



# ***New York State Testing Program***

## **Mathematics Common Core Sample Questions**

**Grade**

**3**

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**Domain:** Operations and Algebraic Thinking

**Item:** CR

**1**

**Part A:** Fill in the blanks below with whole numbers greater than 1 that will make the number sentences true.

1.  $63 \div \underline{\quad} = 7$
2.  $63 = 21 \times \underline{\quad}$
3.  $21 = \underline{\quad} \times 7$
4.  $7 \times (\underline{\quad} \times \underline{\quad}) = 21 \times 7$
5.  $(21 \times 3) \div \underline{\quad} = 7$

**Part B:** If the product of two whole numbers greater than 1 is 63, what could the two whole numbers be?           ,           

**Key: Part A**

1.  $63 \div \underline{9} = 7$
2.  $63 = 21 \times \underline{3}$
3.  $21 = \underline{3} \times 7$
4.  $7 \times (\underline{3} \times \underline{7}) = 21 \times 7$  **or**  $7 \times (\underline{7} \times \underline{3}) = 21 \times 7$
5.  $(21 \times 3) \div \underline{9} = 7$

**Key: Part B**

7,9 (or 9,7) or 3,21 (or 21,3).

**Aligned CCLS:** 3.OA.4, 3.OA.5, and 3.OA.6

**Commentary:** This question aligns with CCLS 3.OA.4, 3.OA.5, and 3.OA.6 and assesses the student's ability to determine the unknown whole numbers in multiplication and division equations. The question also assesses the student's ability to apply properties of operations as strategies to multiply or divide and to understand division as an unknown factor problem.

**Rationale:**

**Part A:** Errors in A1, A2, and A3 are most likely due to errors in computing single-digit number facts or difficulty in non-forward execution. Errors in A4 and A5 may be attributed to errors in applying properties of operations as strategies to multiply and divide. Errors in A1 and A5 may also be due to not recognizing division as an unknown-factor problem.

**Part B:** Errors likely arise from limited application of associative and/or distributive properties of multiplication to generate multiple combinations of whole numbers for a given product.

**Domain:** Operations and Algebraic Thinking

**Item:** MC

**2**

Two groups of students from Douglas Elementary School were walking to the library when it began to rain. The 7 students in Mr. Stem's group shared the 3 large umbrellas they had with Ms. Thorn's group of 11 students. If the same number of students were under each umbrella, how many students were under each umbrella?

You may use the space below to draw a picture of the problem.

- A 6
- B 10
- C 18
- D 21

**Key:** A

**Aligned CCLS:** 3.OA.8, 3.OA.2

**Commentary:** This question aligns to CCLS 3.OA.8 and assesses the student's ability to solve a two-step word problem using addition and division of whole numbers. It also aligns to 3.OA.2 because it assesses the ability to partition a number into equal groups.

**Rationale:** The total number of students in the two groups is 18 ( $7 + 11$ ), so 18 must be divided into 3 equal groups; therefore, 6 students are in each group. Selecting Options B and D could indicate relating of the numbers in the problem with incorrect operations (adding 7 and 3 in B and multiplying 7 and 3 in D) and therefore a lack of understanding of the problem. Selecting Option C indicates that a student had knowledge of how to begin the problem, by adding the two groups together, but then forgot to divide the students into 3 equal groups.

**Domain:** Operations and Algebraic Thinking

**Item:** MC

**3**

Tommy made 6 rows of blocks, with each row containing 8 blocks. How many blocks did Tommy have altogether?

You may use the space below to draw a picture of the problem.

- A 14
- B 36
- C 48
- D 64

**Key:** C

**Aligned CCLS:** 3.OA.1

**Commentary:** This question aligns to CCLS 3.OA.1, as it assesses the student's ability to interpret the product created when each of the 6 rows of blocks contains 8 blocks.

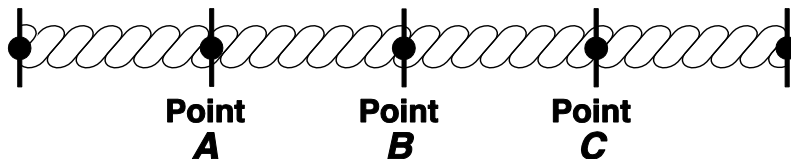
**Rationale:** Selecting Option C as the correct answer shows that a student is able to visualize the abstract concept of 6 rows with 8 in each row and is able to count the total number of blocks, either by adding them together (individually or in sets) or by finding the product of  $6 \times 8$ . Selecting Option A likely indicates that the wrong operation was chosen to model the situation (adding  $6 + 8$ ) as well as an incorrect visualization of what the problem was asking. Selecting Option B or D could indicate that students performed an error in addition or multiplication or used a single dimension for their calculations (6 rows of 6 each or 8 rows of 8 each).

