

# MATH NEWS

Grade 5, Module 2, Topic F

## 5<sup>th</sup> Grade Math

Module 2: Multi-Digit Whole Number and Decimal Fraction Operations

### Math Parent Letter

This document is created to give parents and students a better understanding of the math concepts found in Eureka Math (© 2013 Common Core, Inc.) that is also posted as the Engage New York material which is taught in the classroom. Grade 5 Module 2 of Eureka Math (Engage New York) covers Multi-Digit Whole Number and Decimal Fraction Operations. This newsletter will discuss Module 2, Topic F.

### Topic F. Partial Quotients and Multi-Digit Whole Number Division

#### Words to know

- dividend (whole)
- divisor
- quotient
- remainder
- division algorithm
- estimate
- about ( $\approx$ )
- multiple
- decompose

#### Things to Remember!!!

- Before dividing, estimate to get an idea of about how many groups of the divisor can be made.

Example:  $84 \div 23$   
 $\approx 80 \div 20$   
 $= 4$   
*(4 is placed in the ones place of the quotient.)*

$$23 \overline{) 84} \begin{array}{r} 4 \\ - 92 \\ \hline 15 \end{array} \Rightarrow 23 \overline{) 84} \begin{array}{r} 3 \text{ R } 15 \\ - 69 \\ \hline 15 \end{array}$$

- The remainder has to be **smaller** than the divisor.
- A division problem is not complete unless there is a digit above the last digit in the dividend.

## OBJECTIVES OF TOPIC F

- Divide two- and three-digit dividends by multiples of 10 with single-digit quotients and make connections to a written method.
- Divide two- and three-digit dividends by two-digit divisors with single-digit quotients and make connections to a written method.
- Divide three- and four-digit dividends by two-digit divisors resulting in two- and three-digit quotients, reasoning about the decomposition of successive remainders in each place value.

## Focus Area— Topic F

Multi-digit Whole Number Division

### Knowing division with the standard algorithm

$$644 \div 80$$

- Can we divide 6 hundreds by 80? (No)
- Since there are 10 tens in 1 hundred, we can decompose 6 hundreds to 60 tens. There are already 4 tens, so there is a total of 64 tens. Can we make a group of 80 with 64 tens? (No)
- Since there are 10 ones in 1 ten, we can decompose 64 tens to 640 ones. There are already 4 ones, so there is a total of 644 ones. Can we make a group of 80 with 644 ones? (Yes)
- So we are dividing 644 ones by 80.

Step 1: **Estimate quotient** to know where to begin.

*64 is a multiple of 8*  
 $64 \div 8 = 8$   
*so 644 becomes 640.*  
 $640 \div 80 = 8$

Step 2: Set up the **division algorithm** and use the **estimation** to find the actual **quotient**.

$$80 \overline{) 644} \begin{array}{r} 8 \text{ R } 4 \\ - 640 \\ \hline 4 \end{array}$$

Step 3: **Check** by multiplying the **divisor** of 80 by the **quotient** of 8, and then add the **remainder** of 4. If the **quotient** is correct, the answer will equal the **dividend**.

$$\left[ \begin{array}{r} 80 \\ \times 8 \\ \hline 640 \\ + 4 \\ \hline 644 \end{array} \right]$$

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Application Problem and Answer:

A shipment of 288 brochures was sent to the main rest areas in the state of Louisiana. Each of the 30 rest areas in the state received the same amount. After the brochures were distributed, were there any extras? If so how many extra brochures were there?

*(Cannot make a group of 30 with 2 hundred, so **decompose** 2 hundreds to 20 tens and combine with the 8 tens you already have. Now there is a total of 28 tens. Cannot make a group of 30 with 28 tens, so 28 tens is **decompose** to 288 ones.)*

Step 1: **Estimate**  $288 \div 30$   
 $\approx 270 \div 30$   
 $= 9$

*28 is not a multiple of 3 but 27 is and it is close to 28.*

Step 2: **Solve**  $30 \overline{) 288} \begin{array}{r} 9 \text{ R } 18 \\ - 270 \\ \hline 18 \end{array}$

**Answer:** There will be 18 extra brochures.

Step 3: **Check**  $30 \times 9 = 270$      $270 + 18 = 288$

There were 192 students at 4-H camp. The camp has 32 cabins. An equal number of students sleep in each cabin. How many students slept in each cabin?

