Just in Time Quick Check

Standard of Learning 2.CE.1

Strand: Computation and Estimation

Standard of Learning 2.CE.1

The student will recall with automaticity addition and subtraction facts within 20 and estimate, represent, solve, and justify solutions to single-step and multistep problems, including those in context, using addition and subtraction with whole numbers where addends or minuends do not exceed 100.

Students will demonstrate the following Knowledge and Skills:

a) Apply strategies (e.g., rounding to the nearest 10, compatible numbers, other number relationships) to estimate a solution for single-step addition or subtraction problems, including those in context, where addends and minuends do not exceed 100.

b) Apply strategies (e.g., the use of concrete and pictorial models, place value, properties of addition, the relationship between addition and subtraction) to determine the sum or difference of two whole numbers where addends or minuends do not exceed 100.

c) Represent, solve, and justify solutions to single-step and multistep contextual problems (e.g., join, separate, part-part-whole, comparison) involving addition or subtraction of whole numbers where addends or minuends do not exceed 100.

d) Demonstrate fluency with addition and subtraction within 20 by applying reasoning strategies (e.g., doubles, near doubles, make-a-ten, compensations, inverse relationships).

e) Recall with automaticity addition and subtraction facts within 20.

f) Use patterns, models, and strategies to make generalizations about the algebraic properties for fluency (e.g., 4 + 3 is equal to 3 + 4; 0 + 8 = 8).

g) Determine the missing number in an equation (number sentence) through modeling and justification with addition and subtraction within 20 (e.g., 3 + __ = 5 or __ + 2 = 5; 5 – __ = 3 or 5 – 2 = __).

h) Use inverse relationships to write all related facts connected to a given addition or subtraction fact model within 20 (e.g., given a model for 3 + 4 = 7, write 4 + 3 = 7, 7 – 4 = 3, and 7 – 3 = 4).

i) Describe the not equal symbol (≠) as representing a relationship where expressions on either side of the not equal symbol represent different values and justify reasoning.

j) Represent and justify the relationship between values and expressions as equal or not equal using appropriate models and/or symbols (e.g., 9 + 24 = 10 + 23; 45 - 9 = 46 - 10; 15 +16 ≠ 31 +15).

Just in Time Quick Check

Just in Time Quick Check Teacher Notes

Supporting and Prerequisite SOL: 1.CE.1

Just in Time Quick Check 2.CE.1

*Note to teachers: Have students share their strategies orally or in writing in order to determine how they solved each problem in question 1.

1. Determine each sum or difference.

   a) 8 + 5 =

   b) 16 – 9 =

   c) 7 + 7 =

   d) 5 + 6 =

   e) 17 – 8 =

2. Tom cooked 8 hotdogs. Wes cooked some more hotdogs. Tom and Wes cooked 19 hotdogs altogether. How many hotdogs did Wes cook?

3. Tonya had 12 flowers. Tonya put some of these flowers in a basket. Tonya has 3 flowers left over. How many flowers did Tonya put in the basket?

4. Mrs. Gates baked some brownies. She gave 8 brownies to her neighbor. Now Mrs. Gates has 12 brownies. How many brownies did Mrs. Gates bake?

5. Write the related facts for 7 + 6 = 13.

6. Estimate the sum.

   53 + 42 = ?

7. Ben has 26 toy cars. Jon has 49 toy cars. About how many toy cars do Ben and Jon have together?

8. Estimate the difference:

$$87 - 36 = ?$$

9. Shaniya has 47 stickers. Kari has 79 stickers. About how many more stickers does Kari have than Shaniya?

10. About how much is 77 – 51?

11. 62 + 28 = _____

12. 97 – 28 = _____

13. 56 – 15 = _____

14. Find the sum: 76 + 17 = ?

15. Find the difference: 78 – 39 = ?

16. Maria has 17 more games than Chris. Maria has 43 games. How many games does Chris have?

17. Bruce had some toy cars. He gave 19 toy cars to Nick. Now Bruce has 56 toy cars left. Bruce started with _______ toy cars.

18. Morgan has 32 rocks. Lora has 19 more rocks than Morgan. What is the total number of rocks Morgan and Lora have?

19. Sharon had 35 pictures. Then she made 45 more pictures. She sold 53 of these pictures at an art show. How many pictures did Sharon have left over?

