

# A Matter of Fact

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**Grade Level:**  
Grades 3-4

**Time Allotment:**  
1 hour class

**Overview:** Multiplication. This lesson focuses on a problem solving approach to developing an understanding of the concept of multiplication. Through hands on activities students will investigate the multiplication concept and demonstrate their understanding by writing related addition and multiplication sentences represented in pictures.

**Subject Matter:**  
Mathematics –Multiplication

## **Learning Objectives:**

Students will be able to:

- Demonstrate an understanding of the multiplication concept as repeated addition
- Identify the factors and product in a multiplication sentence
- Draw a visual interpretation of multiplication
- Write standard notation in the form of a multiplication sentence to describe a picture
- Write about math to verbalize a strategy

## **Standards:**

The objectives listed may be used in part to address the following Virginia Standards of Learning: Virginia Department of Education

<http://www.pen.k12.va.us/go/Sols/home.shtml>

3.9 The student will recall the multiplication and division facts through the nines table.

3.10 The student will represent multiplication and division, using area and set models, and create and solve problems that involve multiplication of two whole numbers, one factor 99 or less and the second factor 5 or less.

## **Media Components:**

*Mathica's Mathshop*: "A Sure Cure" (Multiplication segment)

[www.unitedstreaming.com](http://www.unitedstreaming.com)

This video is also available on video tape through WBRA *Mathica's Mathshop* Episode # 109, "A Sure Cure"

**Materials:**

- At least 4 pairs of chopsticks
- Pair of chopsticks for each student in class (optional)
- Paper and pencil
- Dice for each pair of students
- A sheet of unlined paper (such as duplicating paper) for each child
- A pair of scissors for each child or pair of children
- Staplers, two or three for the class
- Computer lab for interactive sites (optional)
- Overhead projector
- VCR or computer with Internet access
- Projection device for whole class viewing of video or streamed video segment

**Prep for Teachers:**

- Bookmark websites,
- Download Java plug-in,
- Download United Streaming video clips or burn to CD.
- Prepare student materials listed above prior to lesson presentation.

**Introductory Activity: Setting the Stage**

**Step 1** To set the stage for learning **ask**: “How many of you have ever eaten Chinese or Japanese food? What is different about the eating utensils traditionally used in those countries?” Have a short discussion about the traditional way Chinese eat their food. Lead them to a discussion of chopsticks and ask how many have used chopsticks to eat before.

**Step 2** **Ask**: “If I were eating with chopsticks, how many chopsticks would I need?” Pull out a pair of chopsticks and demonstrate how to use chopsticks.

**Step 3** **Ask**: “Suppose I invited three friends to dinner and all four of us were going to eat with chopsticks. How many chopsticks would we need?” Hand chopsticks out to three students. **Say**: “Before I call on you, along with giving your answer I’d like you to explain how you figured it out.” Begin calling on students, accepting their different strategies such as:

You could add up the chopsticks  $2 + 2 + 2 + 2 = 8$

You could count 2, 4, 6, 8 for the four people.

Each student needs two chopsticks and there are four students so you could add  $4+4$

**Step 4** **Say**: “Here’s another question for you. Suppose I plan a Chinese or Japanese meal for everyone in this class. How many chopsticks would I need to bring?” Before allowing students to share their ideas for solving the problem, put them into small groups of 3-4 and give them time to discuss their strategies. **Say**: “I’d like you to discuss this in your small groups and in a few minutes you’ll have a chance to report the answer and



the onions?" (9:00, 12:00 and 6:00) **ASK:** "For how long is the elf supposed to eat the onions?" (a whole week).

**Step 4** Provide a **Focus for Media Interaction** by saying, "Let's watch the next clip and pay close attention to the problem that needs to be solved." **RESUME** and **PAUSE** when you see the word problem, "How many onions will Mathica eat if she eats one 3 times a day?" **Ask:** "What is the problem that needs to be solved?" Have students read the question together. **Ask:** "What information do we know?" (Mathica must eat onions 3 times a day. Mathica must eat them for a whole week.)

**Step 5** Provide a **Focus for Media Interaction** by saying, "Let's listen to what Mathica says about the problem. **RESUME** and **PAUSE** when you hear "Any idea?" **Ask:** "Does anyone have an idea what other information is needed?" (7 days in one week) **Ask:** "Does anyone know the answer to the problem?" Allow students time to offer possible answers.

**Step 6** Provide a **Focus for Media Interaction** by saying, "Let's see how Mathica solves the problem." **RESUME** the video and stop at the end. Review the video by **asking:** "Why didn't Mathica want to eat what the wolf brought her?" (because they were onions) "How many days was Mathica supposed to eat the onions?" (7 days - a week) "How many onions was she supposed to eat each day?" (3). **Say:** "Drawing pictures is a good strategy to help you know when to multiply. How could we draw a picture to represent our problem?" Allow students to verbalize their ideas but suggest a square to represent each day on a calendar. Draw 7 squares and label them Sun.-Sat. **Ask:** "How many onions would I draw in each square?" (3) "Could I draw sticks to represent each onion?" Draw 3 sticks in each circle.

