

Multiplication Facts for Two One-digit Numbers

Student Probe

Give Student Probe Worksheet on various facts. If a student misses any, he needs this lesson.

Lesson Description

This lesson is designed for those students who need practice to develop fluency with multiplication facts.

Rationale

Developing fluency of a fact means that a person can respond in about 3 seconds with the correct answer without having to count to get the answer. In order to develop this fluency, students must have multiple experiences involving manipulatives, word problems, arrays, unknown factors, using what you know to figure out what you don't know, dot cards, repeated addition and subtraction, etc. Strategy development and a good sense of number relationships and meaning of operations are the best contributors for mastery. Drill without those things is ineffective. Drill IS effective for children who already have strategies in place. It is important for students to see the relationship between multiplication and division so the two should be taught concurrently. Repetition over time to develop this fluency is extremely important. Timed tests should only be used for diagnosis to see which facts the student does not know. A student should be competing with himself, not with others in the classroom. This lesson is based on explicit strategies that are applicable to a collection of facts. These strategies are intended to support the student's thinking rather than forcing a student to memorize a strategy and use it. The idea is to present students with the possibilities and let them pick strategies that help them get the solution without having to count.

Preparation

Prepare copies of Student Probe Worksheet for each student.

At a Glance

What: Fluency with multiplication facts for two one-digit numbers

Common Core State Standard: CC.3.OA.7.

Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers.

Mathematical Practices:

Attend to precision.

Look for and make use of structure.

Look for and express regularity in repeated reasoning.

Who: Students who are not fluent with multiplication facts.

Grade Level: 3

Prerequisite Vocabulary: None

Prerequisite Skills: commutative property of multiplication, zero property of multiplication, identity property of multiplication, understanding of operations

Delivery Format: individual, pairs, small group

Lesson Length: varied, on-going

Materials, Resources, Technology: None

Student Worksheets: Student Probe Worksheet

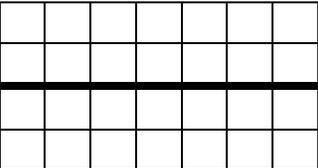
Lesson

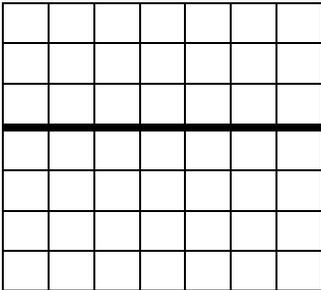
The teacher says or does...	Expect students to say or do...	If students do not, then the teacher says or does...
<p>1. After giving the student the worksheet in the Student Probe section, address facts that student missed with the following strategies for specific numbers.</p>		
<p>2. If a student missed any problems that have 0 for a factor, give him word problems such as:</p> <p>Becky earns \$5 an hour to babysit. She babysat for 0 hours. How much money did she make?</p> <p>There were 8 rows at the theater and 0 people were on each row. How many people were sitting in the rows?</p>	<p>For each problem, the answer will be 0.</p> <p>$0 \times 5 = 0$</p> <p>$8 \times 0 = 0$</p>	<p>If the student cannot write the number sentence, refer to Representing Multiplication.</p>
<p>3. Do several problems and have student write the number sentence to match. Guide him through questioning to develop the idea of multiplying by 0.</p> <p>Ask student to make an array using 7 color tiles in each row with 0 rows. Ask how many color tiles will be used.</p> <p>Ask student to make an array with 0 rows that has 7 color tiles in each row. Ask how many color tiles will be used.</p>	<p>0 color tiles will be used.</p> <p>$0 \times 7 = 0$</p> <p>0 color tiles will be used.</p> <p>$7 \times 0 = 0$</p>	

The teacher says or does...	Expect students to say or do...	If students do not, then the teacher says or does...
<p>4. If a student missed any problems that have 1 for a factor, refer to Identity Property of Multiplication.</p>		
<p>5. If a student missed any problems that have 2 for a factor, refer to Addition Strategies-Basic Facts. Multiplying by 2 is simply doubling that number. If the child understands the meaning of multiplication, he will see that $4 + 4 = 2 \times 4$.</p>		
<p>6. If a student missed any problems that have 5 for a factor, practice skip-counting by 5s. Connect counting by 5s to arrays that have 5 squares on each row. Do the activity "Count Around the Class" by 5s. Hold up a finger when each person counts. First person says 5 (one finger up), second person says 10 (two fingers up), etc. Ask "What will the 5th person say? What will the 8th person say?" "John said 35. How many people including John have counted so far?"</p>		

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<p>7. If a student missed any problems with 9 as a factor, there are some interesting patterns that make learning these facts easier.</p> <p>Give student a list of the facts for 9s. Ask student to notice any patterns he sees to help him remember the fact.</p>	<p>The tens digit of the product is always one less than the factor other than 9.</p> <p>For example:</p> $9 \times \overbrace{8} = \underline{7}2$ <p>(The "7" in 72 is one less than 8.)</p> <p>The sum of the two digits in the product is always 9.</p> <p>In the above example, the product is 72. $7 + 2 = 9$.</p> <p>To use this strategy to figure out the product of 9×4:</p> <p>The tens digit of the product will be one less than 4 which is <u>3</u>. The sum of the two digits in the product will be 9.</p> <p>$3 + 6 = 9$ so $9 \times 4 = 36$.</p>	

