Overview of Instructional Task: A Multiplication Problem

In this instructional task, students determine the difference between 25 x 8 and 25 x 9 without doing any multiplication. Emphasize the phrase "without doing any multiplication."

Task Window

Within Unit 4, task window is flexible.

Task should be implemented after students have begun work on arrays to solve problems involving multiplication but before complete mastery.

Summary of Instructional Task

- One to two days before lesson, do the section titled Before Lesson.
- The lesson plan gives suggested time allotments, questions, and prompts to support students with the task. Collaborative group work, as well as whole group work, is noted.
- After the lesson, students read and revise their original responses and write what they learned.
- Analyze student responses to identify next instructional steps.

Task details are included on the following pages.

Framework for Effective Teaching

I.2 Provides rigorous tasks that require critical thinking with appropriate digital and other supports to ensure student success.
I.5 Checks for understanding of content/language objectives.
I.6 Provides differentiation that addresses students' instructional needs and supports mastery of content/language objectives.
I.8 Promotes student communication and collaboration using appropriate digital and other resources.

ELG Connection

3.OC.5: Use arrays, area models, and skip counting to represent multiplication (3.OA.1); use equal sharing and equal grouping to model division (3.OA.2). Understand division as an unknown-factor problem (3.OA.6). (Major)

Instructional Task: A Multiplication Problem

Content/Language Objective

Students determine the difference between 25 x 8 and 25 x 9 without multiplying by describing solution strategies, using nouns (e.g., array, difference) and supports such as:

a. **quarters,**
b. **two one-digit multiplication problems on cards with one factor the same, and/or**
c. **sentence stems (e.g., The difference between 25 x 8 and 25 x 9 is _____ because _____).**

Common Core State Standards

This instructional task emphasizes the following Standards for Mathematical Practice.

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique others' reasoning.
6. Attend to precision.

This instructional task also asks students to select and apply mathematical content from the following Common Core State Standard.

3.OA.1: Interpret products of whole numbers (e.g., interpret 5 x 7 as the total number of objects in five groups of seven objects each). For example, describe a context in which a total number of objects can be expressed as 5 x 7.

Background for Teachers

In this task, students determine the difference between 25 x 8 and 25 x 9 without doing any multiplication.

- Before the lesson, students attempt the task individually. Review their work and formulate questions for students to answer to improve their solutions.
- At the start of the lesson, students work alone answering teacher questions about the same task.
- Then students are grouped and engage in collaborative discussions of the same task.
- In the same small groups, students are given student work samples to comment on and evaluate.
- In a whole class discussion, students explain and compare alternative solution strategies they have seen and used.
- Finally, students revise their original solutions and comment on what they learned.

Required Materials

- Copies of task, A Multiplication Problem, for students (page 10)
- Grid paper, coins, or counters for student use

Time

- Before lesson: 10–15 minutes
- Lesson: 60 minutes
- Total Time: 70–75 minutes

Before Lesson

Initial Exploration Before Providing Student Feedback (10–15 minutes)

Before the lesson, have students read the A Multiplication Problem task (page 10) individually and record what information they know and questions they have about solving the task. Make available for student use grid paper, coins, or counters for problem solving.

Have students work on the task individually for ten minutes. Collect students' responses to the task. Make notes on what their work reveals about their current levels of understanding and their different problem-solving approaches.

Do not score students' work. Research shows that it is counterproductive, as it encourages students to compare their scores and distracts their attention from what they can do to improve their mathematics.

Instead, help students make further progress by summarizing their difficulties as a series of questions, such as the suggestions below. Write a list of your own open-ended questions, based on your students' work. You may write questions on each student's work or select and write few questions on the board at the beginning of the lesson that will help the majority of students. You may also note students with particular issues, so you can ask them about their difficulties in the formative lesson.

Common Issues	Suggested Questions and Prompts
Student has difficulty getting started.	• *What do you know?* • *What do you need to find out?*
Student has difficulty understanding what the problem is asking.	• *In your own words, tell me what the task is asking you to do.* • *What tools could you use to help you solve this problem (e.g., quarters, grid paper)?* • *Remember, we are not using multiplication to solve the problem.*
Student works unsystematically.	• *Show me a model of the problem.*
Student presents work poorly.	• *How would you explain how you arrived at your answer?* • *What mathematical words (e.g., arrays, factors, difference) could you use in your explanation of how you found the difference?*
Student produces correct solution. Student needs extension task.	• *What would happen if you compared the difference between 25 x 4 and 25 x 8 without multiplying? What do you notice about these two problems?*

Suggested Lesson Outline

Improve Individual Solutions to Instructional Task (10 minutes)

> *Recall what we looked at yesterday. What was the task? I have read the work you have done, and I have some questions about your work. I would like you to work on your own to answer my questions for about ten minutes.*

Small Group Collaborative Work (10 minutes)

Organize the class into small groups of two or three students and distribute a blank A Multiplication Problem task (page 10) to each group. Ask students to try the task again; this time combining their ideas.

