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Expressions and Equations

[1] Each lesson is ONE day, and ONE day is considered a 45-minute period.

Grade 6 • Module 4

Expressions and Equations

OVERVIEW

In Module 4, students extend their arithmetic work to include using letters to represent numbers. Students understand that letters are simply "stand-ins" for numbers and that arithmetic is carried out exactly as it is with numbers. Students explore operations in terms of verbal expressions and determine that arithmetic properties hold true with expressions because nothing has changed—they are still doing arithmetic with numbers. Students determine that letters are used to represent specific but unknown numbers and are used to make statements or identities that are true for all numbers or a range of numbers. Students understand the importance of specifying units when defining letters. Students say, "Let $K =$ Karolyn's weight in pounds" instead of "Let $K =$ Karolyn's weight" because weight cannot be a specific number until it is associated with a unit, such as pounds, ounces, grams, etc. They also determine that it is inaccurate to define K as Karolyn because Karolyn is not a number. Students conclude that in word problems, each letter (or variable) represents a number, and its meaning is clearly stated.

To begin this module, students are introduced to important identities that will be useful in solving equations and developing proficiency with solving problems algebraically. In Topic A, students understand the relationships of operations and use them to generate equivalent expressions (**6.EE.A.3**). By this time, students have had ample experience with the four operations since they have worked with them from kindergarten through Grade 5 (**1.OA.B.3**, **3.OA.B.5**). The topic opens with the opportunity to clarify those relationships, providing students with the knowledge to build and evaluate identities that are important for solving equations. In this topic, students discover and work with the following identities: $w - x + x = w$, $w + x - x = w$, $a \div b \cdot b = a$, $a \cdot b \div b = a$ (when $b \neq 0$), and $3x = x + x + x$. Students will also discover that if $12 \div x = 4$, then $12 - x - x - x - x = 0$.

In Topic B, students experience special notations of operations. They determine that $3x = x + x + x$ is not the same as x^3, which is $x \cdot x \cdot x$. Applying their prior knowledge from Grade 5, where whole number exponents were used to express powers of ten (**5.NBT.A.2**), students examine exponents and carry out the order of operations, including exponents. Students demonstrate the meaning of exponents to write and evaluate numerical expressions with whole number exponents (**6.EE.A.1**).

Students represent letters with numbers and numbers with letters in Topic C. In past grades, students discovered properties of operations through example (**1.OA.B.3**, **3.OA.B.5**). Now, they use letters to represent numbers in order to write the properties precisely. Students realize that nothing has changed because the properties still remain statements about numbers. They are not properties of letters, nor are they new rules introduced for the first time. Now, students can extend arithmetic properties from manipulating numbers to manipulating expressions. In particular, they develop the following identities: $a \cdot b = b \cdot a$, $a + b = b + a$, $g \cdot 1 = g$, $g + 0 = g$, $g \div 1 = g$, $g \div g = 1$, and $1 \div g = \frac{1}{g}$. Students understand that a letter in an expression represents a number. When that number replaces that letter, the expression can be evaluated to one number. Similarly, they understand that a letter in an expression can represent a number. When that number is replaced by a letter, an expression is stated (**6.EE.A.2**).

In Topic D, students become comfortable with new notations of multiplication and division and recognize their equivalence to the familiar notations of the prior grades. The expression $2 \times b$ is exactly the same as $2 \cdot b$, and both are exactly the same as $2b$. Similarly, $6 \div 2$ is exactly the same as $\frac{6}{2}$. These new conventions are practiced to automaticity, both with and without variables. Students extend their knowledge of GCF and the distributive property from Module 2 to expand, factor, and distribute expressions using new notation (**6.NS.B.4**). In particular, students are introduced to factoring and distributing as algebraic identities. These include: $a + a = 2 \cdot a = 2a$, $(a + b) + (a + b) = 2 \cdot (a + b) = 2(a + b) = 2a + 2b$, and $a \div b = \frac{a}{b}$.

In Topic E, students express operations in algebraic form. They read and write expressions in which letters stand for and represent numbers (**6.EE.A.2**). They also learn to use the correct terminology for operation symbols when reading expressions. For example, the expression $\frac{3}{2x-4}$ is read as "the quotient of three and the difference of twice a number and four." Similarly, students write algebraic expressions that record operations with numbers and letters that stand for numbers. Students determine that $3a + b$ can represent the story: "Martina tripled her money and added it to her sister's money" (**6.EE.A.2b**).

Students write and evaluate expressions and formulas in Topic F. They use variables to write expressions and evaluate those expressions when given the value of the variable (**6.EE.A.2**). From there, students create formulas by setting expressions equal to another variable. For example, if there are 4 bags containing c colored cubes in each bag with 3 additional cubes, students use this information to express the total number of cubes as $4c + 3$. From this expression, students develop the formula $t = 4c + 3$, where t is the total number of cubes. Once provided with a value for the amount of cubes in each bag ($c = 12$ cubes), students can evaluate the formula for t: $t = 4(12) + 3$, $t = 48 + 3$, $t = 51$. Students continue to evaluate given formulas such as the volume of a cube, $V = s^3$, given the side length, or the volume of a rectangular prism, $V = l \cdot w \cdot h$, given those dimensions (**6.EE.A.2c**).

