

5E Lesson Plan Maximize Your Product

teachHOUSTON Student Name:

Mentor Teacher Name:

Grade Level: 4th

Lesson Teaching Date:

Concept(s): Multiplication, place value, and problem solving are all part of a fundamental understanding of number sense. Being able to apply problem solving skills to a variety of mathematical or real life contexts will increase a students' ability to think critically and make them more effective in any career.

TEKS:

- 4.D. Use multiplication to solve problems (no more than two digits times two digits without technology)
- 15.A. Explain and record observations
- 16.A. Make generalizations from patterns

Objectives The student will be able to:	Evaluation Questions for each Objective
1. Perform 2-digit multiplication.	
2. Use problem-solving skills and knowledge of place value to maximize a product of a 2x2 multiplication problem when given four numbers.	
3. Use problem-solving skills and knowledge of place value to minimize a product of a 2x2 multiplication problem when given four numbers.	

Materials List and Advanced Preparations:

For the teacher:

- A die
- "Carnival Candy" transparency
- "Maximize Your Product" transparency

For each student:

- Evaluation

Engagement		
What the Teacher Will Do	Eliciting Questions/ Student Responses	What the Students Will Do
<p>The teacher will display the “Carnival Candy” transparency.</p> <p>The teacher will select several students to share their suggestions or questions about the “Carnival Candy” problem.</p> <p>The teacher will conclude the discussion about the “Carnival Candy” problem before any final answer is given or any resolution to the problem is found. The teacher and students will revisit the problem at the end of the lesson.</p>	<p>Without doing any multiplication, which store do you think has more lollipops for Mrs. Jenkins to buy? Why?</p> <p><i>-The Sweet Shop because they have so many more bags of lollipops than the other store</i></p> <p><i>-The Candy Shack because even though there are less bags, there are more lollipops in every bag</i></p> <p>Is there any way for Mrs. Jenkins to be sure before she chooses a store?</p> <p>-Yes</p> <p>-No</p>	<p>A student volunteer will read the “Carnival Candy” problem out loud.</p> <p>In pairs, students will spend 2-4 minutes discussing the problem and if it can be done without doing any multiplication.</p> <p>Student will share their thoughts about the “Carnival Candy” problem so far.</p>

TRANSITION
<p>You will have a chance to continue thinking about the “Carnival Candy” problem at the end of the lesson. For our next activity, we will play a game called “Maximize Your Product.” While you play the</p>

game, think about how the game might help you find the answer to the “Carnival Candy” problem.

Exploration		
What the Teacher Will Do	Eliciting Questions/ Student Responses	What the Students Will Do
<p>The teacher will display the “Maximize Your Product” transparency.</p> <p>The teacher will roll a die 4 times and announce the resulting number to the class.</p>	<p>What is a product? <i>A product is what you get when you multiply two numbers together</i></p> <p>What does maximize mean? <i>Create the largest possible number of something</i></p> <p>How did you decide where to put each number? <i>I tried to wait for bigger numbers to put in the 10s column instead of in the 1s column.</i></p> <p>How does the placement of your numbers compare with that of your neighbor’s? How does their product compare to yours? <i>Answers will depend on the numbers rolled and students’ placement of the numbers.</i> <i>Sample answer: My partner put a higher number in the 10s place than I did and she got a larger</i></p>	<p>Each student will copy the multiplication template from the “Maximize Your Product” transparency on a piece of paper or into their notebook.</p> <p>After each die roll, each student will write the number rolled in any space on their multiplication template. Once they choose a space for a number, they may not change its location. After all 4 numbers have been placed, students will multiply their 2 digit numbers together. The goal of the game is for students to try to get the largest possible product.</p> <p>Students will compare the placement of their 4 numbers with those of their partners or group members.</p>

<p>The teacher will determine who has the largest product by asking students what product they got and having students with larger products stand up. The teacher continues to ask students their products until only students with the largest products remain standing.</p> <p>The teacher will repeat the game several times. Note: The explanation section of the lesson will occur between each game.</p>	<p><i>product.</i></p> <p>If you could change the placement of your numbers now that you know what all 4 numbers are, how would you change them. <i>Answers will depend on what numbers were rolled. Sample answer: I was waiting for a 5 or a 6 to put in the 10s place, but I never got one, so now I would put the 4 in the 10s place since it is the biggest number.</i></p> <p>Are you noticing any patterns that help you create the largest product? <i>When the 2 numbers are closer together, they tend to make a larger product; when the 2 numbers are farther apart, they tend to make a smaller product.</i></p>	<p>Students will draw another multiplication template and play the game again using what they learn each time to try and obtain the highest product.</p>
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TRANSITION		
Now that you have placed your 4 numbers, you will get to compare what you did with your classmates.		
<p>Explanation</p> <p>Repeat this section between each game during the exploration</p>		
What the Teacher Will Do	Eliciting Questions/ Student Responses	What the Students Will Do
After each game, the teacher will select 2 students to share their answers. Select 1 student with	Why did you place the numbers in those locations? <i>I applied the patterns I saw in the</i>	The selected students will explain the reasoning behind their number placements and