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<p>8. Another idea for teaching facts for 9 is to have the student hold up both hands palms down. Start with pinky on the left hand, count over for which fact you are doing. For example, to multiply 2×9, you move to the 2nd finger and bend it down. The fingers on the left side of the bent finger represent the tens in the product. The fingers on the right side represent the ones in the product. In the problem 2×9, you will have 1 finger (1 tens or 10) to the left and 8 fingers to the right (8 ones or 8), so the answer would be 18.</p> <p>For 4×9, you would bend the 4th finger down. There are 3 to the left, so those are the tens (3 tens or 30) and 6 to the right, so those are ones (6 ones or 6). The answer to 4×9 is 36.</p>		
<p>9. If a student got a fact correct but missed the turn-around fact (for example, the student got 3×8 but missed 8×3), refer to the lesson for Commutative Property of Multiplication.</p>		

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<p>10. Students can use facts they know to help with facts they don't know.</p> <p>This will work for any fact. See Distributive Property lesson for more information.</p> <p>For example, to work 4×7, give the student a 4×7 array. Student can divide the array into two or more parts to use what he knows to figure out the fact he does not know.</p> <p>One strategy is to divide the array into a 2×7 array and another 2×7 array. Student can use the fact he knows (2×7) to figure out a fact that he doesn't know.</p> <p>$2 \times 7 = 14$ and $2 \times 7 = 14$. $14 + 14 = 28$ so $4 \times 7 = 28$.</p> 		

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<p>11. Another example: 7×7</p> <p>I don't know 7×7, but I know 3×7 and 4×7.</p> <p>Divide the array into a 3×7 array and a 4×7 array.</p>  <p>$3 \times 7 = 21$ $4 \times 7 = 28$ $21 + 28 = 49$ $7 \times 7 = 49$</p> <p>After practice, a student may not need to have the array and can think of the problem in terms of 2 equations without the drawing.</p>		

Teacher Notes:

1. There are 100 (facts for 0, 1, 2, 3, 4, 5, 6, 7, 8, and 9 multiplied by 0, 1, 2, 3, 4, 5, 6, 7, 8, and 9) multiplication facts for one digit numbers. If a child understands the zero property of multiplication, then there is no need to spend time learning those facts. If a child understands the identity property of multiplication (multiplying by 1), there is no need to spend time learning those facts. That leaves just 64 facts to learn. If a student understands the commutative property, ($2 \times 6 = 6 \times 2$), the list of facts is cut down to just 36 facts. This is a much more manageable number for the student.
2. The list below includes several activities that children should repeat over time to develop fluency with math facts. Also see [Fluently Divide within 100 Using Strategies](#) for other ideas.
 - a. Flash cards with a partner or alone for 5 to 10 minutes at a time.
 - b. Use problem solving mode on Texas Instrument TI10 or TI15 Calculator.
 - c. Play Missing Array (Refer to [Inverse Relationship Between Multiplication and Division](#))
 - d. NCTM Illuminations activity "It's In The Cards"
<http://illuminations.nctm.org/LessonDetail.aspx?id=U110>
 - e. NCTM Illuminations activity "Product Game"
<http://illuminations.nctm.org/ActivityDetail.aspx?ID=29>

Variations

None

Formative Assessment

Ask student to rework the worksheet given in the Student Probe.

References

Mathematics Preparation for Algebra. (n.d.). Retrieved Dec. 10, 2010, from Doing What Works
Sousa, David A., (2008), *How The Brain Learns Mathematics*, Thousand Oaks, CA Corwin Press
Van de Walle, John A., Karp, Karen S., and Bay-Williams, Jennifer M., (2010), *Elementary and Middle School Mathematics: Teaching Developmentally*, Boston, Allyn & Bacon

Student Probe Worksheet

$9 \times 1 = \underline{\quad}$

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

$3 \times 5 = \underline{\quad}$

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

$4 \times 2 = \underline{\quad}$

$9 \times 4 = \underline{\quad}$

$0 \times 8 = \underline{\quad}$

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

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

$4 \times 3 = \underline{\quad}$

$8 \times 2 = \underline{\quad}$

$6 \times 0 = \underline{\quad}$

$7 \times 4 = \underline{\quad}$

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

$2 \times 8 = \underline{\quad}$

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

$4 \times 4 = \underline{\quad}$

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

$3 \times 3 = \underline{\quad}$

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

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

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

$3 \times 7 = \underline{\quad}$

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

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

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

$4 \times 7 = \underline{\quad}$

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

$3 \times 9 = \underline{\quad}$

$1 \times 4 = \underline{\quad}$

$4 \times 6 = \underline{\quad}$

$3 \times 6 = \underline{\quad}$

$4 \times 8 = \underline{\quad}$

$9 \times 1 = \underline{\quad}$

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

$3 \times 5 = \underline{\quad}$

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

$3 \times 8 = \underline{\quad}$

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