**Domain:** Number and Operations—Fractions

**Item:** CR

**4**

Give a fraction that represents each point on the string compared to the whole.



- A Point A \_\_\_\_\_
- B Point B \_\_\_\_\_
- C Point C \_\_\_\_\_
- D Identify another fraction that is equivalent to the fraction represented by point A. \_\_\_\_\_
- E Identify another fraction that is equivalent to the fraction represented by point C. \_\_\_\_\_

**Key**

- A  $\frac{1}{4}$ , or fraction equivalent
- B  $\frac{1}{2}$ , or fraction equivalent
- C  $\frac{3}{4}$ , or fraction equivalent
- D any fraction equivalent to  $\frac{1}{4}$ , but not the answer given in A
- E any fraction equivalent to  $\frac{3}{4}$ , but not the answer given in C

**Aligned CCLS:** 3.NF.2a, 3.NF.2b, 3.NF.3b

**Commentary:** This question aligns to CCLS 3.NF.2a and assesses the student’s ability to represent a fraction in the form  $\frac{1}{b}$  on a number line. It also aligns to 3.NF.2b and assesses the student’s ability to represent a fraction  $\frac{a}{b}$  on the number line and also aligns to 3.NF.3b, assessing the ability to generate simple equivalent fractions.

**Rationale:** Incorrect responses for A, B, or C may be due to incorrect division of the whole into four equal parts and constructing an incorrect denominator. An incorrect

answer for D or E while having a correct answer for A, B, and/or C likely indicates a difficulty in constructing equivalent fractions or limited knowledge of equivalent fractions. An incorrect answer for D or E could also be a result of incorrect answers for A and/or C.

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**Domain:** Operations and Algebraic Thinking

**Item:** MC

**5**

A third grade class decided to sell boxes of cookies to help raise money for a school trip. Each box has two bags of cookies inside, and each bag holds 14 cookies. If each student needed to sell 4 boxes of cookies, how many cookies did each student need to sell?

- A 28
- B 56
- C 112
- D 224

**Key:** C

**Aligned CCLS:** 3.OA.3

**Commentary:** This question is aligned to CCLS 3.OA.3 and assesses a student's ability to solve a multiplication word problem.

**Rationale:** Selecting Option C as the correct answer indicates that the student has accurately understood that each of the 4 boxes contains two bags and that each of those bags holds 14 cookies as well as the correct operation, multiplication, to determine the total number of cookies ( $4 \times 2 \times 14 = 112$ ). Option A does not include the information from the stem and only gives the total amount of cookies in a single box ( $2 \times 14 = 28$ ). Option B is the result of multiplying the number of boxes by the number of cookies ( $4 \times 14 = 56$ ), but excludes that each box contains two bags of 14 cookies. Option D is the result of multiplying all the numbers in the problem using "two" twice ( $2 \times 2 \times 4 \times 14 = 224$ ), rather than a single time.

**Domain:** Operations and Algebraic Thinking

**Item:** MC

**6**

There were 54 apples set aside as a snack for 3 classes of students. The teachers divided up the apples and placed equal amounts on 9 separate trays. If each of the 3 classes received the same number of trays, how many apples did each class get?

- A 2
- B 6
- C 18
- D 27

**Key:** C

**Aligned CCLS:** 3.OA.2, 3.OA.3

**Commentary:** This question is aligned to CCLS 3.OA.2 and assesses a student's ability to interpret whole-number quotients of whole numbers. It is also aligned to 3.OA.3 and assesses the ability to divide whole numbers less than 100 when solving word problems in situations involving equal groups.