> *Put your own work aside until later in the lesson. I want you to work in groups now. Your task is to produce a complete solution that expands on your individual solutions.*

While students work in small groups, note different student approaches to the task and support student problem solving.

Note Different Student Approaches to Task

Use this information to focus a whole class discussion towards the end of the lesson. In particular, note any common mistakes.

Support Student Problem Solving

Try not to make suggestions that move students toward a particular approach to this task. Instead, ask questions that help students clarify their thinking. To help students really struggling with the task, use the questions on the previous page to support your questioning.

If the whole class struggles with the same issue, write relevant questions on the board. You could also ask students who performed well on the task to help struggling students. If students are having difficulty making any progress at all, hand out student work samples (pages 6–9) to model problem-solving methods.

Collaborative Analysis of Student Work Samples (20 minutes)

After students have had sufficient time to attempt the task, give each small group of students copies of the student work samples (pages 6–9) and ask for written comments. This step gives students the opportunity to evaluate a variety of possible approaches to the task, without providing a complete solution strategy.

> *Imagine you are the teacher and have to assess this work. Correct the work and write comments on the accuracy and organization of each response.*

Each student work sample poses specific questions for students to answer. In addition to these questions, you could ask students to evaluate and compare responses. To help them do more than check if the answer is correct, you may ask the following questions.

- *How did this student organize his or her work?*
- *What mistakes have been made?*
- *What isn't clear?*
- *What questions would you like to ask this student?*
- *In what ways might the work be improved?*

Every group may not have enough time to work through all student work sample questions. If so, be selective about what you hand out. For example, groups that successfully completed the task using one method might benefit from looking at different approaches. Other groups that struggled with a particular approach may benefit from seeing a student version of the same strategy.

During small group work, support students as before. Note similarities and differences between students' approaches during small group work and student work sample approaches. Also check which methods students have difficulties understanding to focus the next activity, a whole class discussion.

Whole Class Discussion: Compare Different Approaches (10 minutes)

Organize a whole class discussion to consider different approaches used in the student work samples. Focus the discussion on those parts of the small group tasks that students found difficult. Ask students to compare different solution methods.

- *Which approach did you find easiest to understand? Why?*
- *Which approach did you find most difficult to understand? Why?*

Review Original Solutions to Task (10 minutes)

Ask students to read their original responses to the task.

> *Read your original solutions and think about your work on this task. Write down what you learned. Which method would you prefer to use if you were doing the task again? Why?*

Encourage students to compare new approaches they learned during the task with their original methods.

Solutions

An array, number model, diagram coins, or counters that show the difference of 25 **without** multiplying