**Step 7** Provide a **Focus for Media Interaction** by saying, "Let's look again at Mathica's strategy for solving the problem." **REWIND** to 3:07, where you see the elf laying out 7 groups of 3 onions and **FREEZE FRAME**. **Say:** "Let's compare our drawing to what Mathica did." Using a dry erase marker, write on the TV screen or whiteboard and draw a rectangle around each set of onions. After drawing a symbolic picture representation **ask:** "How could I figure out the answer?" Accept all correct responses. (count each onion, count by 3's,  $3+3+3+3+3+3+3=21$ . If a student comes up with  $3 \times 7$  or  $7 \times 3$  ask them to explain what this means.

**Step 8** Write  $7 \times 3$  on the board. **Say:** "This is a multiplication sentence and is a short way to solve a problem that involves adding equal groups." Have students count the groups on the screen (7) and **say:** "You have seven groups, so 7 is your first factor." (Write factor on the board.) "A factor is one of the numbers you will multiply. 7 represents the number of groups you have." **Ask:** "What do you think the other factor will be?" If they are unable to come up with the 3, **Ask:** "What amount do you see repeated over and over?" (3) Explain that the 3 represents how many in each group. Show how to write the multiplication symbol and complete the number sentence  $7 \times 3 =$ . **Ask:** "How many onions were there in all?" (21) **Say:** "21 is the total number in all and

this number is called the *product*.” (Write *product* on the board.) “Remember the first factor represents how many groups you have, the second factor is the number in each group, and your *product* (answer when you multiply) is the total number in all.” Write the following on the board as a visual for students to refer to if necessary.

7 groups, 3 in each group, 21 in all.

$7 \times 3 = 21$  (Label the factors and the product to provide a visual to refer to.)

### **Culminating Activity:**

#### **Game: Cookies and Chips**

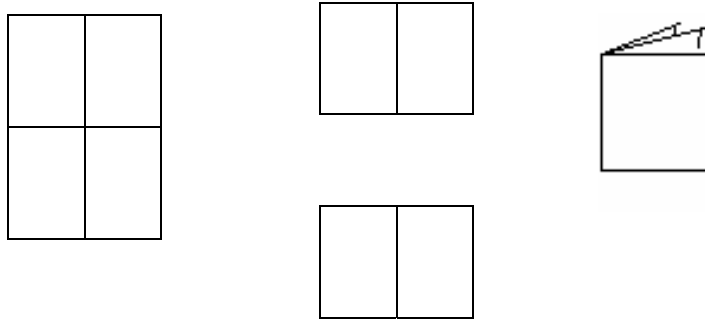
**Step 1 Say:** “Now I’m going to teach you a partner game that will help you learn how to write multiplication sentences using factors and products. Who remembers what a *factor* is? a *product*?”

**Step 2 Say:** “How many of you would rather eat chocolate chip cookies than onions? That’s what I thought. Today I’m going to teach you how to play a partner game called Cookies and Chips.” To model how to play, invite a student to the overhead.

**Step 3** Draw a line down the middle of the overhead viewing area to separate your playing area from the student’s. Using an overhead dice, begin by rolling the dice and drawing that number of circles on the overhead. Each circle represents a cookie. Point out to the class that you’re making the circles large enough to put chocolate chips inside them later. Then allow the student to do the same and draw the number of circles that corresponds to the number they rolled. Remind students that the circles represent how many groups or “cookies”. Now roll the dice again and draw that number of chips in each of your circles. Allow the student to do the same. Explain this is the number in each group or “the chips.”

**Step 4: Ask:** “How many cookies did I draw?” Write the number under the picture and remind students this is the first factor representing the number of groups or “cookies”. “How many chips did I draw in each cookie?” Write the number under the picture with the X symbol and = sign. Remind them this is how to write a multiplication sentence and the number in each group (or the “chips”) represents the second factor. **Ask:** “How many chips did I draw in all?” Allow students to figure out this answer using different strategies and write the total number under your picture as the product. **Ask:** “Who remembers what we call our answer in multiplication?” (*product*). Read the multiplication sentence with the students. Repeat the same process for the student’s picture. **Ask:** “Who got the greatest total?” The player who got the greatest amount puts a ☺ to indicate s/he won that round. Play another round to be sure students understand the game if necessary.

