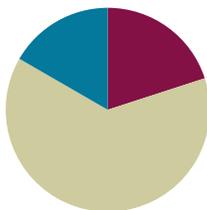


Lesson 30

Objective: Share and critique peer strategies for problem solving.

Suggested Lesson Structure

■ Fluency Practice	(12 minutes)
■ Concept Development	(38 minutes)
■ Student Debrief	(10 minutes)
Total Time	(60 minutes)



Fluency Practice (12 minutes)

- Multiply by 9 **3.OA.7** (8 minutes)
- Multiply and Divide **3.OA.7** (4 minutes)

Multiply by 9 (8 minutes)

Materials: (S) Multiply by 9 (6–10) Pattern Sheet

Note: This activity builds fluency with multiplication facts using units of 9. It works toward students knowing from memory all products of two one-digit numbers. See Lesson 1 for the directions for administration of a Multiply-By Pattern Sheet.

T: (Write $7 \times 9 = \underline{\quad}$.) Let's skip-count up by nines. I'll raise a finger for each nine. (Raise a finger for each number to track the count.)

S: 9, 18, 27, 36, 45, 54, 63.

T: Let's skip-count up by nines starting at 45. Why is 45 a good place to start?

S: It is a fact we already know, so we can use it to figure out a fact we do not know.

T: (Track with fingers as students say the numbers.)

S: 45 (5 fingers), 54 (6 fingers), 63 (7 fingers).

T: Let's see how we can skip-count down to find the answer, too. Start at 90 with 10 fingers, 1 for each nine. (Count down with fingers as students say the numbers.)

S: 90 (10 fingers), 81 (9 fingers), 72 (8 fingers), 63 (7 fingers).

Continue with the following possible sequence: 9×9 , 6×9 , and 8×9 .

T: (Distribute the Multiply by 9 Pattern Sheet.) Let's practice multiplying by 9. Be sure to work left to right across the page.

Multiply and Divide (4 minutes)

Note: This activity focuses on student mastery of all products of two one-digit numbers.

T: (Write $2 \times 2 = \underline{\quad}$.) Say the multiplication sentence.

S: $2 \times 2 = 4$.

Continue with the following possible sequence: 3×3 , 4×4 , and 5×5 .

T: (Write $3 \times 2 = \underline{\quad}$.) Say the multiplication sentence.

S: $3 \times 2 = 6$.

T: Flip it.

S: $2 \times 3 = 6$.

Continue with the following possible sequence: 4×2 , 5×3 , and 4×3 .

T: (Write $4 \div 2 = \underline{\quad}$.) Say the division sentence.

S: $4 \div 2 = 2$.

Continue with the following possible sequence: $15 \div 5$, $9 \div 3$, and $24 \div 4$.

Concept Development (38 minutes)

Materials: (T) Student work sample images (Template), timer
(S) Problem Sets from Lessons 28, 29, and 30, personal white board

Part 1: Analyze sample student work for accuracy and efficiency.

T: Read Problem 3 from yesterday’s Problem Set.

S: (Read: Jeremiah and Hayley use a piece of rope to mark a square space for their booth at the science fair. The area of their space is 49 square feet. What is the length of the rope that Jeremiah and Hayley use if they leave a 3-foot opening so they can get in and out of the space?)

T: (Project Student A’s work from the Template.) Let’s look at and discuss some possible solutions for this problem. Talk to your partner. What did Student A do to solve?



NOTES ON MULTIPLE MEANS OF REPRESENTATION:

Provide sentence starters to help English language learners confidently articulate what Student A did to solve:

- Student A drew a and labeled...
- He wrote the equation , which makes sense because ...
- He found the length of the rope by...
- He subtracted because...

Student A

Handwritten work for Student A:

Left side: A square with side length 7ft. Inside the square, it says $A=49$ and $P=28ft$. Below the square, it says $7 \times 7 = 49$.

Right side: A rectangle with a total length of 28ft and a 3ft opening. The width is labeled r ft. Below the rectangle, it says $r = 28 - 3$ and $r = 25$. Below that, it says "The total length of the rope is 25 feet."

- S: He found the side lengths of the square. Then, he figured out the perimeter of the square and subtracted the 3-foot opening to find the length of the rope.
- T: Other than getting the right answer, what did Student A do well?
- S: He drew a picture of the square and labeled the area and the side lengths. → He multiplied 4 sides times 7 centimeters to find the perimeter. → He drew a tape diagram to show why he subtracted in the last step. → He used a letter to represent the unknown.

Facilitate a discussion in which students analyze this work more closely. Use any combination of the following questions to guide the conversation.

