GRADE FOCUS

Sixth grade mathematics is about (1) connecting ratio and rate to whole number multiplication and division and using concepts of ratio and rate to solve problems; (2) dividing more complex fractions and extending idea of rational numbers to include negative numbers; (3) writing, interpreting, and using expressions and equations; and (4) developing understanding of statistical thinking.

• Module 1: Ratios and Unit Rates
• Module 2: Arithmetic Operations Including Dividing by a Fraction
• Module 3: Rational Numbers
» Module 4: Expressions and Equations
• Module 5: Area, Surface Area, and Volume Problems
• Module 6: Statistics

TOPIC OVERVIEW

Topics are the lessons within a module that help children master the skills above. Here are the lessons that will guide your child through Module 4:

• Topic A: Relationships of the Operations
• Topic B: Special Notations of Operations
• Topic C: Replacing Letters and Numbers
• Topic D: Expanding, Factoring, and Distributing Expressions
• Topic E: Expressing Operations in Algebraic Form
• Topic F: Writing and Evaluating Expressions and Formulas
• Topic G: Solving Equations
• Topic H: Applications of Equations

WORDS TO KNOW

• Simple Expression: A simple expression is a number, a variable (letter), a product whose factors are either numbers or variables involving whole number exponents, or sums and/or differences of such products. Each product in a simple expression is called a term, and the evaluation of the numbers in the product is called the coefficient of the term. The following are all examples of simple expressions: 2, x, \(5y^2\), 10 \(- x\).
• Linear Expression: A linear expression is a product of two simple expressions where only one of the simple expressions has letters and only one letter in each term of that expression or sums and/or differences of such products (e.g. 3x, \((4x)(2)\), \(x + 4\), \(m/50\)).
• Equivalent Expressions: Two simple expressions are equivalent if both equal same number for every substitution of numbers into all the letters in both expressions (e.g. \(y + y + y\) and \(3y\)).
• Equation: An equation is a statement of equality between two expressions (e.g. \(7a = 14\)).
• Truth Values of a Number Sentence: A number sentence is said to be true if both numerical expressions are equivalent; it is said to be false otherwise. True and false are called truth values.
• Exponential Notation for Whole Number Exponents: Let \(m\) be a non-zero whole number. For any number \(a\), we define \(a\) to be the product of \(m\) factors of \(a\), i.e., \(a^n = a \cdot a \cdot a \cdot a \ldots \cdot a\) (multiplied together \(m\) times). The number \(a\) is called the base, and \(m\) is called the exponent, or power of \(a\).
SAMPLE PROBLEMS

SAMPLE 1

In the example below, students develop expressions involving addition and subtraction from real-world problems. They also evaluate these expressions for given values.

Noah and Carter are collecting box tops for their school. They each bring 1 box top per day starting on the first day of school. However, Carter had a head start because his aunt sent him 15 box tops before school began. Noah’s grandmother saved 10 box tops, and Noah added those on his first day.

1. Fill in the missing values that indicate the total number of box tops each boy brought to school.

<table>
<thead>
<tr>
<th>School Day</th>
<th>Noah</th>
<th>Carter</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>11</td>
<td>16</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. If we let D be the total number of days since school started, on day D of school, how many box tops will Noah have brought to school? Solution: \( D + 10 \)

3. On day D of school, how many box tops will Carter have brought to school? Solution: \( D + 15 \)

4. On day 10 of school, how many box tops will Noah have brought to school? 20 box tops

5. On day 10 of school, how many box tops will Carter have brought to school? 25 box tops

SAMPLE 2

Here are two examples of problems that require students to write an expression in which variables (letters) stand in for numbers:

1. \( b \) decreased by \( c \) squared \( \rightarrow b - c^2 \)

2. 24 divided by the product of 2 and \( a \) \( \rightarrow \frac{24}{2a} \)

Writing & Solving Equations

Solve for \( x \).

Solution:

\[ x^2 + 52^\circ = 90^\circ \]
\[ x^2 + 52^\circ - 52^\circ = 90^\circ - 52^\circ \]
\[ x^2 = 38^\circ \]

HOW YOU CAN HELP AT HOME

• Ask your child what they learned in school today, and ask them to show you an example.

  » Using the following set of numbers, ask your child to determine the number(s) that make the inequality true: \{0,1,5,8,11,17\}, \( 5 \ h > 40 \)

  » Solution: \( h \) can be 11 or 17

• Ask your child to explain the difference between a straight angle and a reflex angle.

  » Solution: A straight angle has a measurement of exactly \( 180^\circ \) while a reflex angle has a measurement between \( 180^\circ \) and \( 360^\circ \).

• Have your child graph the following expression on a number line: Tarek has more than $5

  » Solution: \( T > 5 \)