

North Penn School District
Elementary Math Parent Letter

Grade 6

Unit 1 – Chapter 1: Whole Numbers and Decimals

Examples for each lesson:

Lesson 1.1

Divide Multi-Digit Numbers

When you divide multi-digit whole numbers, you can estimate to check if the quotient is reasonable.

Divide $399 \div 42$.

Step 1 Estimate, using compatible numbers.

400 and 40 are compatible numbers because
40 divides evenly into 400.

$$400 \div 40 = 10$$

Step 2 Divide the original numbers.

$$\begin{array}{r} 9 \text{ r}21 \\ 42 \overline{)399} \\ \underline{-378} \\ 21 \end{array}$$

$$399 \div 42 = 9 \text{ r}21$$

Step 3 You can write the remainder as a fraction. Use the remainder for the numerator, and the divisor for the denominator. Simplify if possible.

$$\frac{21 \div 21}{42 \div 21} = \frac{1}{2}$$

$$399 \div 42 = 9\frac{1}{2}$$

Step 4 Compare the quotient with your estimate.

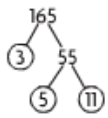
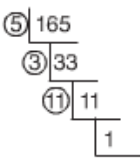
Since $9\frac{1}{2}$ is close to 10, the quotient is reasonable.

Lesson 1.2

Prime Factorization

A number written as the product of prime numbers is called the **prime factorization** of that number. To break a number down into its prime factors, divide it by prime numbers. The first eight prime numbers are listed below.

2, 3, 5, 7, 11, 13, 17, 19

<p>You can use a factor tree to find the prime factorization of a number.</p>  <p>Divide the number by the least prime factor possible. Try 2, 3, 5, and so on.</p> <p>Break 55 down because it is not a prime number.</p> <p>The numbers at the bottom of the branches are all prime.</p>	<p>You can use a ladder diagram to find the prime factorization of a number.</p>  <p>165 ends in 5, so it is divisible by 5. Divide 165 by 5.</p> <p>Write the quotient below 165.</p> <p>The sum of the digits in 33 is divisible by 3, so divide 33 by 3.</p> <p>11 is prime. Divide 11 by itself.</p> <p>The bottom number is 1 and all the numbers to the left are prime.</p>
<p>Write the number as a product of prime factors. The factors should be in order from least to greatest.</p> <p>So, the prime factorization of 165 is $3 \times 5 \times 11$.</p>	

Lesson 1.3

Least Common Multiple

The **least common multiple**, or **LCM**, is the least number that two or more numbers have in common in their list of nonzero multiples.

<p>Find the LCM of 3 and 9.</p> <p>List the first ten nonzero multiples of each number:</p> <p>Multiples of 3: 3, 6, 9, 12, 15, 18, 21, 24, 27, 30</p> <p>Multiples of 9: 9, 18, 27, 36, 45, 54, 63, 72, 81, 90</p> <p>The first three nonzero multiples that 3 and 9 have in common are 9, 18, and 27.</p> <p>So, the LCM of 3 and 9 is 9.</p>

More information on this strategy is available on Animated Math Model #1.

Lesson 1.4

Greatest Common Factor

A **common factor** is a number that is a factor of two or more numbers. The **greatest common factor**, or **GCF**, is the greatest factor that two or more numbers have in common.

Find the common factors of 9 and 27. Then find the GCF.

Step 1

List the factors of each number.

Factors of 9: 1, 3, 9

Factors of 27: 1, 3, 9, 27

Step 2

Identify the common factors.

Common factors of 9 and 27:

1, 3, 9

The greatest of the common factors is 9.

So, the GCF of 9 and 27 is 9.

You can use the GCF and the Distributive Property to express the sum of two numbers as a product.

Write $9 + 27$ as a product.

Step 1

Write each number as the product of the GCF and another factor.

$$9 = 9 \times 1 \quad 27 = 9 \times 3$$

Step 2

Write an expression multiplying the GCF and the sum of the two factors from Step 1.

$$9 \times (1 + 3)$$

The product $9 \times (1 + 3)$ has the same value as $9 + 27$.

So, $9 + 27 = 9 \times (1 + 3)$.


More information on this strategy is available on Animated Math Model #2.

Lesson 1.5

Problem Solving • Apply the Greatest Common Factor

Use the Distributive Property and a diagram to solve.

Bethany is packing cookies for her drama club's bake sale. She has 28 oatmeal cookies and 36 peanut butter cookies to pack. Each bag will contain only one kind of cookie, and every bag will have the same number of cookies. What is the greatest number of cookies she can pack in each bag? How many bags of each kind will there be?

Read the Problem	Solve the Problem
<p>What do I need to find?</p> <p>I need to find the _____ number of cookies for each _____ and the number of bags for _____.</p>	<p>Step 1 Find the GCF of 28 and 36. Use prime factorization.</p> <p style="text-align: center;">$28 = 2 \times 2 \times 7$ $36 = 2 \times 2 \times 3 \times 3$</p> <p>Multiply common prime factors: $2 \times 2 =$ _____</p> <p>GCF: _____</p>
<p>What information do I need to use?</p> <p>I need to use the number of _____ and the number of _____.</p>	<p>Step 2 Write 28 as a product of the GCF and another factor. $28 = 4 \times$ _____</p> <p>Write 36 as a product of the GCF and another factor. $36 = 4 \times$ _____</p>
<p>How will I use the information?</p> <p>First, I can find the _____.</p> <p>Then I can draw a diagram showing the _____.</p>	<p>Step 3 Use the Distributive Property to write $28 + 36$ as a product. $28 + 36 =$ $4 \times (\text{_____} + \text{_____})$</p> <p>Step 4 Use the product to draw a diagram of the bags of cookies. Write O for each oatmeal cookie and P for each peanut butter cookie.</p>
	
<p>So, each bag will have _____ cookies. There will be _____ bags of oatmeal cookies and _____ bags of peanut butter cookies.</p>	

More information on this strategy is available on Animated Math Model #2.