- Was the drawing helpful? What makes it helpful or unhelpful?
 - Did Student A represent all the important information in his drawing? Why or why not?
 - Was this drawing the best one to use? Why or why not?
 - Can you retell the story using only the drawing and labels? Explain.
 - How did he organize the information?
- T: What suggestion would you make to Student A to improve his work?
- S: He does not need the addition number sentence for perimeter since he has the multiplication number sentence. → In the second step of the problem, it is not really clear what he is solving for. Maybe instead of using the letter P, he could write *perimeter* so anyone who looks at his work knows he is finding the perimeter. → He could draw another picture to show the square with the 3-foot opening in it. Then, he could just add the side lengths, and he would not have to show the third step of subtracting.

Repeat the process of analyzing using the two samples from the Template below. Modify these or create others as appropriate for the class. Select samples that are likely to stimulate discussion beneficial to student needs.

Student B

The length of the rope is 25 feet.

Student C

The length of the rope is 25 ft.

Conclude the analysis of the sample student work for this problem by discussing the following questions:

- Can you think of a quicker way to solve this problem? Why or why not?
- Would you have chosen any of these ways to solve this problem? Why or why not?

Part 2: Analyze peer work for accuracy and efficiency.

Note: Students should have enough copies of the Problem Set to complete a critique for each member of their group, or they can record their thoughts in their math journals.

Students work in groups of four to share solutions and critique their classmates' work. Students take turns presenting their solutions to a problem from the Lesson 28 or 29 Problem Sets. Today's Problem Set is a critiquing tool that group members can use as a guide for analysis and a place where they can record their thoughts at each step of the way. When a student finishes presenting, the other group members take a few minutes to ask the presenter clarifying questions. They might use questions similar to those given for discussion facilitation in Part 1. Students continue in this manner until each group member has presented at least one solution for the group to analyze.

MP.3

Prepare students:

- Model how students should present their work to their groups.
- List some of the clarifying questions that group members can choose to ask the presenter.
- Show a completed Problem Set (critiquing tool) to establish expectations for the group members who are critiquing their classmate's solution.
- Remind students to show their appreciation to classmates, both for sharing their work and for providing feedback about their work.
- Inform students that a timer will be set to let them know when they should transition to a new presenter, if appropriate for the class.
- Provide each group with a talking tool (e.g., a craft stick) to establish a protocol for only one student in the group to talk while the others listen, if appropriate for the class. Model using and then passing the tool to other group members to talk.



NOTES ON MULTIPLE MEANS OF ENGAGEMENT:

Student presenters may use translators, interpreters, or sentence frames to present and respond to feedback. Models shared may include concrete manipulatives, adaptive materials, or technology. If timing is a consideration, prepare presenters beforehand.

Student Debrief (10 minutes)

Lesson Objective: Share and critique peer strategies for problem solving.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson.

Any combination of the questions below may be used to lead the discussion.

- How did today's Problem Set or critiquing tool help you analyze your classmates' work?
- How does having your work critiqued by your classmates improve your problem-solving skills?

- How does critiquing your classmates' work improve your problem-solving skills?
- What was difficult about today's group activity? Why was it difficult?
- What strategies did you see in your classmates' work that you might try in future problems?

Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help with assessing students' understanding of the concepts that were presented in today's lesson and planning more effectively for future lessons. The questions may be read aloud to the students.

NYS COMMON CORE MATHEMATICS CURRICULUM Lesson 30 Problem Set 3•7

Name Gina Date _____

Use this form to critique your classmate's problem-solving work.

Classmate:	<u>Charlotte</u>	Problem number:	<u>L29 #4</u>
Strategies my classmate used:	<ul style="list-style-type: none"> • Drew a picture of a rectangle and labeled side lengths. • Added to find perimeter. • Used a tape diagram to find total of $3\frac{1}{2}$ perimeters. 		
Things my classmate did well:	<ul style="list-style-type: none"> • Used all steps in RDW. • Realized that $52+48=100$, so the perimeter is $2 \times 100 = 200$. • Drew and labeled a tape diagram to show thinking for the last step. 		
Suggestions for improvement:	<ul style="list-style-type: none"> • Use a letter to show the unknown in the last step. • Include units in all steps. 		
Strategies I would like to try based on my classmate's work:	<ul style="list-style-type: none"> • Thinking about numbers, like $52+48=100$, so I can use mental math, or do less work. 		

COMMON CORE Lesson 30: Share and critique peer strategies for problem solving. engage^{ny} 7.E.7
 Date: 12/19/13
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Multiply.