Strategy:  $192 \div 32$

- Can we make a group of 32 with 1 hundred? (No)
- We **decompose** 1 hundred to 10 tens. There are already 9 tens, so there is a total of 19 tens. Can we make a group of 32 with 19 tens? (No)
- We **decompose** 19 tens to 190 ones. There are already 2 ones, so there is a total of 192 ones. Can we make a group of 32 with 192 ones? (Yes)

Step 1: Estimate  $\longrightarrow$  Round 32 to 30.

$$192 \div 32 \rightarrow 19 \text{ is not a multiple of 3 but 18 is and it is close to 19.}$$

$$\approx 180 \div 30$$

$$= 6$$

Step 2: Solve  $\longrightarrow$   $32 \overline{) 192}$

Step 3: Check  $\longrightarrow 32 \times 6 = 192$

**Answer: 6 students slept in each cabin.**

Bart was arranging his 823 baseball cards in a book that holds 24 cards per page. Bart **divided** 823 by 24 and got a **quotient** of 34 with a **remainder** 7. Explain what the **quotient** and **remainder** represent.

$$24 \overline{) 823} \begin{array}{r} 34 \text{ R } 7 \\ \underline{-72} \\ 103 \\ \underline{-96} \\ 7 \end{array}$$

Answer: 823 is the total number of baseball cards, and the **divisor**, 24, is the amount of cards a page holds. Therefore 34, the **quotient**, is the amount of pages that will be full in his book. The **remainder** of 7 will be the amount of cards on the last page.

Erin made 1,695 chocolate fudge candies for her Christmas gifts. She put them in bags of 36 candies per bag. How many candy bags did Erin give out? Did she have any candies **left over**? If so, how many candies were left over?

Strategy:  $1,695 \div 36$

- Can we make a group of 36 with 1 thousand? (No)
- Decompose 1 thousand to 10 hundreds. There are already 6 hundreds, so there is a total of 16 hundreds. Can we make a group of 36 with 16 hundreds? (No)
- Since there are 10 tens in 1 hundred, we decompose 16 hundreds to 160 tens. There are already 9 tens, so there is a total of 169 tens. Can we make a group of 36 with 169 tens? (Yes)

First division step  $\longrightarrow 169 \text{ tens} \div 36$

Estimate:  $\approx 160 \text{ tens} \div 4 \text{ tens}$   
 $= 40$  (4 is placed in the tens place of the quotient)

$$36 \overline{) 1,695} \begin{array}{r} 4 \\ \underline{-144} \\ 25 \end{array}$$

- After subtracting, there are 25 tens left. Can we make a group of 36 with 25 tens? (No) Since there are 10 ones in 1 ten, we compose 25 tens to 250 ones. There are already 5 ones, so there is a total of 255 ones. Can we make a group of 36 with 255 ones? (Yes)

Next division step  $\longrightarrow 255 \text{ ones} \div 36$

$\approx 240 \text{ ones} \div 40$   
 $= 6$  (6 is placed in the ones place of the quotient)

$$36 \overline{) 1,695} \begin{array}{r} 46 \\ \underline{-144} \\ 255 \\ \underline{-216} \\ 39 \end{array}$$

$$36 \overline{) 1,695} \begin{array}{r} 47 \text{ R } 3 \\ \underline{-144} \\ 255 \\ \underline{-252} \\ 3 \end{array}$$

- After subtracting, there are 39 ones left. Can we make a group of 36 with 39? (Yes) So there are 7 groups of 36 in 255 and not 6.

Check:

$$\begin{array}{r} 47 \\ \times 36 \\ \hline 282 \\ +1410 \\ \hline 1,692 \end{array} \qquad \begin{array}{r} 1,692 \\ + 3 \\ \hline 1,695 \end{array}$$

**Answer: Erin gave out 47 bags of candy. She had 3 candies left over.**