Lesson 1: Multiplying Integers and Decimals, part 1

factor: any two or more numbers multiplied to form a product

56 x 7 = 392   factors: 56, 7   product 392

Integers: all positive and negative whole numbers including zero {…-2, -1, 0, 1, 2…}

Choose your method!

a

Use this plan to multiply positive and negative numbers.
1. Ignore the signs of the numbers and multiply as usual.
2. Determine the sign of the answer using these rules:
   ➤ positive · positive = positive
   ➤ negative · positive = negative
   ➤ positive · negative = negative
   ➤ negative ·negative = positive

b

Sing it!

Multiply or Divide

It's an easy thought

Same signs are positive

Different signs are not

Or, you can count the number of factors with negative signs:

c

The product of two or more non-zero numbers is:

1. Positive if there are an even number of negative factors.

2. Negative if there are an odd number of negative factors.

OFFLINE WORK:

- Read pages 103–105.
- Complete Problems 1–14 and 22–25 on pages 105–106.
- Use the Solution Manual to check your work (optional). The Solution Manual is located in the Resources section in the Online Book Menu of *Intermediate Mathematics B: A Reference Guide and Problem Sets*

Lesson 2: Multiplying Integers and Decimals, part 2

Order of operations: the order in which operations must be computed when more than one operation is involved.

Follow these suggestions when evaluating an expression.

Example: $6p - 10.6$ when p = -7.1

- ○ Use parentheses when you substitute a value for a variable.

    = 6(-7.1) + 10.6

- ○   Use the order of operations to simply the numerical expression.

    = -42.6 – 10.6

- ○ Use the rules for adding, subtracting, multiplying, and dividing positive and negative numbers.

    = -42.6 + (-10.6)

    = -53.2

OFFLINE WORK

- Read page 105.
- Complete Problems 26–37 on page 106.
- Use the Solution Manual to check your work (optional). The Solution Manual is located in the Resources section in the Online Book Menu of *Intermediate Mathematics B: A Reference Guide and Problem Sets*.

Lesson 3: Dividing Integers and Decimals

Inverse operations: opposite operations that undo each other; subtraction and addition are inverse operations; division and multiplication are inverse operations

quotient: the answer to a division problem.

The rules for dividing two signed numbers are the same as the rules for multiplying two signed numbers.

Use the following guidelines when dividing positive and negative numbers:

The sign rules for division

- Ignore any negative signs and divide as usual.
- If the numbers have the same sign, the answer is positive.
    - $9 \div 3 = 3$ $-9 \div (-3) = 3$
- If the numbers have different signs, the answer is negative.
    - $-9 \div 3 = -3$ $9 \div (-3) = -3$

$$\frac{positive}{positive} = positive \qquad \frac{negative}{negative} = positive$$

$$\frac{positive}{negative} = negative \qquad \frac{negative}{positive} = negative$$

$$\frac{a}{-1} = -a$$

The mean, or average, of a set of numbers is calculated as follows:

$$\{-6, -8, 3, -4, 5\}$$

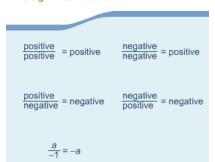1. Find the sum of all the values in the set. $(-6) + (-8) + 3 + (-4) + 5 = -10$
2. Divide the sum by the number of values in the set. $-10 \div 5 = -2$

The mean of the set of numbers $\{-6, -8, 3, 4, 5\}$ is -2

OFFLINE WORK:

- Read pages 107–108.
- Complete Problems 1–29 odd on page 109.
- Use the Solution Manual to check your work (optional). The Solution Manual is located in the Resources section in the Online Book Menu of *Intermediate Mathematics B: A Reference Guide and Problem Sets*.

Lesson 4: Multiplication and Division Properties

Reciprocals: two numbers whose product is 1.