20. What number will make this equation true?

$$6 + 7 = \square + 8$$

21. Which symbol makes each number sentence correct? Write the correct symbol in each box.

$=$ $\neq$

a) $5 + 3 \ \square \ 16 - 8$

b) $8 - 2 \ \square \ 6 + 4$

2.CE.1 Just in Time Quick Check Teacher Notes

Common Errors/Misconceptions and their Possible Indications

*Note to teachers: Have students share their strategies orally or in writing in order to determine how they solved each problem in question 1.

1. Determine each sum or difference.

   a) 8 + 5 =

      Students relying on a counting on strategy for addition may start with 9 when counting on 5 (9, 10, 11, 12, 13) and arrive at a correct answer, or they may include the 8 in their count (8, 9, 10, 11, 12) and arrive at an incorrect answer. In both situations, students would benefit from exposure to other students' strategies for basic facts, as well as practice using and selecting strategies that may be more efficient. An efficient strategy for students unable to recall this sum with automaticity would be to "make 10," decomposing the 5 from 8 + 5 to arrive at 8 + 2 + 3, making 10 from 8 + 2, and then solving 10 + 3 = 13. Number routines (i.e., number talks using two dot cards) can provide opportunities for students to explore making ten and other composing/decomposing strategies that develop flexibility and fluency in working with numbers to 20.

   b) 16 – 9 =

      Students may rely only on the counting back strategy, solving this by starting at 16 and counting back 9 (15, 14, 13, 12, 11, 10, 9, 8, 7) or miscounting and/or including the 16 in their count for a difference of 8. These students would benefit from practice in the use and selection of strategies that may be more efficient. An efficient strategy for this problem would be using the knowledge that 16 – 10 is 6, so 16 – 9 would be 7. Students might also use related facts and think "9 plus what number make 16?" to solve this subtraction fact.

   c) 7 + 7 =

      Students who count on or count all may find the sum, but they may be more likely to miscount than students who are able to apply an efficient strategy using facts with which they are fluent. An efficient strategy for this problem would be doubles. For students who have not yet developed fluency with double 7's, exposure to decomposing the seven (thinking of 7 as 5 + 2) and using the combination of those doubles (double 7 = double 5 + double 2) may be helpful. Students may also use the "make 10" strategy and think "7 + 7 = 7 + 3 + 4 = 10 + 4." Exposure to a variety of strategies and practice using those strategies helps students develop flexibility with number combinations that will be a helpful foundation for computation with larger numbers.

   d) 5 + 6 =

      Students may start at 5 and count on 6 or start at 6 and count on 5 but arrive at 10 instead of 11. These students would benefit from opportunities to think about and practice other strategies using facts with which they are fluent. For example, students who are fluent with doubles for 5 or for 6 may use "near doubles" and think 5 + 6 = (5 + 5) + 1, or they may think 5 + 6 = (6 + 6) - 1. Encouraging students to try another strategy, even when they have found the correct sum, helps them discern which strategies are more efficient for certain sums and builds confidence with this flexible thinking.

e) 17 – 8 =

Students who count back 8 must keep track along the way and may be likely to miscount. Students might also include 17 in their count and get 10 instead of 9. These students would benefit from opportunities to participate in number routines where they are exposed to and can consider other students' strategies. One efficient strategy for this problem would be to use 17 – 7 = 10 and then take one more away (since subtracting 8 is subtracting one more than 7) to arrive at a final answer of 9. Students might also use the "near doubles" (double 8 is 16 and 17 is one more than 16). Teachers are encouraged to record examples of strategies shared by students that other students may use as reference as they explore strategies with which they are less familiar.

2. Tom cooked 8 hotdogs. Wes cooked some more hotdogs. Tom and Wes cooked 19 hotdogs altogether. How many hotdogs did Wes cook?

Students may add 8 and 19 for an incorrect response of 27 hotdogs. This may indicate that students are relying on a key word or phrase to suggest an operation (in this problem, "altogether") instead of using the complete context to solve the problem. Students making this type of error would benefit from more experiences with the various problem types described in the Grade 2 Mathematics Instructional Guide.

Students may use logical strategies for subtraction but make an error when applying their strategy. Students who count on from 8 to 19 may mistakenly start with 8 (8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19) and say that Wes cooked 12 hotdogs. Similarly, students who count back from 19 to subtract 8 from 19 may miscount or mistakenly count 19 and arrive at 12. For both errors, students may benefit from exposure to and practice with other strategies for computation and/or the use of concrete objects, a hundred chart, or a number line for support. For example, encourage students to think about how they could use their knowledge that 8 + 10 = 18 as another strategy for solving this problem.