$9 \times 1 = \underline{\quad}$ $9 \times 2 = \underline{\quad}$ $9 \times 3 = \underline{\quad}$ $9 \times 4 = \underline{\quad}$

$9 \times 5 = \underline{\quad}$ $9 \times 6 = \underline{\quad}$ $9 \times 7 = \underline{\quad}$ $9 \times 8 = \underline{\quad}$

$9 \times 9 = \underline{\quad}$ $9 \times 10 = \underline{\quad}$ $9 \times 5 = \underline{\quad}$ $9 \times 6 = \underline{\quad}$

$9 \times 5 = \underline{\quad}$ $9 \times 7 = \underline{\quad}$ $9 \times 5 = \underline{\quad}$ $9 \times 8 = \underline{\quad}$

$9 \times 5 = \underline{\quad}$ $9 \times 9 = \underline{\quad}$ $9 \times 5 = \underline{\quad}$ $9 \times 10 = \underline{\quad}$

$9 \times 6 = \underline{\quad}$ $9 \times 5 = \underline{\quad}$ $9 \times 6 = \underline{\quad}$ $9 \times 7 = \underline{\quad}$

$9 \times 6 = \underline{\quad}$ $9 \times 8 = \underline{\quad}$ $9 \times 6 = \underline{\quad}$ $9 \times 9 = \underline{\quad}$

$9 \times 6 = \underline{\quad}$ $9 \times 7 = \underline{\quad}$ $9 \times 6 = \underline{\quad}$ $9 \times 7 = \underline{\quad}$

$9 \times 8 = \underline{\quad}$ $9 \times 7 = \underline{\quad}$ $9 \times 9 = \underline{\quad}$ $9 \times 7 = \underline{\quad}$

$9 \times 8 = \underline{\quad}$ $9 \times 6 = \underline{\quad}$ $9 \times 8 = \underline{\quad}$ $9 \times 7 = \underline{\quad}$

$9 \times 8 = \underline{\quad}$ $9 \times 9 = \underline{\quad}$ $9 \times 9 = \underline{\quad}$ $9 \times 6 = \underline{\quad}$

$9 \times 9 = \underline{\quad}$ $9 \times 7 = \underline{\quad}$ $9 \times 9 = \underline{\quad}$ $9 \times 8 = \underline{\quad}$

$9 \times 9 = \underline{\quad}$ $9 \times 8 = \underline{\quad}$ $9 \times 6 = \underline{\quad}$ $9 \times 9 = \underline{\quad}$

$9 \times 7 = \underline{\quad}$ $9 \times 9 = \underline{\quad}$ $9 \times 6 = \underline{\quad}$ $9 \times 8 = \underline{\quad}$

$9 \times 9 = \underline{\quad}$ $9 \times 7 = \underline{\quad}$ $9 \times 6 = \underline{\quad}$ $9 \times 8 = \underline{\quad}$

 multiply by 9 (6–10)

Name _____

Date _____

Use this form to critique your classmate’s problem-solving work.

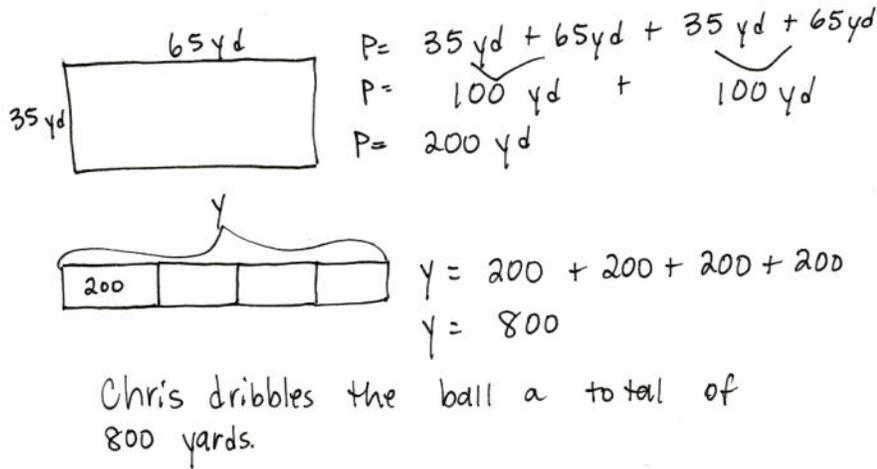
Classmate:	Problem Number:
Strategies My Classmate Used:	
Things My Classmate Did Well:	
Suggestions for Improvement:	
Strategies I Would Like to Try Based on My Classmate’s Work:	

Name _____

Date _____

Jayden solves the problem as shown below.