**Rationale:** The correct response, Option C, is arrived at by determining the number of apples per tray ( $\frac{54}{9} = 6$  per tray) and then determining the number of trays per class ( $\frac{9}{3} = 3$  trays per class). Therefore, each class received 18 apples ( $3 \text{ trays} \times 6 \text{ apples per tray} = 18 \text{ apples}$ ). Option C could also be arrived at by dividing the total number of apples by the number of classes ( $54 \text{ apples} \div 3 \text{ classes} = 18 \text{ apples}$ ). Option A could be arrived at by determining the number of apples per tray ( $\frac{54}{9} = 6$  per tray) and incorrectly dividing the number of apples per tray by the number of classes. Option B could represent the number of apples per tray ( $\frac{54}{9} = 6$  per tray) rather than the number of apples for the entire class. Option D could represent the multiplication of three classes by the number of trays ( $3 \times 9 = 27$ ).



**Domain:** Operations and Algebraic Thinking

**Item:** MC

**7**

There are 3 large picture frames. Each picture frame contains exactly 2 pictures. What fraction represents just one picture out of all the pictures in the frames?

**A**  $\frac{1}{3}$

**B**  $\frac{2}{3}$

**C**  $\frac{2}{5}$

**D**  $\frac{1}{6}$

**Key:** D

**Aligned CCLS:** 3.0A.1, 3.NF.1

**Commentary:** This question is aligned to CCLS 3.0A.1 and assesses the student's ability to interpret the setting in order to find the total number of pictures in the frames. It also aligns to 3.NF.1 because it assesses the student's ability to understand the fraction  $\frac{1}{6}$  as the quantity formed by 1 part when the whole is partitioned into 6 equal parts.

**Rationale:** Option D is correct since there are 2 pictures per frame and 3 frames, with a total of six pictures ( $2 \times 3$ ). One picture would represent  $\frac{1}{6}$  of all the pictures in the frames. Option A is incorrect because the denominator does not accurately represent the whole. Option B indicates the incorrect creation of a fraction using the given numbers in the problem. Option C is incorrect because the denominator is the result of adding the numbers rather than multiplying them to determine the total number of pictures in all three frames.

**Domain:** Operations and Algebraic Thinking

**Item:** MC

**8**  $20 \div n = 5$  and  $n \times 5 = 20$ . What is  $n$ ?

- A 4
- B 5
- C 8
- D 15

**Key:** A

**Aligned CCLS:** 3.OA.6

**Commentary:** This question is aligned to CCLS 3.OA.6 and assesses the student's ability to understand division as an unknown-factor problem.

**Rationale:** Since  $20 \div 4 = 5$ , and  $4 \times 5 = 20$ , it follows that  $n = 4$ . If answer choice B was selected, it is possible that the student confused the use of 5 within the problem or made an error in whole number division or multiplication. Answer choice C may be selected if students add the value of  $n$  twice or double the value of  $n$  given the presence of two  $n$ 's in the stem. Answer choice D indicates a misunderstanding of the operations in the problem or a false assumption of addition and subtraction ( $20 - 15 = 5$  and  $15 + 5 = 20$ ). If answer choice C or D was selected, the student probably did not know the correct number sentence to make the statement true, or could not divide correctly.

**Domain:** Number and Operations—Fractions

**Item:** MC

**9**

Three students are sharing a box of 8 crayons. Jari has 2 of the crayons on his desk, Nora has 3 of the crayons on her desk, and Tommy has 1 of the crayons on his desk. If the rest of the crayons are still in the box, what fractional part of the crayons is still in the box?

- A  $\frac{1}{8}$
- B  $\frac{2}{8}$
- C  $\frac{3}{8}$
- D  $\frac{6}{8}$

**Key:** B

**Aligned CCLS:** 3.NF.1

**Commentary:** The question is aligned to CCLS 3.NF.1 and assesses the student's ability to understand a fraction  $\frac{a}{b}$  as the quantity formed by  $a$  parts of  $\frac{1}{b}$ .

**Rationale:** Option B is the correct answer. If a total of  $2 + 3 + 1$  crayons (6) are on the students' desks, then  $8 - 6 = 2$  crayons are still in the box. This can be represented fractionally as  $\frac{2}{8}$  of the box. Option A could indicate a student selected the unit fraction for a single crayon rather than answering the specific question of the stem. Option C likely indicates a student created a fraction from the number of students with the number of crayons (3 students per 8 crayons) or could indicate an error in calculating the number of crayons remaining in the box. Option D may indicate that students represented the fractional part of crayons out of the box, rather than in the box.





# Grade 3 Mathematics Common Core Sample Questions

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