Experiences during which students share strategies with their peers (i.e., number routines or number talks) strengthen the ability to recognize and use the relationships between addition and subtraction and offer opportunities to explore other efficient strategies for solving problems.

3. Tonya had 12 flowers. Tonya put some of these flowers in a basket. Tonya has 3 flowers left over. How many flowers did Tonya put in the basket?

Students who use subtraction may struggle with the computation, such as making a counting back error. Students might use a "close" fact incorrectly. For example, students might recognize that 13 – 3 is close to 12 – 3 but then adjust the 10 (from 13 – 3 = 10) by adding 1 instead of subtracting 1 to compensate for the difference between 13 and 12. It may be helpful to provide experiences that allow students to consider and practice other students' strategies for subtraction (e.g., using manipulatives with tens frames or a number line to model the problem and determine the difference, representing thinking with a picture). Students would benefit from more experience with the various problem types. Refer to the Grade 2 Mathematics Instructional Guide for descriptions of problem types.

4. Mrs. Gates baked some brownies. She gave 8 brownies to her neighbor. Now Mrs. Gates has 12 brownies. How many brownies did Mrs. Gates bake?

   Students who use key words, rather than developing an understanding of the complete context to solve the problem, may see the word "gave" in the problem and subtract 8 from 12, resulting with Mrs. Gates starting with 4 brownies. These students may benefit from acting out and discussing various problem scenarios with their peers, as well as increased exposure to the full variety of problem types to build understanding of the importance of context in problem solving. Additionally, students should ask themselves if their answer is reasonable. It is not reasonable for Mrs. Gates to have only baked 4 brownies if she gave 8 brownies to her neighbor.

   Students counting on from 8 and adding 12 more may count incorrectly or may begin counting with 8 instead of 9. Students who solve this problem using addition and regrouping may not regroup correctly. Students making computation errors may benefit from more experience using manipulatives (e.g., ten frames, base-ten blocks, hundred charts, and number lines) to model the action of the problem. They would also benefit from number routines that allow them to explore and develop flexible strategies for addition that are based on the numbers involved. For this example, students using ten frames to model this problem might use a "make ten" strategy, seeing that the 2 from the 12 can be used with the 8 to make ten (8 + 12 = 8 + 2 + 10 = 10 + 10 = 20).

5. Write the related facts for 7 + 6 = 13.

   Students commonly struggle with writing the related subtraction facts and may write 7 – 6 = 13 or 6 – 7 = 13 as a related fact sentence. Students should be encouraged to think of the related addition fact when they encounter a subtraction fact they do not know. For example, students who are unsure of 13 – 7 = ? but who know that 7 + 6 = 13 can be encouraged to think, "7 and what number make 13?" Providing students with a scenario that they can act out will help in visualizing the relationship between addition and subtraction. For instance, if there are 7 girls and 6 boys on the soccer team (13 players), what are the addition and subtraction number sentences that could be written to describe this team (e.g., 13 players – 7 girls = 6 boys)?

6. Estimate the sum.

   53 + 42 = ?

   Students who estimate the sum to be 95 have found the exact sum instead of estimating, which may indicate they are unsure how to estimate. These students may benefit from further exposure to estimation strategies shared by their peers during number talks.

7. Ben has 26 toy cars. Jon has 49 toy cars. About how many toy cars do Ben and Jon have together?

   Students who say that Ben and Jon have about 75 cars found the exact answer, instead of an estimate. It may be beneficial to draw their attention to the word "about" in the problem and facilitate a discussion about what this word means in this context.

Some students may use front end estimation and estimate the sum to be 60 (20 + 40 = 60). While 60 is an accurate result from front-end estimation, it may be helpful to encourage students who arrive at this estimate to consider if another strategy may be closer to the exact answer and why. Students who are unable to estimate may benefit from additional opportunities to participate in number sense routines where they can share strategies and collaborate with classmates in solving estimation problems.

8. Estimate the difference:

   81 – 38 = ?

   Students who estimate the difference to be 50 have likely used front-end estimation correctly (80 – 30), when using 40 in place of 38 will yield an estimate closer to the exact answer since 38 is closer to 40 than to 30. Students may need additional opportunities to collaborate and solve estimation problems and to become more familiar with different estimation strategies, as well as when an estimate is appropriate and might be used.