Lesson 1.6

Add and Subtract Decimals

Estimate $84.9 + 0.463$. Then find the sum.

$84.9 \rightarrow 85$ Round each number to the nearest whole number.
 $+ 0.463 \rightarrow + 0$ So, a good estimate is 85.

$\begin{array}{r} 84.9 \\ + 0.463 \\ \hline 85 \end{array}$

Now line up the decimal points. Then add.

Write zeros as placeholders. Regroup.

$\begin{array}{r} 84.9 \\ + 0.463 \\ \hline \end{array} \rightarrow \begin{array}{r} 84.900 \\ + 0.463 \\ \hline \end{array} \rightarrow \begin{array}{r} 84.900 \\ + 0.463 \\ \hline 85.363 \end{array}$

The answer is close to the estimate. So, the answer is reasonable.

Evaluate $45.2 - (27.93 - 10.84)$ using the order of operations.

Perform the operations in parentheses. Subtract.

$\begin{array}{r} 27.93 \\ - 10.84 \\ \hline 17.09 \end{array}$ $\begin{array}{r} 45.20 \\ - 17.09 \\ \hline 28.11 \end{array}$

So, $45.2 - (27.93 - 10.84)$ is 28.11.

More information on this strategy is available on Animated Math Model #3.

Lesson 1.7

Multiply Decimals

When multiplying decimals, you can estimate to help you place the decimal point in the product.

Estimate $\$32.05 \times 7.4$. Then find the product.

Step 1 Estimate. Round each factor to the nearest ten or the nearest whole number.

$\begin{array}{r} 32.05 \\ \times 7.4 \\ \hline \end{array} \rightarrow \begin{array}{r} 30 \\ \times 7 \\ \hline 210 \end{array}$

$\$32.05$ is about $\$30$, and 7.4 is close to 7 .

So, the product should be close to $\$210$.

Step 2 Multiply.

$\begin{array}{r} 32.05 \\ \times 7.4 \\ \hline 12820 \\ 224350 \\ \hline 237170 \end{array}$

Step 3 Place the decimal point. Remember, the product is estimated to be 210. Place the decimal point so that the product is close in value to 210.

237170

So, the product is $\$237.17$.

More information on this strategy is available on Animated Math Model #4.

Lesson 1.8

Divide Decimals by Whole Numbers

When you divide a decimal by a whole number, place the decimal point in the quotient directly above the decimal point in the dividend.

Estimate $12\overline{)60.84}$. Then find the quotient.

Step 1 Estimate the quotient, using compatible numbers.

60 and 12 are compatible numbers because
12 divides evenly into 60.

$$60 \div 12 = 5$$

Step 2 Use long division to divide.

$$\begin{array}{r} 5.07 \\ 12\overline{)60.84} \\ \underline{-60} \\ 8 \\ \underline{-0} \\ 84 \\ \underline{-84} \\ 0 \end{array}$$

Place the decimal point in the quotient directly above the decimal point in the dividend.

Since 8 tenths cannot be shared among 12 groups, write 0 as a placeholder in the tenths place.

So, $60.84 \div 12 = 5.07$.

More information on this strategy is available on Animated Math Model #5.

Lesson 1.9

Divide with Decimals

When dividing a decimal by a decimal, rewrite the divisor as a whole number. To keep an equivalent problem, move the decimal point in the dividend the same direction and number of places.

Rewrite the problem so that the divisor is a whole number.	
$300.7 \div 1.24$	300.7 is the dividend and 1.24 is the divisor.
Change the Divisor	
$1.24 \times 100 = 124$	Multiply 1.24 by 100 because 1.24 has two decimal places.
Change the Dividend	
$300.7 \times 100 = 30,070$	To keep an equivalent problem, multiply the dividend by the same number, 100.
So, $300.7 \div 1.24$ is the same problem as $30,070 \div 124$.	
Find the quotient.	
$0.55 \overline{)24.2}$	
Step 1	Step 2
Rewrite the problem so that the divisor is a whole number.	Divide.
Divisor	Dividend
$0.55 \times 100 = 55$	$24.2 \times 100 = 2,420$
$\begin{array}{r} 44 \\ 55 \overline{)2420} \\ \underline{-220} \\ 220 \\ \underline{-220} \\ 0 \end{array}$	
So, $24.2 \div 0.55 = 44$.	

More information on this strategy is available on Animated Math Model #6.

Vocabulary

Common factor – a number that is a factor of two or more numbers

Greatest common factor (GCF) – the greatest factor that two or more numbers have in common

Least common multiple (LCM) – the least number that is a common multiple of two or more numbers

Prime factorization – a number written as the product of all its prime factors

Compatible numbers – numbers that are easy to compute with mentally

Decimal – a number with one or more digits to the right of the decimal point

Dividend – the number that is to be divided in a division problem

Divisor – the number that divides the dividend

Prime number – a number that has exactly two factors, one and itself

Quotient – the number, not including the remainder, that results from dividing