<p>the largest product and 1 student without the largest product. The teacher will use this time to identify and illuminate any common mistakes that are being made on the 2 digit multiplication.</p>	<p><i>previous examples and tried to place the higher numbers in the 10s column. I also tried to create 2 numbers that were closer together because I noticed their products were larger than 2 numbers that were farther apart numerically</i></p> <p>Are you sure this is the largest product? What makes you sure? <i>-I tried some other arrangements and they all had lower products -Yes, based on the patterns I have seen so far</i></p> <p>Why do you think this placement creates the largest product? <i>Answers will depend on the numbers rolled.</i></p> <p>If you could change your number placement, how would you change it? <i>Answers will depend on the numbers rolled and the student's original placement of the numbers</i></p> <p>What patterns do you see? <i>Two numbers that are closer together in value seem to have higher products than two numbers that are farther apart in value, assuming both numbers use the highest numbers in the 10s column</i></p>	<p>will show the steps of their 2 digit multiplication on the board or overhead. The remaining students will evaluate the process of 2 digit multiplication to make sure the product is correct.</p>
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<p>TRANSITION</p> <p>You have seen many patterns in our game to try and maximize your product. Now we will play the game again, but this time your goal is to minimize the product.</p>
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Elaboration

What the Teacher Will Do	Eliciting Questions/ Student Responses	What the Students Will Do
<p>The teacher will roll the die 4 times and announce the result to the class each time.</p>	<p>How will your strategy be different this time? <i>This time I will try to put lower numbers in the 10s column</i></p> <p>What patterns do you see in this game? <i>I see the same patterns only opposite. For example, now I am trying to make two numbers that are further apart in order to get the smallest product</i></p>	<p>After each die roll, each student will write the number rolled in any space on their multiplication template. Once they choose a space for a number, they may not change its location. After all 4 numbers have been placed, students will multiply their 2 digit numbers together. The goal of the game is for students to try to get the smallest possible product.</p>
<p>The teacher will remind students of the “Carnival Candy” problem.</p>	<p>What advice would you give Mrs. Jenkins so she can buy the most candy for the carnival? Why? <i>Mrs. Jenkins should go to The Candy Shack because those numbers are closer together so when you multiply them you would get a larger product</i></p> <p>How can we check our answer? <i>Perform the actual multiplication</i></p>	<p>Students will apply what they have learned during the Maximize Your Product game to answer the “Carnival Candy” problem.</p> <p>Students will calculate how many lollipops are at each store to confirm their answer to the “Carnival Candy” problem.</p>

TRANSITION
<p>Congratulations, you have solved the “Carnival Candy” problem. Now you will have the opportunity to show what you have learned.</p>

Evaluation

1. Multiply:

$$\begin{array}{r} 34 \\ \times 25 \\ \hline \end{array}$$

$$17 \times 84 =$$

2. Using the following four numbers, create a 2 digit multiplication problem that will give you the highest possible product. Tell why you chose to put each digit where you did.

1 3 4 8

X

3. Which multiplication problem will give you the **smaller** product? Tell how you can figure it out without multiplying the numbers.

$$\begin{array}{r} 64 \\ \times 35 \\ \hline \end{array}$$

$$\begin{array}{r} 46 \\ \times 53 \\ \hline \end{array}$$

Carnival Candy

Mrs. Jenkins is in charge of purchasing lollipops for the school carnival.



The Sweet Shop sells lollipops in bags of 25. They have 94 bags in stock.

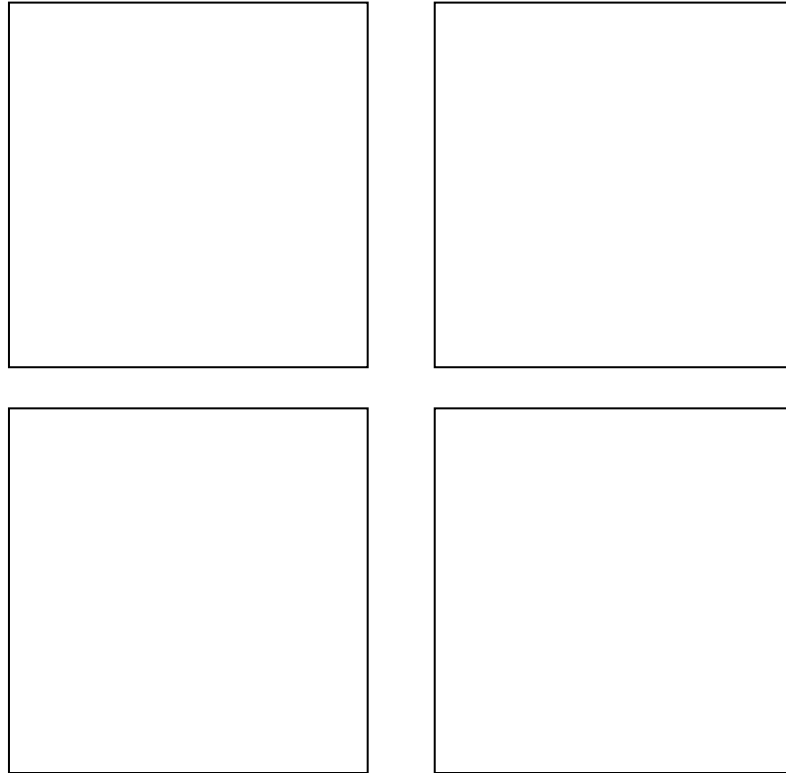
The Candy Shack sells lollipops in bags of 42, but they only have 59 bags in stock.

Mrs. Jenkins only has time to go to one store. Which store should she go to if she want to buy as many lollipops as possible?



(Mrs. Jenkins is in her car with no calculator and no pencil or paper! Is it possible to answer Mrs. Jenkins' question without doing any multiplication?)

Maximize Your Product



X