Sample 1: Student A

Name _____ Date _____ Time _____

LESSON 4•11

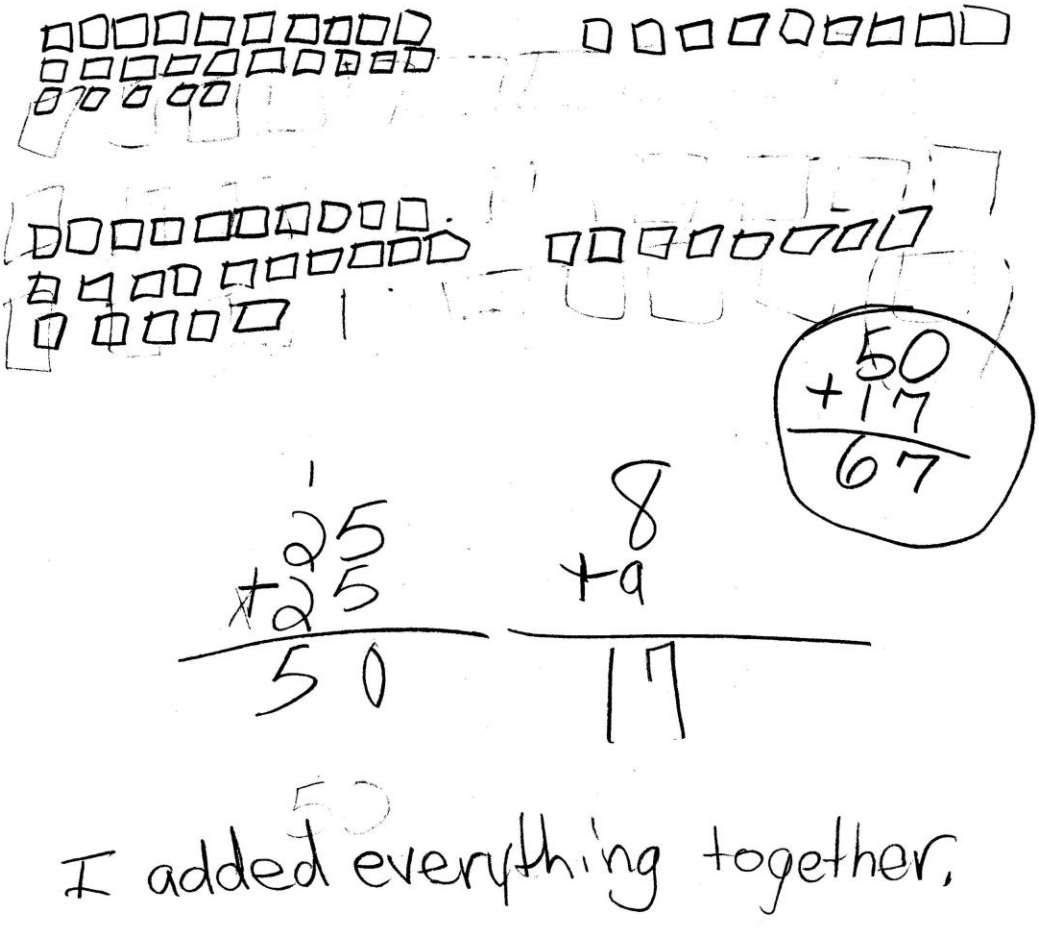
Open Response

Progress Check 4

Mrs. Sita told her class that they could calculate the **difference** between 25 × 8 and 25 × 9 without doing any multiplication.

Show or explain how Mrs. Sita's class might have solved the problem. (Hint: They might use pictures, arrays, number models, diagrams, coins, or counters.)

Make sure to include the answer to the problem in your explanation.



What mistakes have been made in this solution?

_____

_____

_____

_____

_____

_____

What questions would you ask this student?

_____

_____

_____

_____

_____

_____

_____

Sample 2: Student B

Name _____ Date _____ Time _____

LESSON 4•11

Open Response

Progress Check 4

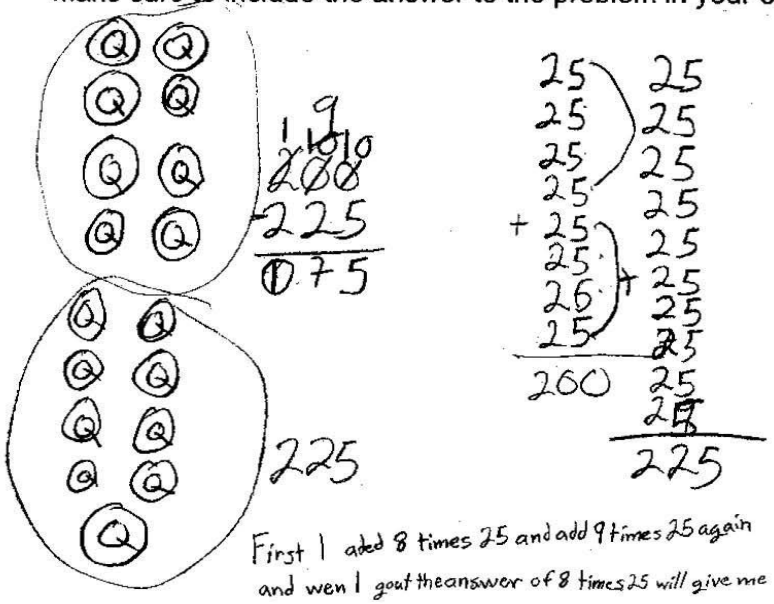
Mrs. Sita told her class that they could calculate the **difference** between

25 × 8
and
25 × 9

without doing any multiplication.

Show or explain how Mrs. Sita's class might have solved the problem. (Hint: They might use pictures, arrays, number models, diagrams, coins, or counters.)

Make sure to include the answer to the problem in your explanation.



First I added 8 times 25 and add 9 times 25 again and wen I got the answer of 8 times 25 will give me 200 and then I add 9 times 25 will be 225. Next I draw a picture of Quaters so will be the same total of step one. I record I find that total the number model. forth then I subtracted 200 + 225 the total will be 75.

What questions would you ask this student?

_____

_____

_____

_____

_____

_____

In what ways might the work be improved?

_____

_____

_____

_____

_____

_____

Name Date Time

LESSON 4•11

Open Response

Progress Check 4

A Multiplication Problem

Mrs. Sita told her class that they could calculate the **difference** between

$$25 \times 8$$
and
$$25 \times 9$$

without doing any multiplication.

Show or explain how Mrs. Sita's class might have solved the problem.

(Hint: They might use pictures, arrays, number models, diagrams, coins or counters.)

Make sure to include the answer to the problem in your explanation.