

Lesson 2: Division with Decimals

LESSON 2: Division with Decimals

Weekly Focus: Decimals
Weekly Skill: Division

Lesson Summary: For the warm up, students will solve a word problem. In Activity 1, they will practice dividing whole numbers by decimals. In Activity 2, they will learn and how dividing by a decimal yields a smaller number through a visual representation. Then they will practice. In Activity 3, they will do word problems. In Activity 4, they do a budget application problem. There is also an extra word problem at the end. Estimated time for the lesson is two hours.

Materials Needed for Lesson 2:

- Dividing Decimals Video (about 4 minutes). The video is required for teachers and optional for students.
- Worksheet 2.1 Dividing Decimals by a Whole Number (attached)
- Worksheet 2.2 Dividing Decimals (attached)
- *Math Reasoning Test Prep for the 2014 GED Test Workbook by Steck-Vaughn, pages 24-25*
- Worksheet 2.3 Complete Bob's Budget (attached)
- Exit Ticket

Objectives: Students will be able to:

- Divide whole numbers by decimals
- Divide decimals by decimals
- Solve varied word problems with decimals

ACES Skills Addressed: N, CT, LS

CCRS Mathematical Practices Addressed: Model with math, Attend to precision, Reason abstractly and quantitatively

Levels of Knowing Math Addressed: Intuitive, Pictorial, Abstract, Application

Notes:

You can add more examples if you feel students need them before they work. Any ideas that concretely relates to their lives make good examples.

For more practice as a class, feel free to choose some of the easier problems from the worksheets to do together. The “easier” problems are not necessarily at the beginning of each worksheet. Also, you may decide to have students complete only part of the worksheets in class and assign the rest as homework or extra practice.

The GED Math test is 115 minutes long and includes approximately 46 questions. The questions have a focus on quantitative problem solving (45%) and algebraic problem solving (55%).

Students must be able to understand math concepts and apply them to new situations, use logical reasoning to explain their answers, evaluate and further the reasoning of others, represent real world problems algebraically and visually, and manipulate and solve algebraic expressions.

This computer-based test includes questions that may be multiple-choice, fill-in-the-blank, choosing from a drop-down menu, or dragging-and-dropping the response from one place to another.

The purpose of the GED test is to provide students with the skills necessary to either further their education or be ready for the demands of today's careers.

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Activities:

Warm-up: Calculate the cost of texting and compare plans

Time: 15-20 Minutes

Write on the board: Cell Phone Plan A charges \$35 a month and \$0.20 per text.

Basic Question: How much is your 30-day monthly bill if you send one text message a day?
(30 days x \$0.20 = \$6.00 + \$35.00= \$41.00).

Extension Questions: If you send an average of 5 texts a day, is it more cost effective to have Plan A above or to have Plan B at \$50 a month with unlimited texting? (Answer: Plan B because on Plan A 150 texts x \$0.20 = \$30 just for texting. Therefore, \$30 texting + \$35 plan = \$65 total. The difference in the monthly cost of the plans is \$15.)

Discuss how students solved the problem.

Activity 1: Dividing a decimal by a whole number

Time: 20-25 Minutes

1) Teach how to divide a decimal by a whole number with these examples:

Example 1: If the texting portion of your plan costs \$15 a month and you send 500 text messages in a month, how much does it cost per text? $\$15 \div 500$. Since the *dividend* \$15 is smaller than the *divisor* 500, you will need to add a decimal point and zeros to compute

the division.
$$500 \overline{)15.00} \begin{array}{r} 0.03 \end{array}$$

Example 2: Diane is having friends over for a barbecue. She bought 3.5 pounds of hamburger meat for five people. How much hamburger meat can each person get? Estimate first. (Each person gets less than one pound.) Set up the division problem of $3.5 \div 5$ (Answer is 0.7).

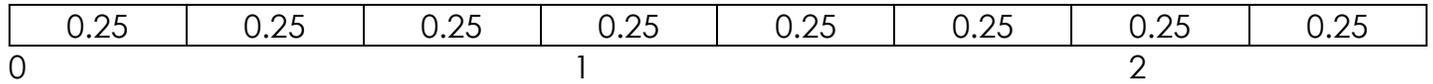
2) Do Worksheet 2.1 Dividing a Decimal by a Whole Number

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Activity 2: Dividing by a Decimal

Time: 20-25 Minutes

- 1) **Make a drawing with a number line to explain what it means to divide by a decimal.** Ask the students: If you have \$2 in quarters and shared the quarters equally among your friends, how many people would get a quarter? (8 people). Then draw a number line to show that the question is actually asking how many times you can find .25 (or $\frac{1}{4}$) in the whole number 2.



- 2) How do you divide by a decimal? You can't, so that's why you have to multiply both the dividend and the divisor by 100 to eliminate the decimal. $\frac{2 \times 100}{.25 \times 100}$. Then you get $\frac{200}{25} = 8$.
- 3) Explain: When you multiply both the dividend and the divisor by the same number it doesn't change the value. Just think: $4 \div 2$ is the same as $40 \div 20$. You increased both $\times 10$.
- 4) Watch the **Dividing Decimals Video** for another example.
- 5) **Do Worksheet 2.2 Dividing Decimals.**
- 6) For extra practice, go to www.aaamath.com and select decimals from the left side column.

