Just in Time Quick Check

Standard of Learning 4.CE.2

Strand: Computation and Estimation

Standard of Learning 4.CE.2

The student will estimate, represent, solve, and justify solutions to single-step and multistep problems, including those in context, using multiplication with whole numbers, and single-step problems, including those in context, using division with whole numbers; and recall with automaticity the multiplication facts through 12 × 12 and the corresponding division facts.

Students will demonstrate the following Knowledge and Skills:

a) Determine and justify whether an estimate or an exact answer is appropriate when solving contextual problems involving multiplication and division of whole numbers. Refine estimates by adjusting the final amount, using terms such as *closer to*, *between*, and *a little more than*. (1)

b) Recall with automaticity the multiplication facts through 12 × 12 and the corresponding division facts.* (2)

c) Create an equation using addition, subtraction, multiplication, and division to represent the relationship between equivalent mathematical expressions (e.g., 4 × 3 = 2 × 6; 10 + 8 = 36 ÷ 2; 12 × 4 = 60 − 12). (3, 4)

d) Identify and use the appropriate symbol to distinguish between expressions that are equal and expressions that are not equal, using addition, subtraction, multiplication, and division (e.g., 4 × 12 = 8 × 6 and 64 ÷ 8 ≠ 8 × 8). (5)

e) Determine all factor pairs for a whole number 1 to 100, using concrete, pictorial, and numerical representations. (6)

f) Determine common factors and the greatest common factor of no more than three numbers. (7, 8)

g) Apply strategies (e.g., rounding, place value, properties of multiplication and/or addition) and algorithms, including the standard algorithm, to estimate and determine the product of two whole numbers when given:

   i) a two-digit factor and a one-digit factor;* (12)

   ii) a three-digit factor and a one-digit factor;* or (12)

   iii) a two-digit factor and a two-digit factor.* (12)

h) Estimate, represent, solve, and justify solutions to single-step and multistep contextual problems that involve multiplication with whole numbers. (13)

i) Apply strategies (e.g., rounding, compatible numbers, place value) and algorithms, including the standard algorithm, to estimate and determine the quotient of two whole numbers, given a one-digit divisor and a two- or three-digit dividend, with and without remainders.* (9, 11)

j) Estimate, represent, solve, and justify solutions to single-step contextual problems involving division with whole numbers. (10)

k) Interpret the quotient and remainder when solving a contextual problem. (9)

* **On the state assessment, items measuring this objective are assessed without the use of a calculator.**

Just in Time Quick Check

Just in Time Quick Check Teacher Notes

Supporting and Prerequisite SOL: 4.CE.1, 4.PFA.1, 3.CE.2

Just in Time Quick Check 4.CE.2

1. The principal of the elementary school is planning an assembly in the school's auditorium.
   - There are 19 classes in the school.
   - Each class has 17 students.
   - There are 25 teachers at the school.
   - The auditorium can hold 500 people.

   The principal wants to know if the auditorium is big enough to fit all the students and teachers. Should the principal find an exact total number of students and teachers or make an estimate of the total number of students and teachers? Justify your reasoning.

2. Solve the problems below.

   a) $8 \times 7 =$ _____

   b) What is the product of 11 and 12? _____

   c) _____ $= 9 \times 6$

   d) What is the quotient of 81 divided by 9? _____

   e) $48 \div 8 =$ _____

3. The teacher wrote the equation $10 \times 4 = \square + 5$ on the board. Sarah said the missing number is 40. Is Sarah correct or incorrect? What reasoning do you think Sarah was using?

4. Create three different expressions that each make this equation true when placed in the blank:

   $15 - 3 =$ _____

   Use a different operation ($+$, $-$, $\times$, $\div$) in each expression you create.

