

Indicator 1 Class Notes by Mrs. Joshi

Dividing Multi-Digit Numbers-(6.NS.2)

Divisibility Rules

Divisor	Divisibility Condition	Example
2	The last digit is even (0, 2, 4, 6, or 8).	$38 : 8$ is even which is divisible by 2.
3	The sum of the digits is divisible by 3. For large numbers, digits may be summed iteratively.	$4,053 \Rightarrow 4+0+5+3=12$ and $1+2=3$ which is clearly divisible by 3.
4	Add the ones digit to twice the tens digit. (All digits to the left of the tens digit can be ignored.)	$7,372 : 2 + (2 \times 7) = 16$ which is clearly divisible by 4.
	The last two digits divisible by 4. If the tens digit is even, and the ones digit is 0, 4, or 8. If the tens digit is odd, and the ones digit is 2, or 6.	$20,516 : 16$ is divisible by 4. $728 : 2$ is even, & the last digit is 8. $356 : 3$ is odd, & the last digit is 6.
5	The last digit is 0 or 5.	$1,285 : 5$ the last digit is 5.
6	If it is divisible by 2 and by 3.	$2,562 : 2 + 5 + 6 + 2 = 15$, which it is divisible by 3, and the last digit is even which is divisible by 2, so the number is divisible 6.
8	If the last three digits are divisible by 8, then the entire number is also divisible by 8.	$1,024 : 024$ is divisible by 8 so, $1,024$ is also divisible by 8.
9	The sum of the digits is divisible by 9. For large numbers, digits may be summed iteratively.	$1,269 \Rightarrow 1+2+6+9=18$ and $1+8=9$ which is clearly divisible by 9.
10	The last digit has to end in zero.	20, 440, 560, 9940, 10,000

Lesson 5.5 Mrs. Joshi 11/2/12

1-Digit Quotients

What are the steps for dividing by 2-digit numbers?
Find $330 \div 42$.

Step 1:
Estimate first.
 $330 \div 42$ is about
 $320 \div 40 = 8$

Step 2:
Divide the ones
Multiply and subtract.
 $42 \overline{) 330}$
 $\underline{-336}$
8 groups of 42
or $8 \times 42 = 336$
Since $336 > 330$,
my estimate is too high.

Step 3:
Revise your estimate. Since 8 was too high, try 7 and divide.
 $42 \overline{) 330}$
 $\underline{-294}$
36
7 groups of 42
or $7 \times 42 = 294$
 $330 - 294 = 36$
 $36 < 42$, so I do not have to divide again.

Step 4:
Check your work.
Multiply the divisor by the quotient. Add the remainder.

Answer: $7R36$

$$\begin{array}{r} 42 \\ \times 7 \\ \hline 294 \\ + 36 \\ \hline 330 \end{array}$$

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11/5/12

Lesson 5.6 Mrs. Joshi

2-Digit Quotients

How can you divide larger numbers?

Problem:
 $467 \div 15$

Step 1:
Estimate to help decide where to place the first digit in the quotient. Use compatible numbers.
 $467 \div 15$
 $450 \div 15 = 30$
Start dividing tens.

Step 2:
Divide the tens. Multiply and subtract. Continue the process.

$$\begin{array}{r} 31R2 \\ 15 \overline{)467} \\ \underline{45} \\ 17 \\ \underline{15} \\ 2 \end{array}$$

Step 3:
Check:

$$\begin{array}{r} 31 \\ \times 15 \\ \hline 155 \\ + 310 \\ \hline 465 \end{array}$$

$465 + 2 = 467$
↑
remainder

Answer:
31R2

Dividing Difficult Large Numbers

$$31 \overline{)1719}$$

- 31 will not go into 1
- 31 will not go into 17
- 31 will go into 171

Dividing Difficult Large Numbers

$$3 \square \overline{)17 \square 9}$$

To figure what your first number will be cover the 1 in 31 & the 1 in 171.

Dividing Difficult Large Numbers

$$3 \square \overline{)17 \square 9}$$

Now ask how many 3's will go into 17.

