Integers: Multiplication and Division

Reporting Category   Computation and Estimation

Topic   Solve multiplication and division problems that contain integers

Primary SOL   7.3   The student will

        a) model addition, subtraction, multiplication, and division of integers; and

        b) add, subtract, multiply, and divide integers.

Materials
- Red and yellow chips (small squares of red and yellow construction paper can be used)
- Integer Multiplication activity sheet (attached)
- Graphic Organizer (attached)
- Integer Multiplication Chart (attached)
- Red and yellow colored pencils

Vocabulary
integer, product, factor (earlier grades)

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)
1. Give each student an Integer Multiplication activity sheet and some red and yellow chips. Establish that the red chips will represent negative numbers; the yellow chips will represent positive numbers.
2. Use chips to model how to multiply 4 × 3. Students should be using their chips to complete the same steps. Next, model how to represent the chips in pictorial form. Have students draw the same representation in their box on the Integer Multiplication activity sheet.
3. Model how to multiply 4 × −3, using chips. Students should be using their chips to complete the same steps. Next, model how to represent the chips in pictorial form. Have students draw the same representation in their box. Lead a discussion about the product.
4. Place students in groups of two and ask them to complete Chart 1 on the Integer Multiplication activity sheet. Lead a discussion on the pattern occurring in the chart.
5. Have each group complete Chart 2. The first part of the chart can be completed from chart 1. Direct students to finish the rest of the chart by continuing the pattern. When students have completed the chart, lead a discussion about the product. As students begin to formulate the algorithm for multiplication with integers, list the rules for the algorithm. A graphic organizer can be used. A sample organizer has been included.
6. Give students additional problems for practice.
7. Facilitate a discussion about related facts or "facts families." Have students use the multiplication charts to complete Chart 3. Discuss the results of the chart. Continue in the same manner to complete Chart 4.
8. When students have completed the activity, discuss the pattern. List the rules for the algorithm. A graphic organizer can be used. A sample organizer has been included.

9. Give students additional problems for practice.
10. Give students the Integer Multiplication Chart activity sheet to complete.

Assessment
- **Questions**
    - How are the rules for multiplying and dividing integers different from the rules for adding and subtracting?
    - When multiplying or dividing integers, how do you know what the sign of your answer will be?
    - When you multiply three positive integers, what sign does the product have? Is this the same if you multiply three negative integers? Give an example to prove your answer.
- **Journal/Writing Prompts**
    - Create a practical problem using multiplication of integers. Solve the problem.
    - Explain how to determine the sign of the product if the multiplication problem contains more than two factors.
- **Other**
    - Ask students to create some division problems. Ask a friend to solve their problems.

Extensions and Connections (for all students)
- Have students search the newspaper or Internet to find examples of multiplication problems with integers.
- Have students create posters to explain how to multiply and divide integers. Examples should be included.

Strategies for Differentiation
- Use a coordinate grid instead of a multiplication chart for the Integer Multiplication Chart activity.
- Draw the representations of red and yellow chips.

Integer Multiplication

Name _____   **Date** _____

Model 4 × 3
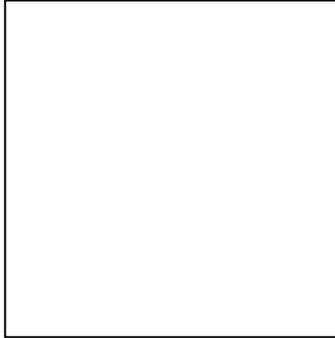
Model 4 × (–3)
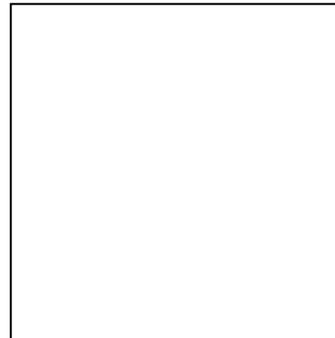
Complete the charts.

Chart 1

4 × 3 =	
4 × 2 =	
4 × 1 =	
4 × 0 =	
4 × –1 =	
4 × –2 =	
4 × –3 =	

Chart 2

–4 × 3 =	
–4 × 2 =	
–4 × 1 =	
–4 × 0 =	
–4 × –1 =	
–4 × –2 =	
–4 × –3 =	

Chart 3

12 ÷ 4 =	
8 ÷ 4 =	
4 ÷ 4 =	
0 ÷ 4 =	
–4 ÷ 4 =	
–8 ÷ 4 =	
–12 ÷ 4 =	

Chart 4

–12 ÷ 4 =	
–8 ÷ 4 =	
–4 ÷ 4 =	
0 ÷ 4 =	
–4 ÷ –4 =	
–8 ÷ –4 =	
–12 ÷ –4 =	

Graphic Organizer

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┌─────────────────────────────┐
│  Integer Multiplication and │
│           Division          │
└─────────────────────────────┘
               │
               ▼
┌─────────────────────────────┐
│                             │
└─────────────────────────────┘
        │              │
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┌───────────┐    ┌───────────┐
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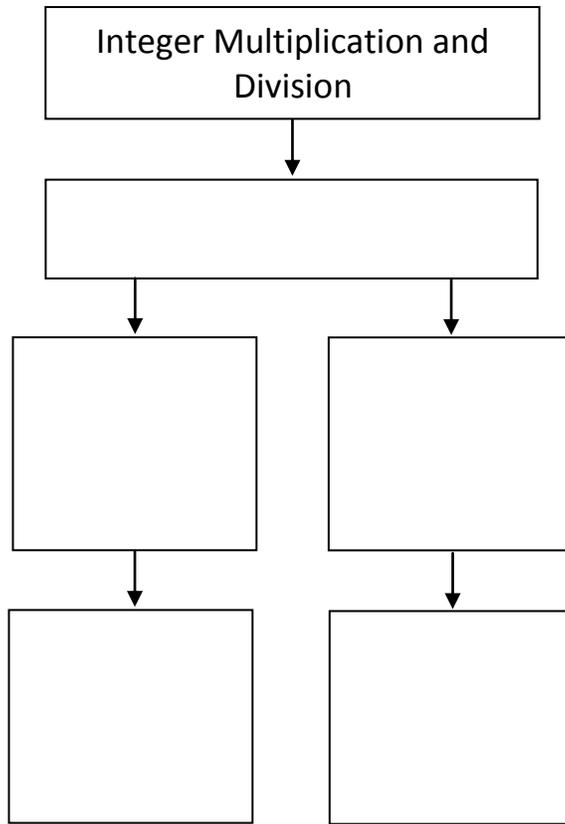
Integer Multiplication Chart

Name _____ **Date** _____

Complete the chart.

	−4	−3	−2	−1	0	1	2	3	4
4									
3									
2									
1									
0									
−1									
−2									
−3									
−4									

If both factors are positive, color the product **red**.
If both factors are negative, color the product **blue**.
If one factor is positive and one factor is negative, color the product **green**.

☐ Both factors are positive.

☐ Both factors are negative.

☐ One factor is positive; one factor is negative.