5. Fill in the blanks to show whether the expressions are equal (=) or not equal (≠).

   a) 7×6 _____ $6 + 7$

   b) 2×6 _____ 3×4

   c) $20 \div 2$ _____ 10×3

   d) $35 - 19$ _____ $20 + 15$

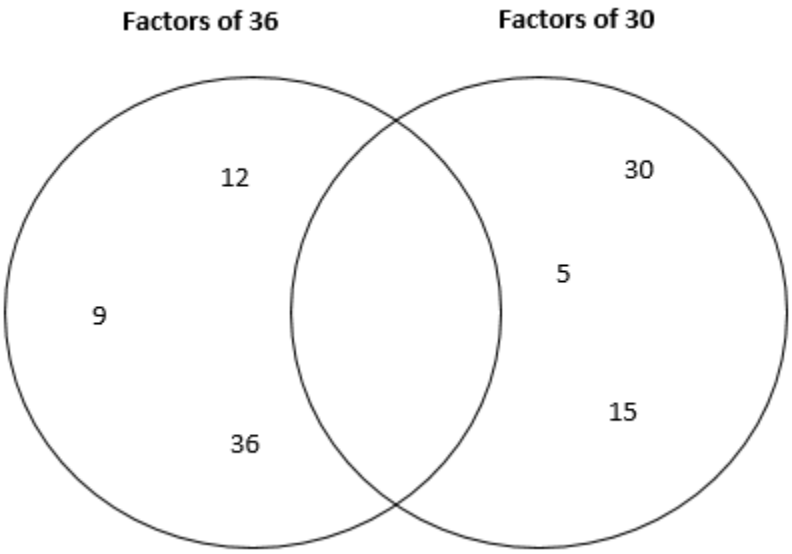
6. Determine all the factor pairs for the following numbers:

   a) 96 b) 54

7. Complete the table shown below. Identify the greatest common factor for each set of numbers.

Set of Numbers	Greatest Common Factor
12 and 30	
3, 6, and 7	

8. Use the numbers shown below the diagram to complete this problem. Write the numbers in the correct section to show the factors of 36, the factors of 30, and the common factors of 36 and 30. Some of the numbers in the table may not be used.



Numbers for Diagram

1	2	3	4	6
8	10	13	14	18

9. Solve the problem shown below.

$$92 \div 4$$

10. Three friends earned a total of 200 tickets playing a game at the school carnival. They decided each of them would receive an equal share of the tickets. How many tickets did each friend receive?

11. Use estimation to identify the division problem shown below that has a quotient that is a little more than 100. Justify your reasoning using pictures and/or words.

    a) $389 \div 5$
    b) $705 \div 6$
    c) $899 \div 3$
    d) $656 \div 8$

12. Solve the following problems.

    a) 32×78 = _____

    b) 617×4 = _____

    c) 89×5 = _____

13. Smithtown Elementary School hosted a canned food drive. They collected 188 cans of food per day for 7 days. How many total cans of food did the school collect?

4.CE.2 Just in Time Quick Check Teacher Notes

Common Errors/Misconceptions and their Possible Indications

1. The principal of the elementary school is planning an assembly in the school's auditorium.
   - There are 19 classes in the school.
   - Each class has 17 students.
   - There are 25 teachers at the school.
   - The auditorium can hold 500 people.

   The principal wants to know if the auditorium is big enough to fit all the students and teachers. Should the principal find an exact total number of students and teachers or make an estimate of the total number of students and teachers? Justify your reasoning.

   Students may have difficulty determining when an estimate or an exact answer is appropriate when solving contextual problems. In this example, students may believe that they must find the exact number of students and teachers to determine whether they will all fit in the football stadium. However, by rounding each number up to the nearest ten (20 × 20 = 400) and then adding the 25 teachers (400 + 25 = 425), the principal can easily determine that there will be enough seats to accommodate all students and teachers.

   When solving contextual problems, it may be beneficial for students to engage in discussions about when contextual problems require an exact solution and when an estimate will suffice. As they become more familiar with contexts where an estimate is needed, they may begin to recognize that certain estimation strategies (e.g., rounding all numbers up) are better suited to estimating when it is important to ensure that there are enough to meet the demands of the context (e.g., enough cookies for everyone in the class, enough money to pay for all of the groceries, enough seats to fit all students and teachers).