Dividing Difficult Large Numbers

$$31 \overline{)1719} \quad 5$$

Be sure to put that number directly above the 1 not the 7.

Dividing Difficult Large Numbers

$$31 \overline{)1719} \quad 5$$

Now multiply the 5 x 31 and place it under the 171.

Dividing Difficult Large Numbers

$$\begin{array}{r} 31 \overline{)1719} \\ \underline{-151} \\ 209 \end{array}$$

$\begin{array}{r} 31 \\ \times 5 \\ \hline 151 \end{array}$

Dividing Difficult Large Numbers

$$\begin{array}{r} 3 \square \overline{)1719} \\ \underline{-151} \\ 20 \square \end{array}$$

Now cover up the 1 in 31 & the 9 in 209

Dividing Difficult Large Numbers

$$\begin{array}{r} 3 \square \overline{)1719} \\ \underline{-151} \\ 20 \square \end{array}$$

Ask how many 3's will go into 20.

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Dividing Difficult Large Numbers

$$\begin{array}{r} 56 \\ 3 \square \overline{) 1719} \\ \underline{-151} \downarrow \\ 20 \square \end{array}$$

Place that number next to the 5 in your quotient.

Dividing Difficult Large Numbers

$$\begin{array}{r} 56 \\ 31 \overline{) 1719} \\ \underline{-151} \downarrow \\ 209 \end{array}$$

Now multiply 31×6 .

Dividing Difficult Large Numbers

$$\begin{array}{r} 56 \\ 31 \overline{) 1719} \\ \underline{-151} \downarrow \\ 209 \\ \underline{186} \longrightarrow \\ 186 \end{array}$$

$31 \times 6 = 186$

Dividing Difficult Large Numbers

$$\begin{array}{r} 56 \\ 31 \overline{) 1719} \\ \underline{-151} \downarrow \\ 209 \\ \underline{-186} \\ 23 \end{array}$$

Subtract & your answer is 56 R23

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$$\begin{array}{r} 36 \\ 7 \overline{) 2,538} \\ \underline{-21} \\ 43 \\ \underline{-42} \end{array}$$

- ✓ $25 \div 7$ or how many groups of 7 are in 25
- ✓ Think of a your seven facts
- ✓ $7 \times 3 = 21$
- ✓ Place the 3 above the bar
- ✓ Subtract 21 from 25
- ✓ Bring down the next digit in the dividend ~ THREE
- ✓ $43 \div 7$ or how many 7's are in 43 $7 \times 6 = 42$

$$\begin{array}{r} 362 \\ 7 \overline{) 2,538} \\ \underline{-21} \\ 43 \\ \underline{-42} \\ 18 \\ \underline{-14} \\ 4 \\ \text{remainder} \longrightarrow \end{array}$$

- ✓ $7 \times 6 = 42$ ~ Place the 6 above the division bar
- ✓ Subtract 42 from 43
- ✓ Bring down the next number in the dividend ~ EIGHT
- ✓ How many 7's are in 18
- ✓ $7 \times 2 = 14$
- ✓ Place the 2 above the bar
- ✓ Subtract 14 from 18
- ✓ Our quotient is **362** with a remainder of **4**

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$$\begin{array}{r} 47 \\ 8 \overline{) 3,792} \\ \underline{-32} \\ 59 \\ \underline{-56} \\ 30 \\ \underline{-24} \\ 60 \\ \underline{-60} \\ 0 \end{array}$$

- ✓ $37 \div 8$ or how many groups of 8 are in 37
- ✓ Think of your eight facts
- ✓ $8 \times 4 = 32$
- ✓ Place the **4** above the bar
- ✓ Subtract 32 from 37
- ✓ Bring down the next digit in the dividend ~ NINE
- ✓ $59 \div 8$ or how many 8's are in 59 $8 \times 7 = 56$

$$\begin{array}{r} 474 \\ 8 \overline{) 3,792} \\ \underline{-32} \\ 59 \\ \underline{-56} \\ 32 \\ \underline{-32} \\ 0 \end{array}$$

no remainder
→

- ✓ $8 \times 7 = 56$ ~ Place the **7** above the division bar
- ✓ Subtract 56 from 59
- ✓ Bring down the next number in the dividend ~ TWO
- ✓ How many 8's are in 32
- ✓ $8 \times 4 = 32$
- ✓ Place the **4** above the bar
- ✓ Subtract 32 from 32
- ✓ Our quotient is **474**

