demonstrate an understanding of geometric concepts and applications involving one-, two-, and three-dimensional geometry and justify their findings.

Juanita works in a paint store. The store sells paint in 1-gallon and 1-quart cans. The 1-gallon cans have a diameter of  $6\frac{1}{2}$  inches, and the 1-quart cans have a diameter of 4 inches.

- a. Juanita is placing cans of paint on the shelves in rows and columns. The shelves are 18 inches wide and 50 inches long. How many 1-gallon cans of paint will fit on a shelf? Justify your answer.



- b. How many 1-quart cans of paint will fit on a shelf? Justify your answer.
- c. Juanita put as many 1-gallon cans of paint as possible on a shelf. Then she decided to put 1-quart cans in the remaining space. How many 1-quart cans of paint can fit in the remaining space? Justify your answer using words, symbols, or pictures.