2. Solve the problems below.

   a) 8 × 7 = _____

   b) What is the product of 11 and 12? _____

   c) _____ = 9 × 6

   d) What is the quotient of 81 divided by 9? _____

   e) 48 ÷ 8 = _____

   Students in Grade 3 spent time developing fluency with multiplication facts through 10 × 10 and the related division facts using a variety of strategies. Strategies may include recall, partial products, the use of friendly numbers, repeated addition, or decomposition strategies. By Grade

4, students should transition to demonstrating recalling with automaticity multiplication facts through 12 × 12 and the corresponding division facts. If students are struggling to recall facts, they may need additional support including the use of concrete materials and pictorial relationships to identify the relationships and patterns that exist in the facts. Understanding these relationships will help students to learn and retain basic facts.

Additionally, some students may not understand the term product or quotient. For example, in b) these students may add the two numbers together for a sum of 23 instead of finding the product of the two factors. Teachers should model using accurate vocabulary during instruction and should encourage students to do the same. For example, teachers may ask students, "What did you get as the answer for a)?" Instead, teachers should reinforce the use of accurate vocabulary by asking, "What did you get as the product of 8 × 7?" Similarly, students should be expected to respond by stating, "The product of 8 × 7 is 56."

3. The teacher wrote the equation $10 \times 4 = \square + 5$ on the board. Sarah said the missing number is 40. Is Sarah correct or incorrect? What reasoning do you think Sarah was using?

   Students may agree that Sarah's answer is correct because they view the equal sign as meaning "the answer is" rather than understanding that the equal sign denotes the equivalence between two quantities. It might be helpful to ask students to model the equation using manipulatives to determine if the equation is balanced or not balanced. In addition, it may be helpful for students to solve the right side of the equation as if the missing number was 40 to show that the left side of 40 is not equivalent to the right side of 40 + 5.

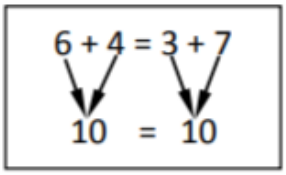
4. Create three different expressions that each make this equation true when placed in the blank:

   $$15 - 3 = \_\_\_\_\_$$

   Use a different operation ($+$, $-$, $\times$, $\div$) in each expression you create.

   Students may have difficulty determining three equations using different operations. Some students may immediately want to simplify and solve the problem instead of creating an equivalent expression using at least one operation.

   If students only create addition equations, they likely need exposure to various equations that use other operations. Encourage students to use manipulatives and to share how they made their decision. This allows students to go beyond doing the arithmetic and to think about the equality relationships between the expressions in an equation. If needed, use a visual to illustrate correct and incorrect responses to ensure that students understand the concept of equality, such as a balance scale or the example below.



5. Fill in the blanks to show whether the expressions are equal (=) or not equal (≠).

   a) 7×6 _____ $6 + 7$

   b) 2×6 _____ 3×4

   c) $20 \div 2$ _____ 10×3

   d) $35 - 19$ _____ $20 + 15$

   A common misconception that some students have is to think that two expressions are not equal if the operations are different for each expression. Students often confuse operations when representing expressions that are equivalent, especially when the same digits are used, as in example a). Another common error is for students to say that example c) is equivalent because they only look at the first number in the second expression (i.e., 20 ÷ 2 = 10). It may be helpful to have students simplify each side independently of each other and compare the two values when deciding if the expressions are equal or not equal. For students who need additional support, it may be helpful to model the expressions using manipulatives to determine whether they are equivalent.