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$$\begin{array}{r} 58 \\ 3 \overline{) 1,763} \\ \underline{-15} \\ 26 \\ \underline{-24} \end{array}$$

- ✓ $17 \div 3$ or how many groups of 3 are in 17
- ✓ Think of a your three facts
- ✓ $3 \times 5 = 15$
- ✓ Place the 5 above the bar
- ✓ Subtract 15 from 17
- ✓ Bring down the next digit in the dividend ~ SIX
- ✓ $26 \div 3$ or how many 3's are in 26 $8 \times 3 = 24$

$$\begin{array}{r} 587 \\ 3 \overline{) 1,763} \\ \underline{-15} \\ 26 \\ \underline{-24} \\ 23 \\ \underline{-21} \\ \text{remainder} \rightarrow 2 \end{array}$$

- ✓ $3 \times 8 = 24$ ~ Place the 8 above the division bar
- ✓ Subtract 24 from 26
- ✓ Bring down the next number in the dividend ~ THREE
- ✓ How many 3's are in 23
- ✓ $3 \times 7 = 21$
- ✓ Place the 7 above the bar
- ✓ Subtract 21 from 23
- ✓ Our quotient is 587 with a remainder of 2

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$$\begin{array}{r} 27 \\ 9 \overline{) 2,473} \\ \underline{-18} \\ 67 \\ \underline{-63} \end{array}$$

- ✓ $24 \div 9$ or how many groups of 9 are in 24
- ✓ Think of your nine facts
- ✓ $9 \times 2 = 18$
- ✓ Place the 2 above the bar
- ✓ Subtract 18 from 24
- ✓ Bring down the next digit in the dividend ~ SEVEN
- ✓ $67 \div 9$ or how many 9's are in 67 $9 \times 7 = 63$

$$\begin{array}{r} \textcircled{274} \\ 9 \overline{) 2,473} \\ \underline{-18} \\ 67 \\ \underline{-63} \\ 43 \\ \underline{-36} \\ \text{remainder } 7 \end{array}$$

- ✓ $9 \times 7 = 63$ ~ Place the 7 above the division bar
- ✓ Subtract 63 from 67
- ✓ Bring down the next number in the dividend ~ THREE
- ✓ How many 9's are in 43
- ✓ $9 \times 4 = 36$
- ✓ Place the 4 above the bar
- ✓ Subtract 36 from 43
- ✓ Our quotient is **274** with a remainder of **7**

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$$\begin{array}{r} 22 \\ 3 \overline{) 6,843} \\ \underline{-6} \\ 08 \\ \underline{-6} \end{array}$$

- ✓ $6 \div 3$ or how many groups of 3 are in 6
- ✓ Recall your multiplication facts $3 \times 2 = 6$
- ✓ Place the 2 above the bar
- ✓ Subtract 6 from 6
- ✓ Bring down the next digit in the dividend ~ EIGHT
- ✓ $8 \div 3$ or how many 3's are in 8
 $3 \times 2 = 6$

$$\begin{array}{r} 2281 \\ 3 \overline{) 6,843} \\ \underline{-6} \\ 08 \\ \underline{-6} \\ 24 \\ \underline{-24} \\ 03 \\ \text{no remainder} \rightarrow \underline{-3} \\ 0 \end{array}$$

- ✓ $3 \times 2 = 6$ or how many groups of 3 are in 6
- ✓ Place the 2 above the bar
- ✓ Subtract 6 from 8
- ✓ Bring down the next digit in the dividend ~ FOUR
- ✓ How many 3's are in 24
- ✓ Place the 8 above the bar
- ✓ Subtract 24 from 24
- ✓ Bring down the THREE
- ✓ $3 \times 1 = 3$ ~ Now subtract
- ✓ Our **quotient** is **2,281**