9. Shaniya has 47 stickers. Kari has 79 stickers. About how many more stickers does Kari have than Shaniya?

   Students who give an estimate of 110 have added instead of subtracting. Students who answer "32" have provided an exact answer, indicating they may not understand the term "about." Students may need additional opportunities to collaborate and solve estimation problems and to become more familiar with how and when an estimation might be used. Students who struggle to solve this problem may also benefit from further practice with comparison problems where the difference is unknown. Refer to the Grade 2 Mathematics Instructional Guide for additional samples of various problem types that should be included during instruction.

10. About how much is 77 – 51?

    Students who answer with the exact difference of 26 may not understand the meaning of estimation and would benefit from additional opportunities to deepen their understanding of estimation, to learn when and why estimation might be used, and to explore and share estimation strategies with their peers.

11. 62 + 28 = _____

    Some students, attempting to use friendly numbers, may round 28 to 30, solving 62 + 30 = 92 but then forget to subtract the extra 2 that was added when rounding 28 to 30 (i.e., 92 – 2 = 90). Some students using the traditional algorithm may have difficulty regrouping. These students would benefit from opportunities to develop a deeper understanding of place value using groups of ten or proportional models (e.g., base-ten blocks) that demonstrate the ten-to-one relationship applied when regrouping, to illustrate the regrouping concept.

12. 97 – 28 = _____

Some students who solve this problem using the traditional algorithm may have difficulty regrouping to subtract. As a result, they may realize they cannot subtract 8 from 7 and "flip" the digits, subtracting 7 from 8, resulting in an incorrect difference of 71. Students making this error have memorized steps for solving problems using the traditional algorithm but do not have a firm understanding of place value. These students may benefit from engaging in number routines that focus on strategies used to subtract two-digit numbers using base-ten blocks, a hundreds chart, number line, or other strategies.

13. 56 – 15 = _____

Students who lack place value understanding may subtract 5 – 1 = 4 (for the tens) and 6 – 5 = 1 (for the ones) but then not consider place value and combine those steps for an answer of 5 (i.e., 4 + 1 = 5). These students would benefit from using base-ten blocks, a hundreds chart, and/or a number line.

Some students, comfortable with making friendly tens, may solve 56 – 20 = 36 but forget to add the 5 back to compensate for the difference in the 20 they used and the 15 that is in the original equation. Some students who used this strategy may compensate by subtracting 5 more from 36 instead of adding 5 to 36. In both instances, students may benefit from recording the changes made to keep track of their thinking.

14. Find the sum: 76 + 17 = ?

Some students may solve the problem by adding the tens digits first (7 + 1 = 8) and then do not know what to do when they find the sum to 6 and 7 is 13 and say the answer is 813. These students may benefit from further instruction on strategies used to add two-digit numbers using concrete objects that are proportional and can be regrouped (e.g., base-ten blocks, trains of ten). It may be helpful for students to use estimation to determine whether the result of their calculation is reasonable. For example, 80 + 20 = 100, so 813 is not a reasonable sum. Having students estimate prior to solving may encourage students to think about place value when computing.

15. Find the difference: 78 – 39 =

Students may solve this problem using partial differences, first solving 78 – 30 = 48, and then counting back 9 from 48, which may result in an error from miscounting or from including 48 in the count and arriving at 40 (48, 47, 46, 45, 44, 43, 42, 41, 40) instead of 39. These students would benefit from using a hundreds chart and from exposure to peers' strategies for composing/decomposing when subtracting.

Students who solve using the traditional algorithm may "flip" the digits in the ones and subtract 8 from 9. These students may have a memorized procedure for the traditional algorithm but may lack a firm understanding of place value. These students would benefit from using proportional models that can be regrouped to illustrate the regrouping concept.

16. Maria has 17 more games than Chris. Maria has 43 games. How many games does Chris have?

Some students make the common error of adding because they see the word "more," and determine the answer to be 60 (17 + 43 = 60). Students who use only one part of the context to determine an operation need to develop an understanding of the complete context to solve the problem. These students would benefit from more *experiences making sense of various contexts during peer discussions and working with a variety of associated problem types.*

Students who add may also not regroup correctly and may make some of the following errors: 43 + 17 = 510 or 43 + 17 = 50, etc.

