Curriculum topics:

- The Commutative Property of Multiplication
- Patterns & Relationships

Subject: Math

Grade range: 3 – 4

COMMUTATIVE COOKIES

"Chip away" at the
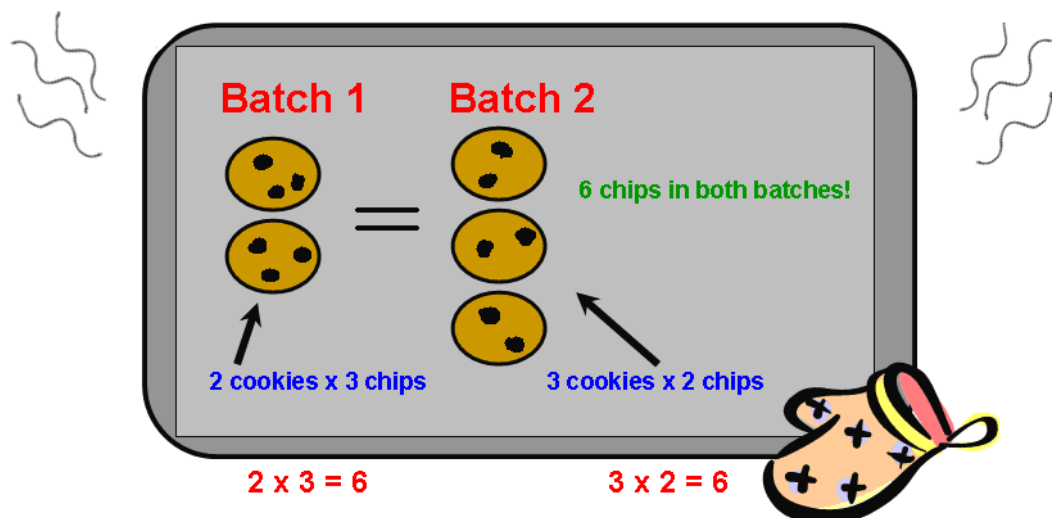commutative property of multiplication!

Demonstrate the commutative property of multiplication by arranging the same number of "chocolate chips" on two different batches of "cookies."

Who we are:

Resource Area for Teaching (RAFT) helps educators transform the learning experience through affordable "hands-on" activities that engage students and inspire the joy and discovery of learning.

Batch 1   Batch 2

6 chips in both batches!

2 cookies x 3 chips   3 cookies x 2 chips

$2 \times 3 = 6$ $3 \times 2 = 6$

For more ideas and to see RAFT Locations

www.raft.net/visit-raft-location

http://www.raft.net/raft-idea?isid=655

Materials required

For 2 to 4 students:

- "Cookies" (cup lids or equivalent), 6
- "Chocolate Chips" (brown beads), 36
- "Cookie Sheets", 2 (patterns can be downloaded at http://www.raft.net/raft-idea?isid=655)
- Six-sided die, 1

- Small container for beads, 1
- Optional: To make cookie sheets reusable, use clear page protectors and erasable markers

Set up

To begin, put all the "chips" in a small container. Place the die, cookies, and "First Batch" cookie sheet next to the container of beads.
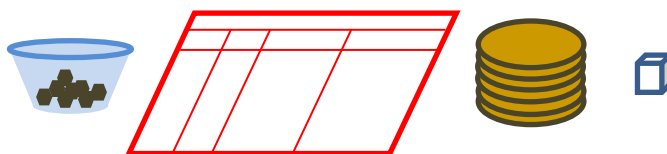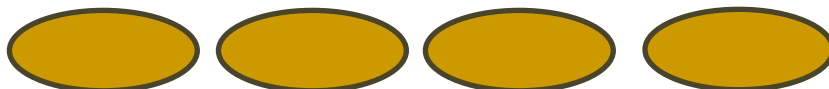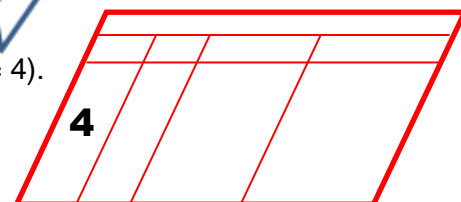
Each student rolls the die; the student who rolls the highest number will go first.

To do and notice

1 First Student:

- Roll the die to determine the number of cookies used (example = 4).

- Write the number of cookies in the **first column** on the "First Batch" cookie sheet.

- Put the correct number of cookies in a row on the table (example = 4).

2 Next Student:

- Roll the die to determine the number of chips used (example = 3).

  Note: If the number of chips = number of cookies, roll again until the number of chips is different from the number of cookies.

- Write the number of chips in the **second column** on the sheet.