**Step 5** Tell the class that each game takes seven rounds. Demonstrate how to fold a piece of paper into fourths, cut it apart, and staple it into a booklet. (See illustration)



**Step 6** Write “Cookies and Chips” on the front of the booklet. Have the children count as you show that seven pages remain for playing. Tell them they can see who wins each round by comparing how many chips each player drew, but the winner of the game is the person who has the greatest total number of chips after seven rounds. Each figures out his or her total of seven rounds and records it on the booklet cover. (Calculators may be used for this part if necessary.)

**Step 7** Instruct students to make their booklets and play one game each. Those who finish early can make another book and play another game. Review with the class how to record a multiplication sentence on each page of their booklets for their picture. On the overhead, draw a sample page of 3 “cookies” and 2 “chips” on each. Underneath write:  $3 \times 2 = 6$ . Remind students that this is a way to use math symbols and write “three groups of two with numbers and symbols”. Tell them you read the sentence as “three times two.” Point out both the factors. Show how writing “= 6” tells how many chips there are in all.

**Step 8** Say: “As you play each round, work with your partner and decide what math sentence to write on each page of your booklets and read the number sentence aloud.”

**Step 9** Once everyone has played at least one game and recorded their number sentences, arrange students in small groups to compare the different ways they got their numbers. Have students report their observations during a class discussion.

**Ask:**

- “What was the highest total number of chips you could get?”  $36$
- “What two factors multiplied together gave you  $36$ ?”  $6 \times 6$
- “Why is  $36$  the highest total you can get?” *6 is the highest you can possibly roll*
- “What was the lowest total you could get?”  $1$
- “What number sentence matched that picture?”  $1 \times 1$
- “Did anyone have a picture that represents a total of  $12$ ?”

- “What two factors were used?  $2 \times 6$ , or  $3 \times 4$ , or  $4 \times 3$  or  $6 \times 2$ . What observations can you make?” (*There is more than one picture or number sentence to represent a total of 12*)

### **Assessment:**

Have students write about the chopstick problem explaining as many different ways to solve the question, “How many chopsticks would we need for the whole class?”

Have students write an explanation of the Cookies and Chips game using the words *factor* and *product*. Have them illustrate a problem and label the factors and product.

### **Cross-Curricular Extensions**

#### Language Arts

Think of things that come in groups of \_\_\_\_\_. Examples: Soda comes in packs of 6, tennis balls come in packs of 3, etc. Write story problems that relate to multiplication. Teach students how to embellish their story problems by adding interesting details and humor.

#### Reading

Literature connections to multiplication:

Neuschwander, Cindy. [Amanda Bean’s Amazing Dream A Mathematical Story](#)

#### Art

Students draw illustrations for multiplication story problems.

Design a box of fancy chocolate candies that illustrates candy packaged in a rectangular package. (*geometric representation of multiplication*)

#### Math:

Extend the activity of “things in groups of” to challenge students to look for things outside of school that come packaged in groups. Post posters for each number listing different items. Example: “Groups of 4” might have, number of legs on a dog, legs on a table or chair, wheels on a car, quarters in a dollar, etc.

Have students record their progress for multiplication timed tests on individual bar or line graphs.

Extend multiplication by exploring the different patterns in multiples of numbers using a hundreds chart.

### Technology

Using a program such as Kid Pix, have students write and illustrate a multiplication story problem.

### Interactive Websites:

Rectangular Multiplication Arrays

[http://matti.usu.edu/nlvm/nav/frames\\_asid\\_199\\_g\\_2\\_t\\_1.html](http://matti.usu.edu/nlvm/nav/frames_asid_199_g_2_t_1.html)

This website provides practice in creating multiplication arrays using gridlines.

<http://www.multiplication.com/cmptgames/quickpractice.htm>

Interactive Self Checking Times Tables Quick Practice

[http://matti.usu.edu/nlvm/nav/frames\\_asid\\_197\\_g\\_2\\_t\\_1.html?open=activities](http://matti.usu.edu/nlvm/nav/frames_asid_197_g_2_t_1.html?open=activities)

Number Line Math

<http://www.multiplication.com/interactive/quickflash/flash/index.html>

Multiplication Timed Practice

[http://www.multiplication.com/interactive\\_games.htm](http://www.multiplication.com/interactive_games.htm)

Interactive Internet Multiplication Games

<http://www.netrover.com/~kingskid/MulTab/Applet.html>

Multiplication Table

<http://www.multiplication.com/teach.htm>

Teacher Resources

### **Community Connections:**

Invite a carpet or tile installer into the classroom to explain how multiplication is used to determine area.

Invite an architect to the class to share house plans. Hold a discussion on how multiplication is used in creating blueprints for a house or building.

Invite an interior decorator to speak to the class on how multiplication is used to help design a room to scale.

### **References:**

This lesson was adapted from lessons created by Marilyn Burns.

Burns, Marilyn. Math by All Means. Math Solutions Publications, 1991.