6. Determine all the factor pairs for the following numbers:

   b) 96 b) 54

   Students may have difficulty determining all the factor pairs for the given numbers. For example, students may recognize the factors that result from a basic fact (e.g., 12 and 8 for 96, 9 and 6 for 54) but may struggle to find other factors. It may be helpful to encourage students to use a systematic approach to check for all factor pairs. Consider the number 96. Students should begin with 1 and determine whether 1 is a factor of 96. (Students should recognize that 1 will be a factor of all numbers.) Then students should determine whether 2 is factor of 96, then 3, and so on. This will result in a list of factor pairs, as shown below:

   96

   1×96
   2×48
   3×32
   4×24
   6×16
   8×12

7. Complete the table shown below. Identify the greatest common factor for each set of numbers.

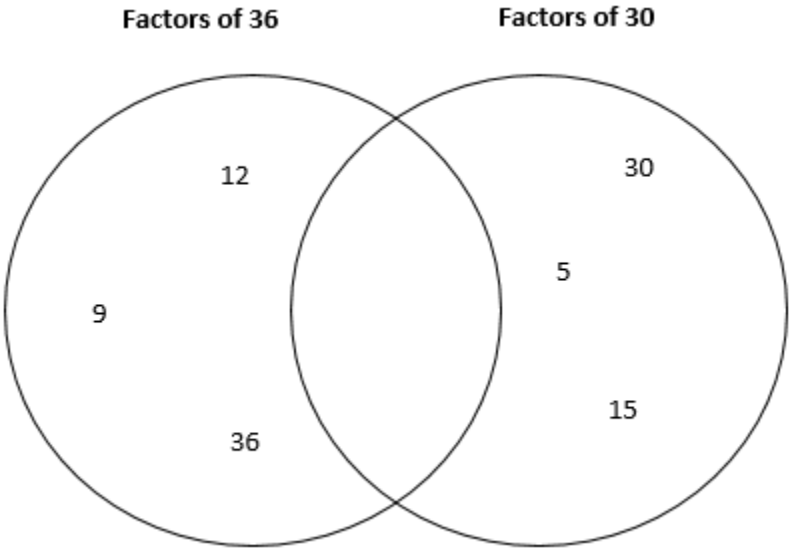
Set of Numbers	Greatest Common Factor
12 and 30	
3, 6, and 7	

A common misconception for some students is to confuse the terms "multiples" and "factors." These students may begin listing multiples and finding the least common multiple between the given numbers. (Note: Least common multiple [LCM] is formally introduced in Grade 5.) Connecting these terms to the concepts of multiplication and division would also benefit students in identifying factors, common factors, and the greatest common factor. Teachers should model using accurate vocabulary during instruction and students should also be encouraged to use accurate vocabulary in their verbal and written responses.

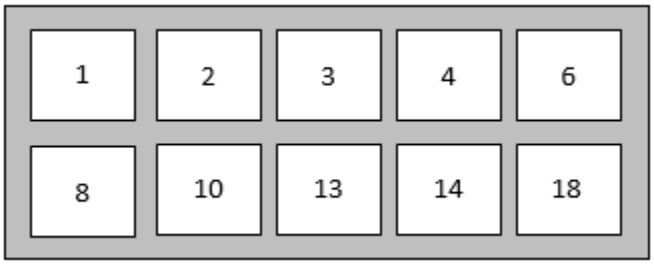
Another common misconception is that some students do not understand that 1 can be the greatest common factor. In the set of numbers 3, 6, and 7, the greatest common factor is 1. Exploring and identifying factors of different sets of numbers is important in developing a greater understanding of factors.

Using a calculator to check for common factors is a strategy that may benefit some students. This strategy could be used to reinforce divisibility rules and students' understanding of those rules.

8. Use the numbers shown below the diagram to complete this problem. Write the numbers in the correct section to show the factors of 36, the factors of 30, and the common factors of 36 and 30. Some of the numbers in the table may not be used.



Numbers for Diagram



When identifying common factors, a common error for some students results from not identifying all factors of each given whole number. When identifying factors of a whole number, students should be able to identify a whole number that divides evenly into that number with no remainder. Several different strategies may be used to help students identify factors of a whole number. Students may create a list of factor pairs, as shown below:

36

1×36
2×18
3×12
4×9
6×6

Some students may need additional support to determine the factors of 36 and 30. Using manipulatives such as a multiplication chart or hundreds chart or pictorial representations to create arrays may help students to identify factors of a whole number. Students may arrange or create arrays with equal rows until all factors have been identified. Whatever method students use to identify all the factors of a number, it is important to use a systematic and organized approach to ensure no factors are missed.