Students who subtract may also not regroup correctly and may make some of the following errors: 43 – 17 = 34 or 43 – 17 = 36, etc.

Students who make computation errors such as these may benefit from experiences that allow them to consider and develop flexible strategies for addition and subtraction, as well as more experiences with concrete objects that represent the ten-to-one relationship that exists within the base-ten system (e.g., trains of ten made from linking cubes or base-ten blocks), hundred charts, and number lines.

17. Bruce had some toy cars. He gave 19 toy cars to Nick. Now Bruce has 56 toy cars left. Bruce started with _______ toy cars.

Students who use key words rather than developing an understanding of the complete context to solve the problem may see the word "left" in the problem and think it means to subtract. This might result in students subtracting 19 from 56 and stating that Bruce started with 37 toy cars. Students may benefit from more experiences with the associated problem types and representing those problems by acting them out or representing them with drawings and words. It may also be helpful to encourage students to check their final answer for reasonableness. For example, it does not make sense for Bruce to have started with 37 cars, given some cars to Nick, and still have 56 cars left.

Students who subtract also may not regroup correctly and may make some of the following errors: 56 – 19 = 43 or 56 – 19 = 47, etc.

Students who add may also not regroup correctly and may make some of the following errors: 56 + 19 = 615 or 56 + 19 = 65, etc.

Students making computation errors such as these may benefit from more experiences with concrete objects that are proportional and can be regrouped, hundred charts, and number lines. They would also benefit from exposure to other students' strategies for addition and subtraction and opportunities to practice those strategies with a variety of problems.

18. Morgan has 32 rocks. Lora has 19 more rocks than Morgan. What is the total number of rocks Morgan and Lora have?

Students may add to find that 32 + 19 = 51 and state this as the total number of rocks. This error suggests that students are not using the full context of the problem and do not understand that this is a multistep problem. Encourage students to reread the question to determine if the answer addresses the question being asked. Drawing pictures to represent each part of the question is a strategy that may increase understanding when solving practical problems. Exposure to a variety of problem types is essential as students develop strategies for solving practical problems.

Students who make computational errors may benefit from more experiences with concrete objects that are proportional and can be regrouped, hundred charts, and number lines. These students would also benefit from opportunities to try out strategies used by other students, which may further the development of flexible strategies for addition and subtraction.

19. Sharon had 35 pictures. Then she made 45 more pictures. She sold 53 of these pictures at an art show. How many pictures did Sharon have left over?

Students may recognize this as a multistep problem, but they may add all three numbers, which may indicate that they are not using the full context of the problem. Representing all the information from the practical problem with a picture and words may help students understand the problem presented and the importance of attending to the full context to solve the problem completely. Students may also benefit from more experiences with the variety of associated problem types described in the Grade 2 Mathematics Instructional Guide.

Encourage students who make computational errors to use concrete objects such as base-ten blocks or trains of ten, hundred charts, and number lines as they solve and record their problem-solving steps. Experiences that allow students to develop flexible strategies for addition and subtraction are also beneficial.

20. What number will make this equation true?

$$6 + 7 = \square + 8$$

The most common error, 13, indicates the misconception that the number immediately following the equal sign is the "answer" for the expression on the left side of the equation. These students may benefit from more experience using manipulatives and/or balances to model number sentences, to include number sentences with expressions that are equal (equations) and number sentences with expressions that are not equal (not equations). Incorporating the terminology associated with equivalence into everyday classroom discussions (e.g., equal/not equal, equivalent/not equivalent, the same value as/not the same value as, balanced/not balanced) along with the symbolic notation will help students acquire and appropriately use this vocabulary.

21. Which symbol makes each number sentence correct? Write the correct symbol in each box.

$$\boxed{=} \quad \boxed{\neq}$$

a) $5 + 3 \ \square \ 16 - 8$

Some students may not think the expressions are equal because the operations are not the same. These students may need to develop their conceptual understanding of equality through more experiences using manipulatives or balances to model.

b) $8 - 2 \; \square \; 6 + 4$

Some students may think these expressions are equal because they have the misconception that the box means "the answer is." Students need more opportunities with manipulatives (e.g., counters, linking cubes) in which they find the value of each expression and then compare the values to determine if they are equivalent. Students will benefit from exposure to peers' strategies for modeling number sentences during classroom discussions.