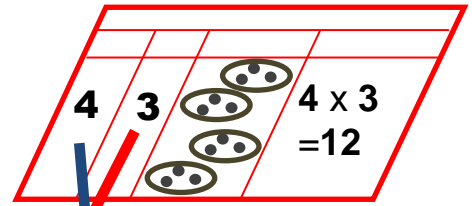- Put the correct number of chips on top of each cookie (example = 3).
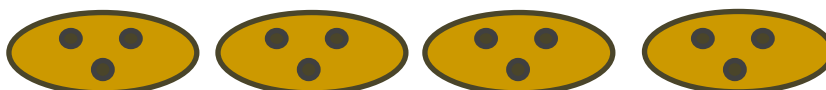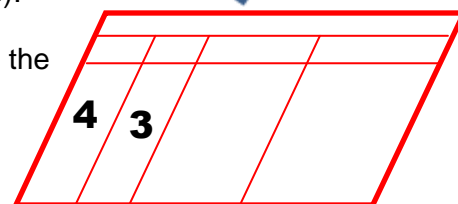
3 Next Student:

- Draw a picture of the cookies and chips in the **third column**.
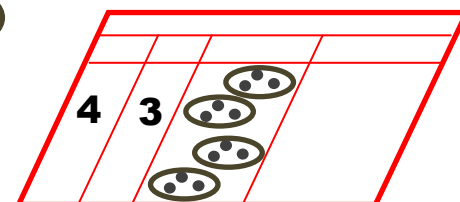
4 Next Student:

- Figure out the total number of chips used. In this example, 4 cookies times 3 chips per cookie equals 12 chips total (4x3=12).

- Write this equation in the **last column** of the sheet. (All students should check the math!)

4 3 $4 \times 3 = 12$

5 Next Student:

- Place the blank "Second Batch" cookie sheet in front of the group.

- <u>Switch</u> the number of cookies and chips from the first batch.

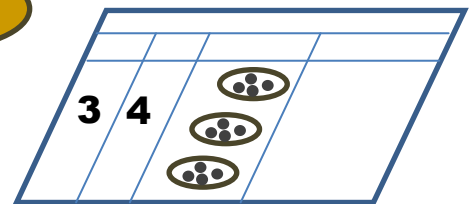- Write these numbers on the new cookie sheet.

3 4

6 Next Student:

Place the correct number of cookies on the table and arrange the number of chips to match the numbers on the "Second Batch" cookie sheet. (See example below.)
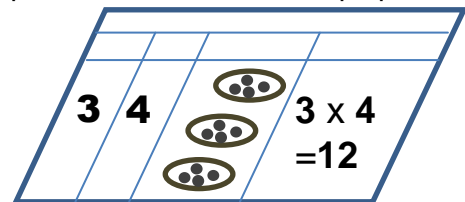
7 Next Student:

- Draw a picture of the cookies and chips in the **third column** of the "Second Batch" cookie sheet.

3 4

8 Next Student:

- Figure out the total number of chips used. In this example, 3 cookies times 4 chips per cookie equals 12 chips total (3x4=12).

- Write this equation in the **last column** of the sheet. (All students should check the math!)

3 4 $3 \times 4 = 12$

9 To end the round, all students compare the math from the two sheets to verify that the Commutative Property of Multiplication was demonstrated. (In this example, 4x3 = 3x4).

Wipe page protectors and start again!

COOKIES

The content behind the activity

This activity helps young people to master the commutative property (one of the first multiplication properties they need to learn), and to connect important mathematical principles to real-life experiences. Once they see that 3 x 4 is equivalent to 4 x 3, students will quickly realize that, in multiplication, the order of factors does not matter. This makes it easier to learn basic math facts, since the number of multiplication pairs that must be memorized is greatly reduced.

Learn more

* Show the Associative Property of Multiplication by grouping sets of equivalent expressions. For example:

    2 x (4 x 3) = two sets of "4 cookies with 3 chips each"

    3 x (2 x 4) = three sets of "2 cookies with 4 chips each"

    By counting the total number of chips in each group it is easy to see that both groups have a product total of 24 chips.

Related activities: See other RAFT Idea Sheets for more activities with multiplication:

Calculating Bones -
http://www.raft.net/ideas/Calculating Bones.pdf

Good Times Roll -
http://www.raft.net/ideas/Good Times Roll.pdf

Fit Together Factors -
http://www.raft.net/ideas/Fit Together Factors.pdf

Modeling Simple Equations -
http://www.raft.net/ideas/Modeling Simple Equations.pdf

Occasions for an Equation
http://www.raft.net/ideas/Occasions for an Equation.pdf

Peek-a-Boo -
http://www.raft.net/ideas/Peek-a-Boo.pdf

Resources

Visit www.raft.net/raft-idea?isid=655 for "how-to" video demos & more ideas!

See these websites for more information on the following topics:

* **Properties of Multiplication -** An interactive math lesson about the commutative, associative, distributive, and multiplicative identity **-** http://www.aaamath.com/pro74b-propertiesmult.html
* Khan Academy resources on arithmetic properties - https://www.khanacademy.org/math/arithmetic/order-of-operations
* **Teacher designed math courses from the New Jersey Center for Teaching & Learning** – https://njctl.org/courses/math