The recreation center soccer field measures 35 yards by 65 yards. Chris dribbles the soccer ball around the field 4 times. What is the total number of yards Chris dribbles the ball?



$P = 35 \text{ yd} + 65 \text{ yd} + 35 \text{ yd} + 65 \text{ yd}$
 $P = 100 \text{ yd} + 100 \text{ yd}$
 $P = 200 \text{ yd}$

$y = 200 + 200 + 200 + 200$
 $y = 800$

Chris dribbles the ball a total of 800 yards.

1. What strategies did Jayden use to solve this problem?

2. What did Jayden do well?

Name _____

Date _____

Use this form to critique Student A’s problem-solving work on the next page.

Student:	Student A	Problem Number:	
Strategies Student A Used:			
Things Student A Did Well:			
Suggestions for Improvement:			
Strategies I Would Like to Try Based on Student A’s Work:			

Name STUDENT A

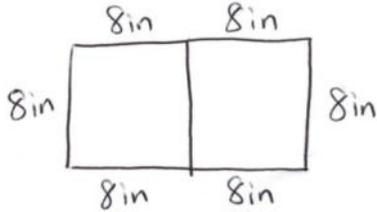
Date _____

1. Katherine puts 2 squares together to make the rectangle below. The side lengths of the squares measure 8 inches.

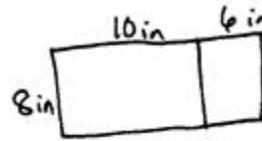


a. What is the perimeter of Katherine’s rectangle?

b. What is the area of Katherine’s rectangle?

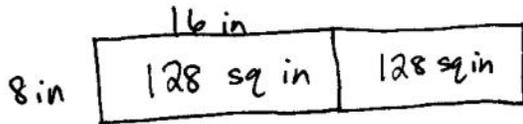


$P = 6 \times 8 \text{ in}$
 $P = 48 \text{ in}$
 The perimeter is 48 inches.



$A = (8 \times 10) + (8 \times 6)$
 $A = 80 + 48$
 $A = 128$
 The area is 128 sq in.

- c. Katherine draws 2 of the rectangles in Problem 1 side by side. Her new, larger rectangle is shown below. What is the area of the new, larger rectangle?

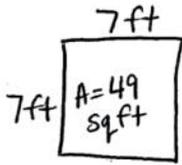


$$A = 128 \text{ sq in} + 128 \text{ sq in}$$

$$A = 256 \text{ sq in}$$

The area of the new rectangle is 256 sq in.

Student A

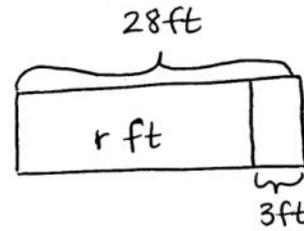


$$7 \times 7 = 49$$

$$P = 7 \text{ ft} + 7 \text{ ft} + 7 \text{ ft} + 7 \text{ ft}$$

$$P = 4 \times 7 \text{ ft}$$

$$P = 28 \text{ ft}$$

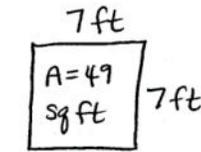


$$r = 28 - 3$$

$$r = 25$$

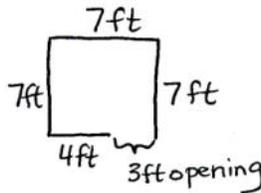
The total length of the rope is 25 feet.

Student B



$$_ \times _ = 49$$

$$7 \times 7 = 49$$



$$7 \text{ ft} + 7 \text{ ft} + 7 \text{ ft} + 4 \text{ ft}$$

$$3 \times 7 \text{ ft} = 21 \text{ ft}$$

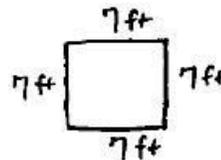
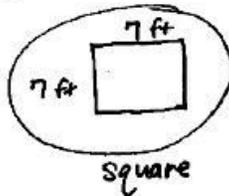
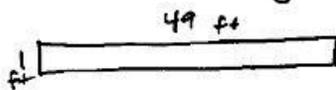
$$21 \text{ ft} + 4 \text{ ft}$$

$$25 \text{ ft}$$

The length of the rope is 25 feet.

Student C

Area = 49 sq ft
Possible rectangles:



$$P = 4 \times 7 \text{ ft}$$

$$P = 28 \text{ ft}$$

$$28 \text{ ft} - 3 \text{ ft} = 25 \text{ ft}$$

The length of the rope is 25 ft.

student work sample images