Another common misconception for some students is not recognizing that 1 is always a common factor for every number. Exploring and identifying factors of different sets of numbers is important in developing a greater understanding of factors.

9. Solve the problem shown below.

$92 \div 4$

A common misconception when solving division problems is understanding and connecting the concept of place value and identifying related facts that correlate with the problem. When dividing

92 by 4, it is important for students to apply estimation strategies to determine that the quotient should be between 20 and 30. When estimating the quotient students could also connect the related multiplication facts such as 4 x 20 and 4 x 30 to determine a reasonable estimate. When finding the actual quotient, students should continue to apply estimation strategies and place value number sense. If students are unable to identify the quotient 23, then these students may need additional time exploring division problems using concrete manipulatives and/or pictorial representations.

10. Three friends earned a total of 200 tickets playing a game at the school carnival. They decided each of them would receive an equal share of the tickets. How many tickets did each friend receive?

    When developing the concept of division, students should explore division problems with a variety of concrete models to build a conceptual understanding, including contextual problems with remainders and without remainders. After solving, students should determine that the quotient is 66 R2. They will need to determine how the remainder of 2 tickets impacts the solution. In this case, each friend will receive 66 tickets, and there will be 2 tickets left over.

    Students should have experience solving contextual problems that require them to interpret the remainder. In some situations (such as above), the remainder can be dropped. However, in other situations, a remainder may result in needing to add an extra (e.g., adding an extra bus for a field trip to ensure all students will have a seat on a bus).

11. Use estimation to identify the division problem shown below that has a quotient that is a little more than 100. Justify your reasoning using pictures and/or words.

    a) $389 \div 5$
    b) $705 \div 6$
    c) $899 \div 3$
    d) $656 \div 8$

    A common misconception for students is to find the exact quotient first instead of estimating. It is important for students to apply a variety of estimation skills such as using compatible numbers or rounding to estimate quotients. Students can also use related multiplication facts and place value to estimate the quotients. Students should be able to justify their answer by using place value to explain which division problem has a quotient that is a little more than 100. If students are unable to identify the division problem, students may need additional time using concrete manipulatives to model. It is also important for these students to make a connection between the dividend and divisor when determining which quotient is a little more than 100. Some students may use the related multiplication fact of multiplying each divisor by 100 to determine which dividend is closest.

12. Solve the following problems.

    a) 32×78 = _____

    b) 617×4 = _____

    c) 89×5 = _____

    When finding the product of two whole numbers, students should have the opportunity to explore a variety of strategies and representations. It is common for students to solve correctly a two-digit number multiplied by a single-digit number or a three-digit number multiplied by a single digit, but they may be unable to apply these skills when multiplying a two-digit number by a two-digit number. This is apparent when students do not understand the concept of multiplication and how to solve the problem conceptually. Prior to solving, students should be encouraged to estimate the product (e.g., $30 \times 80 = 2{,}400$). This will allow students to determine whether their final product is reasonable.

    When solving the problem with an algorithm, some students will not apply place value concepts and instead ignore the value of each digit. When this occurs, students tend to forget to add a zero when multiplying by a ten or they often forget to add when they regroup. These students would benefit from exploring a variety of strategies using concrete models and/or pictorial representations. The area or array model is one strategy that is a pictorial representation that builds number sense while focusing on the value of the numbers. Exploring partial products is another strategy that will help students to build a greater understanding of number sense. When students have a conceptual understanding of multiplication, they can apply these skills to more efficient strategies when multiplying larger numbers.

13. Smithtown Elementary School hosted a canned food drive. They collected 188 cans of food per day for 7 days. How many total cans of food did the school collect?

    Students may have difficulty solving a contextual problem involving multiplication. For example, they may see the word "total" and think they need to add, resulting in an incorrect answer of 195 cans of food. It may be helpful for students to draw a picture of the action occurring in the problem (see below). Then they can see that 188 is being added 7 times, which is the same as multiplying 188×7.

Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
188 cans	188 cans	188 cans	188 cans	188 cans	188 cans	188 cans