

WCSU Instructional Plan

Concept: **Divisibility Rules**

Grade Level: **5th (or 6th - 9th for intervention)**

Notes	The general idea here is to explore multiplicative patterns to discover and articulate divisibility rules that can help to determine whether a number has particular factors efficiently. This work will be a prerequisite for division of multi-digit numbers, operations on fractions, greatest common factor, prime factorization, roots, and simplifying irrational numbers. As students explore multiplicative patterns, it is an excellent time to focus on any multiplication facts that are not yet automatic.
Learning Goals	• Understand, articulate and use rules of divisibility for multiples of 2, 3, 4, 5, 6, 9 and 10.* • Know and apply multiplication facts, related division facts, and extended facts. • Use the standard algorithm to divide (if not already mastered). • Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with grouping symbols (if not already mastered). *Extensions: Have students to explore patterns in multiples of the powers of 2 (2, 4, 8, 16, etc.). Have students look for patterns in multiples of 11, then have them look at 111×111, 1111×1111, etc.
Prerequisites <i>(Pretest these to identify needs for intervention)</i>	• Understanding of prime and composite numbers. • Understanding of factors and multiples. • Conservation of length and area • Equivalent forms of whole numbers • Decomposing and recomposing numbers using the commutative and distributive properties of multiplication. • Understanding of multiplication and division using the area of a rectangle model and Partial Quotient Recording. • Understanding of division of a multi-digit dividend by a one digit divisor • Multiplicative (multiplication and division) facts up to 10×10.
Common Misconceptions	Confusing factors and multiples.

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Language	• Divisibility (divisible) - A number is divisible by another number is that the number can be divided into the other without a remainder. • Factor - if one number is divisible by another number is is a factor of that number. • Multiple - if one number is divisible by another number it is a multiple of that number. • Product • Prime number • Composite numbers • Dividend • Divisor • Quotient • Remainder • Whole number
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DAY ONE	
Tool Building	Multiplicative facts (tables of 2, 3, 4, 5, 6 and 9) and extended multiplication facts.
Intuitive Hook	Have students reflect on this think prompt: <i>How many pencils did Mr. Simon have to order if he wanted to give exactly 6 pencils to each of his students at the beginning of the year and have none left over?</i> Students should realize that there are multiple answers (no pun intended!). After they've had the chance to think about it ask them to consider the validity of these possible answers. Have students justify (prove) their answer using Cuisenaire Rods. 1. 32 2. 11 3. 48 4. 17 5. 80 6. 56 Activate this language: prime, composite, factor, product, multiple, whole number, dividend, divisor, quotient.
Language Building	During Intuitive Hook: prime, composite, factor, product, multiple, whole number, dividend, divisor, quotient. During Concept Building: factor, product, multiple, whole number, divisibility, dividend, divisor, quotient.
Concept Building <i>(include entry points for concrete/pictorial,</i>	Concrete (Cuisenaire Rods)- In a small group (because it will take quite a bit of rods), do the following: At the top, use tens blocks placed in a linear fashion up to 50

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<i>abstract/symbolic, communications and applications levels)</i>	In the following order, use cuisinaire rods to show the multiples of each number, directly under the tens blocks (in a linear manner) • Multiples of: 5, 2, 4, 8, 3, 6, 9, 7 Look for patterns- • What do you notice about the multiples of 5? 10? and 5 and 10 together? • Multiples of 2? 4? 8? What do you notice about the multiples of 2, 4, AND 8? • Multiples of 3? 6? 9? What do you notice about the multiples of 3, 6, and 9 together? How about of 3 and 9? • Multiples of 7?
Practice	
Formative Assessment	Is 84 divisible by 2, 3, 4, 5, 6, 9, 10? List the dimensions. Then express each rectangle as both an addition problem and a division problem symbolically.

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DAY TWO	
Intuitive Hook	
Tool Building	Write down a set of numbers: 12, 24, 33, 42, 51, 66, 75, 84, 93, 102 What do all these numbers have in common? Try to find something that all these numbers share.
Language Building <i>(Done during Concept Building)</i>	
Concept Building <i>(include entry points for concrete/pictorial, abstract/symbolic, communications and applications levels)</i>	Pictorial Use a piece of graph paper to linearly sketch out the multiples of: 10, 5 2, 4, 8 3, 6, 9 7 At the end of each multiple, label the line for what number it is. (Ex: I put down one three, label the 3 at the end of that number. Once I put down another 3, I should label the end of those two blocks as 6 (treating this as a number line) Abstract/symbolic (Not sure if this is another pictorial version or abstract/symbolic?) 1. Use a Hundreds chart. Have students follow these directions: (colors relate to the cuisinaire rods) - RED circle around all multiples of 2 - Purple circle around multiples of 4 - Brown circle around multiples of 8 - Yellow triangle around all multiples of 5 - Orange triangle around all multiples of 10 - Light green heart around all multiples of 3 - Dark green heart around all multiples of 6

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	○ Blue heart around all multiples of 9 ○ Brown X through multiples of 7 What do all the numbers that are left have in common? A: <u>Prime Numbers</u> (what is a prime number?) What do all the numbers that have a color on or around them? A: <u>Composite numbers</u> (What is a composite number?) 2. Use the divisibility rules that were constructed after looking at patterns. Take notes on these rules.
Practice	
Formative Assessment	