## PRIME TIME Factors and Multiples

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| **Instructional Time and Investigations** | 22 days | • Inv. 1: Building on Factors and Multiples (4 Problems)<br>• Inv. 2: Common Multiples and Common Factors (3 Problems)<br>• Inv. 3: Factorizations: Searching for Factor Strings (4 Problems)<br>• Inv. 4: Linking Multiplication and Addition: The Distributive Property (4 Problems) |
| **Goals** | **Factors & Multiples:** Understand relationships among factors, multiples, divisors, and products.<br>• If a number $N$ can be written as a product of two whole numbers, $N = a \times b$, then $a$ and $b$ are factors of $N$. Multiples of a can be found using the expression $a \times$ (some whole number), such as $2a$, $3a$, $4a$, etc. Some numbers can be expressed in exponential notation, such as $a^2$, $a^3$, $a^4$, etc.<br>• When all factors of a number are broken down into prime numbers, you have a unique prime factorization. Finding the prime factorization of two numbers can be useful in finding the least common multiple and greatest common factor of the numbers and in classifying numbers as prime, composite, even, odd, or square. | **Equivalent Expressions:** Understand why two expressions are equivalent.<br>• When calculating the value of an expression, the operations have to be performed in a conventional order, the order of operations.<br>• Sometimes a numerical expression can be written in different ways but the expressions are equivalent because the value is the same. Properties of operations, including the Distributive Property, are essential tools for writing equivalent expressions. |
| **Common Core Standards** | **Common Core Standards for Mathematical Practice**<br>**MP.1:** Make sense of problems and persevere in solving them.<br>**MP.2:** Reason abstractly and quantitatively.<br>**MP.3:** Construct viable arguments and critique the reasoning of others.<br>**MP.4:** Model with mathematics.<br>**MP.5:** Use appropriate tools strategically.<br>**MP.6:** Attend to precision.<br>**MP.7:** Look for and make use of structure.<br>**MP.8:** Look for and express regularity in repeated reasoning. | **Common Core Content Standards**<br>**6.NS.B.4:** Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12. Use the distributive property to express a sum of two whole numbers 1–100 with a common factor as a multiple of a sum of two whole numbers with no common factor.<br>**6.EE.A.1:** Write and evaluate numerical expressions involving whole-number exponents<br>**6.EE.A.3** Apply the properties of operations to generate equivalent expressions.<br>**Also 6.EE.A.2a–c, 6.EE.A.4** |

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| | **Content Connections to Other Units** | |
| **Goals of the Unit** | **Prior Work** | **Future Work** |
| **Factors and Multiples:** Understand relationships among factors, multiples, divisors, and products. | • Learning and applying multiplication and division facts; applying the division algorithm; counting by 2's, 3's, 10's, etc.; testing numbers for divisibility; comparing positive whole numbers; finding equivalent fractions (*Elementary School*) | • Performing arithmetic operations with fractions (*Comparing Bits and Pieces; Let's Be Rational; Decimal Ops*) <br>• Performing arithmetic operations with integers and rational numbers (*Accentuate the Negative*) <br>• Comparing, scaling, and testing for similarity (*Stretching and Shrinking; Comparing and Scaling*) <br>• Factoring algebraic expressions (*Frogs, Fleas, and Painted Cubes; It's In the System; Function Junction*) <br>• Understanding decimal numbers and the concept of place value (*Comparing Bits and Pieces; Let's Be Rational; Decimal Ops; Comparing and Scaling*) <br>• Identifying and analyzing patterns in the products of two numbers (*Covering and Surrounding; Variables and Patterns; Accentuate the Negative; Moving Straight Ahead; It's In the System*) <br>• Finding the LCM in order to find common denominators for fractions and ratios (*Comparing Bits and Pieces; Let's Be Rational; Decimal Ops; Comparing and Scaling*) <br>• Studying patterns in multiplicative relationships to develop algorithms for finding area, surface area, and volume of figures (*Covering and Surrounding; Filling and Wrapping*) <br>• Studying patterns in additive and multiplicative sequences (*Function Junction*) <br>• Identifying irrational numbers (*Looking for Pythagoras*) <br>• Studying exponential relationships (*Growing, Growing, Growing*) <br>• Classifying numbers as positive or negative (*Accentuate the Negative*) and as rational or irrational (*Looking for Pythagoras*) <br>• Classifying relationships as linear, quadratic, or exponential (*Variables and Patterns; Moving Straight Ahead; Thinking With Mathematical Models; Growing, Growing, Growing; Frogs, Fleas, and Painted Cubes; Say It With Symbols*) |
| **Equivalent Expressions:** Understand why two expressions are equivalent. | • *Developing algorithms for operations on whole numbers and using more than one of then to solve a problem (Elementary School)* <br>• *Developing algorithms for finding sums and products of whole numbers and fractions and for finding the area of rectangle (Elementary School)* | • Developing order of operations with decimals (*Decimal Ops*), integers (*Accentuate the Negative*), and algebraic expressions (*Variables and Patterns; Moving Straight Ahead; Thinking With Mathematical Models; Growing, Growing, Growing; Frogs, Fleas and Painted Cubes; Say It With Symbols*) <br>• Developing algorithms for finding sums and products of rational numbers (*Let's Be Rational; Decimal Ops; Accentuate the Negative*) and for finding equivalent algebraic expressions (*Variables and Patterns; Moving Straight Ahead; Thinking With Mathematical Models; Frogs, Fleas, and Painted Cubes; Say It With Symbols; It's In the System; Function Junction*) |