PROPERTIES:

Identity Property of Multiplication:
$$a \cdot 1 = a \qquad \textbf{or} \qquad 1 \cdot a = a \qquad\qquad -5 \cdot 1 = -5$$

Zero Property of Multiplication:
$$a \cdot 0 = 0 \qquad \textbf{or} \qquad 0 \cdot a = 0 \qquad\qquad -5 \cdot 0 = 0$$

Negative One Property of Multiplication:
$$a \cdot (-1) = -a \qquad \textbf{or} \qquad (-1) \cdot a = -a \qquad\qquad -5 \cdot (-1) = 5$$

Identity Property of Division:
$$a \div 1 = a \qquad\qquad -5 \div 1 = -5$$

Division into Zero Property:
$$0 \div a = a \qquad\qquad 0 \div (-5) = 0$$

Negative One Property of Division:
$$a \div (-1) = -a \qquad -5 \div (-1) = 5$$

Reciprocal Property of Multiplication:
$$a \cdot 1/a = 1 \qquad\qquad -5 \cdot 1/(-5) = 1$$

Commutative Property of Multiplication:
$$a \cdot b = b \cdot a$$

Associative Property of Multiplication:
$$(a \cdot b) \cdot c = a \cdot (b \cdot c)$$

Recriprocals:

To find the reciprocal of a fraction, flip it.

The reciprocal of a/b is b/a.

The reciprocal of any nonzero number a is $1/a$. (The reciprocal of 19 is 1/19)

You can change a division problem into a multiplication problem by multiplying by the reciprocal.

$$a \div b = a \cdot 1/b$$

OFFLINE WORK:

- Read pages 110–114.
- Complete Problems 1–27 odd on page 114.
- Use the Solution Manual to check your work (optional). The Solution Manual is located in the Resources section in the Online Book Menu of *Intermediate Mathematics B: A Reference Guide and Problem Sets*.

Lesson 5 – SKIP – optional

Lesson 6: Core Focus: Closure

You already know how to simplify expressions involving basic operations such as addition, subtraction, multiplication, and division of rational numbers. You also know how to simplify fractions. In this lesson, you will apply these skills to determine whether a set of numbers is closed under a particular operation.

A set is a collection of items. In mathematics, we often use the following sets of numbers:

- Natural numbers: {1, 2, 3 ,…}
- Whole numbers: {0, 1, 2, 3,…}
- Integers: {…, –3, –2, –1, 0, 1, 2, 3,… }
- Rational numbers: numbers that can be written as a fraction. This includes terminating or repeating decimals.

WATCH OLS Video: Closure

BE SURE TO WORK THROUGH ALL THE OLS EXAMPLES

OFFLINE WORK:

- Read pages 115–116.
- Complete Problems 1–4 on page 116.
- Use the Solution Manual to check your work (optional). The Solution Manual is located in the Resources section in the Online Book Menu of *Intermediate Mathematics B: A Reference Guide and Problem Sets*.

Lesson 7: Rounding and Estimating

PLACE VALUE AND DECIMALS

ten thousands	thousands	hundreds	tens	ones	and	tenths	hundredths	thousandths	ten-thousandths
				3	.	2	5		
	1	4	5	.	1	0	6	8	
		2	4	.	0	7	9		

Find your number
Look right next door
5 or greater
Add one more

Numbers to the left
Stay the same
Numbers to the right
Zero's your name!

To round to a particular place value:

1. Look at the digit in the place that you want to round to. Round up if the digit to the right is 5 or greater; otherwise keep the digit the same.
2. Make all digits below the place value to which you are rounding to 0.

To estimate:

- o Round each number in the expression to the same place
- o Perform the operation as indicated

OFFLINE WORK:

- Read pages 117–120.
- Complete Problems 1–12 and 13–25 odd on pages 120–121.
- Complete Problems 14–26 even on page 121 for extra practice (optional).
- Use the Solution Manual to check your work (optional). The Solution Manual is located in the Resources section in the Online Book Menu of *Intermediate Mathematics B: A Reference Guide and Problem Sets*.