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Worksheet 2.1 Dividing a Decimal by a Whole Number

1) $15 \div 400 =$	2) $24 \div 120 =$	3) $33 \div 44 =$
4) $35 \div 105 =$	5) $4.5 \div 4 =$	6) $8.02 \div 2 =$
7) $10.57 \div 7 =$	8) $1.75 \div 25 =$	9) $13.5 \div 6 =$

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Worksheet 2.2 Dividing Decimals

1) $3.68 \div 0.4 =$	2) $0.87 \div 0.3 =$	3) $4.48 \div 0.8 =$
4) $3.68 \div 0.04 =$	5) $40.77 \div 2.7 =$	6) $1.6992 \div 0.36 =$
7) $3.68 \div 0.004 =$	8) $10.81 \div 2.35 =$	9) $2.046 \div 6.2 =$

Answers to Worksheet 2.1

Dividing a Decimal by a Whole Number

- 1) 0.0375
- 2) 0.2
- 3) 0.75
- 4) 0.33
- 5) 1.125
- 6) 4.01
- 7) 1.51
- 8) 0.07
- 9) 2.25

Answers to Worksheet 2.2

Dividing Decimals

- 1) 9.2
- 2) 2.9
- 3) 5.6
- 4) 92
- 5) 15.1
- 6) 4.72
- 7) 920
- 8) 4.6
- 9) 0.33

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Activity 3: Mixed Decimals Word Problems

Time: 20-25 Minutes

Have students work independently or in small groups to complete questions 12 – 25 in the **Steck-Vaughn workbook (pages 24-25)**. These are mixed problems that include comparing decimals as well as computation. Circulate to help. Review any questions that several students found challenging.

Activity 4: Complete Bob's Budget

Time: 20-25 Minutes

Hand out **Worksheet 2.3** and go over the instructions with the students. Then, have the students work in pairs to fill in the remainder of the chart.

“Bob is making a budget but has incomplete information. Sometimes he knows how much a bill is per month and other times he knows how much it costs per year. Help him complete his budget by filling in the missing numbers. You will need to decide when to multiply and when to divide.”

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Worksheet 2.3 Complete Bob's Budget

Bob is making a budget but has incomplete information. Sometimes he knows how much a bill is per month and other times he knows how much it costs per year. Help him complete his budget by filling in the missing numbers. You will need to decide when to multiply and when to divide.

Expenses	Monthly	Annually
Rent		\$10,020.00
Food		\$4899.00
Transportation		\$1500.00
Insurance	\$121.20	
Utilities	\$111.50	
Phone/Internet		\$1070.52
Savings		\$2400.00
Total Expenses		
Net Income	\$2492.50	

Bob knows all of his expenses and how much he earns. Any money left over will be for miscellaneous expenses.

- (1) How much does Bob have left over for miscellaneous expenses per month? _____
- (2) How much does he have left over for miscellaneous expenses per year? _____

- (3) If Bob's gross annual income is \$35,000, how much does he pay in taxes annually? _____

- (4) Challenge Question: What percent of his income does Bob pay in taxes? Round to the nearest tenth of a percent. _____

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Worksheet 2.3 Complete Bob's Budget Answers

Bob is making a budget but has incomplete information. Sometimes he knows how much a bill is per month and other times he knows how much it costs per year. Help him complete his budget by filling in the missing numbers. You will need to decide when to multiply and when to divide.

Expenses	Monthly	Annually
Rent	\$835.00	\$10,020.00
Food	\$408.25	\$4899.00
Transportation	\$125.00	\$1500.00
Insurance	\$121.20	\$1454.40
Utilities	\$111.50	\$1338.00
Phone/Internet	\$89.21	\$1070.52
Savings	\$200.00	\$2400.00
Total Expenses	\$1890.16	\$22,681.92
Net Income	\$2492.50	\$29,910.00

Bob knows all of his expenses and how much he earns. Any money left over will be for miscellaneous expenses.

(4) How much does Bob have left over for miscellaneous expenses per month? \$602.34

(5) How much does Bob have left over for miscellaneous expenses per year? \$7228.08

(3) If Bob's gross annual income is \$35,000, how much does he pay in taxes annually? \$5090.00

(4) Challenge Question: What percent of his income does Bob pay in taxes? Round to the nearest tenth of a percent. 14.5% ($\$5090/\$35,000 = 0.145 = 14.5\%$)

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Exit Ticket

Time: 10 Minutes

Write on the board: You have budgeted \$21.00 a month to spend at the coffee shop.

Basic Question: How many \$1.75 coffees can you buy in a month? (12 cups of coffee)

Extension Question: If the price of each cup goes up by 10%, what is the new cost for one cup of coffee? Round to the nearest cent. (\$1.93)

Discuss how students solved the extension question. Did they find 10% of \$1.75 and add it to the original? If so, did they divide by 10 or just move the decimal point? On paper or mentally? Did anyone multiply $\$1.75 \times 1.1$ to get the answer?