Lesson 8: Equations involving Multiplication and Division

Multiplication Property of Equality

If $a = b$, then $a \cdot n = b \cdot n$

Division Property of Equality

If $a = b$, then $a \div n = b \div n$ where n ≠ 0

When deciding how to solve an equation, use the operation that is the inverse of the operation already in the equation.

When you transform an equation, the goal is to arrive at the simplest equation: the equation where the variable is alone on one side of the equal symbol.

OFFLINE WORK

- Read pages 122–124.
- Complete Problems 1–29 odd on pages 124–125.
- Complete Problems 2–26 even on pages 124–125 for extra practice (optional).
- Use the Solution Manual to check your work (optional). The Solution Manual is located in the Resources section in the Online Book Menu of *Intermediate Mathematics B: A Reference Guide and Problem Sets*.

Lesson 9: SKIP – Optional Lesson

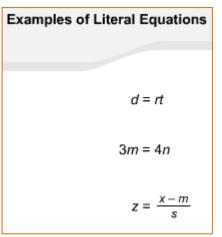## Lesson 10 & 11: Multiplication and Division Applications

Using Formulas:

- Read the problem.
- Write the formula.
- Substitute known values of variables into the formula.
- Solve for the unknown variable to obtain the answer.

literal equation: an equation that has one or more variables

To solve for a variable:
- Find the variable you want to solve for.
- Use the properties of equality to solve for the variable.

Examples of Literal Equations

$$d = rt$$

$$3m = 4n$$

$$z = \frac{x - m}{s}$$

OFFLINE WORK:

Lesson 10:

- Read pages 126–128.
- Complete Problems 1–15 odd and 25–28 on pages 128–129.
- Use the Solution Manual to check your work (optional). The Solution Manual is located in the Resources section in the Online Book Menu of *Intermediate Mathematics B: A Reference Guide and Problem Sets*.

Lesson 11

- Read page 128.
- Complete Problems 17–23 on page 129.
- Use the Solution Manual to check your work (optional). The Solution Manual is located in the Resources section in the Online Book Menu of *Intermediate Mathematics B: A Reference Guide and Problem Sets*.

Lesson 12: Core Focus: Modeling with Multiplication and Division

Suppose that for 7 h the temperature decreased by 2.8°C each hour. You can model that problem situation with a division expression. But first you need to determine which quantities in the problem are positive and which are negative.

In this lesson, you'll learn how to approach story problems that involve multiplication and division. You'll also learn how to think critically about whether quantities in a problem should be represented by positive numbers or negative numbers.

When solving word problems, remember to use a problem-solving plan.

Step 1: Identify.
Step 2: Strategize.
Step 3: Set Up.
Step 4: Solve.
Step 5: Check.

OLS VIDEO: Modeling and Interpreting

OFFLINE WORK:

- Read pages 130–131.
- Complete Problems 1–3 on pages 131–132.
- Use the Solution Manual to check your work (optional). The Solution Manual is located in the Resources section in the Online Book Menu of *Intermediate Mathematics B: A Reference Guide and Problem Sets*.

Lesson 13: CORE FOCUS: Decimal Forms of Rational Numbers

Compare these decimal numbers:

0.12 and 0.12121212 . . .

The first number has a finite number of digits. In the second number, the digits after the decimal point repeat forever.

In this lesson, you'll use long division to convert rational numbers into decimals. You'll also explore why the decimal forms of some rational numbers repeat and why the decimal forms of other numbers terminate.

OLS VIDEO: Terminating and Repeating Decimals

OFFLINE WORK:

- Read pages 133–134.
- Complete Problems 1–3 on page 135.
- Use the Solution Manual to check your work (optional). The Solution Manual is located in the Resources section in the Online Book Menu of *Intermediate Mathematics B: A Reference Guide and Problem Sets*.

Lesson 16: Extended Problems Reasoning

In this lesson, you'll complete Extended Problems: Reasoning for the Multiplication and Division unit.

You will complete a Graded Assignment that focuses on reasoning in math.

Your Learning Coach will score this assignment.

- **Complete** the assignment on your own.
- **Submit** the completed assignment to your Learning Coach.