In Topic G, students are introduced to the fact that equations have a structure similar to some grammatical sentences. Some sentences are true: "George Washington was the first president of the United States," or "$2 + 3 = 5$." Some are clearly false: "Benjamin Franklin was a president of the United States," or "$7 + 3 = 5$." Sentences that are always true or always false are called *closed sentences*. Some sentences need additional information to determine whether they are true or false. The sentence "She is 42 years old" can be true or false, depending on who "she" is. Similarly, the sentence "$x + 3 = 5$" can be true or false, depending on the value of x. Such sentences are called *open sentences*. An equation with one or more variables is an open sentence. The beauty of an open sentence with one variable is that if the variable is replaced with a number, then the new sentence is no longer open: it is either *clearly true* or *clearly false*. For example, for the open sentence $x + 3 = 5$:

If x is replaced by 7, the new closed sentence, $7 + 3 = 5$, is false because $10 \neq 5$.
If x is replaced by 2, the new closed sentence, $2 + 3 = 5$, is true because $5 = 5$.

From here, students conclude that solving an equation is the process of determining the number(s) that, when substituted for the variable, results in a true sentence (**6.EE.B.5**). In the previous example, the solution for $x + 3 = 5$ is obviously 2. The extensive use of bar diagrams in Grades K–5 makes solving equations in Topic G a fun and exciting adventure for students. Students solve many equations twice, once with a bar diagram and once using algebra. They use identities and properties of equality that were introduced earlier in the module to solve one-step, two-step, and multistep equations. Students solve problems finding the measurements of missing angles represented by letters (**4.MD.C.7**) using what they learned in Grade 4 about the four operations and what they now know about equations.

In Topic H, students use their prior knowledge from Module 1 to construct tables of independent and dependent values in order to analyze equations with two variables from real-life contexts. They represent equations by plotting the values from the table on a coordinate grid (**5.G.A.1**, **5.G.A.2**, **6.RP.A.3a**, **6.RP.A.3b**, **6.EE.C.9**). The module concludes with students referring to true and false number sentences in order to move from solving equations to writing inequalities that represent a constraint or condition in real-life or mathematical problems (**6.EE.B.5**, **6.EE.B.8**). Students understand that inequalities have infinitely many solutions and represent those solutions on number line diagrams.

The 45-day module consists of 34 lessons; 11 days are reserved for administering the Mid- and End-of-Module Assessments, returning assessments, and remediating or providing further applications of the concepts. The Mid-Module Assessment follows Topic E, and the End-of-Module Assessment follows Topic H.

Focus Standards

Apply and extend previous understandings of arithmetic to algebraic expressions.[2]

6.EE.A.1 Write and evaluate numeric expressions involving whole-number exponents.

6.EE.A.2 Write, read, and evaluate expressions in which letters stand for numbers.

a. Write expressions that record operations with numbers and with letters standing for numbers. *For example, express the calculation "Subtract y from 5" as $5 - y$.*

b. Identify parts of an expression using mathematical terms (sum, term, product, factor, quotient, coefficient); view one or more parts of an expression as a single entity. *For example, describe the expression $2(8 + 7)$ as a product of two factors; view $(8 + 7)$ as both a single entity and a sum of two terms.*

c. Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole-number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations). *For example, use the formulas $V = s^3$ and $A = 6s^2$ to find the volume and surface area of a cube with sides of length $s = \frac{1}{2}$.*

6.EE.A.3 Apply the properties of operations to generate equivalent expressions. *For example, apply the distributive property to the expression $3(2 + x)$ to produce the equivalent expression $6 + 3x$; apply the distributive property to the expression $24x + 18y$ to produce the equivalent expression $6(4x + 3y)$; apply properties of operations to $y + y + y$ to produce the equivalent expression $3y$.*

[2] 6.EE.A.2c is also taught in Module 4 in the context of geometry.

6.EE.A.4 Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them). *For example, the expressions* $y + y + y$ *and* $3y$ *are equivalent because they name the same number regardless of which number* y *stands for.*

Reason about and solve one-variable equations and inequalities.[3]

6.EE.B.5 Understand solving an equation or inequality as a process of answering a question; which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true.

6.EE.B.6 Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.

6.EE.B.7 Solve real-world and mathematical problems by writing and solving equations in the form $x + p = q$ and $px = q$ for cases in which p, q and x are all nonnegative rational numbers.

6.EE.B.8 Write an inequality of the form $x > c$ or $x < c$ to represent a constraint or condition in a real-world mathematical problem. Recognize that inequalities of the form $x > c$ or $x < c$ have infinitely many solutions; represent solutions of such inequalities on number line diagrams.

Represent and analyze quantitative relationships between dependent and independent variables.

6.EE.C.9 Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. *For example, in a problem involving motion at constant speed, list and graph ordered pairs of distances and times, and write the equation* $d = 65t$ *to represent the relationship between distance and time.*

Foundational Standards

Understand and apply properties of operations and the relationship between addition and subtraction.

1.OA.B.3 Apply properties of operations as strategies to add and subtract.[4] *Examples: If* $8 + 3 = 11$ *is known, then* $3 + 8 = 11$ *is also known. (Commutative property of addition.) To add* $2 + 6 + 4$*, the second two numbers can be added to make a ten, so* $2 + 6 + 4 = 2 + 10 = 12$*. (Associative property of addition.)*

[3] Except for 6.EE.B.8, this cluster is also taught in Module 4 in the context of geometry.
[4] Students need not use formal terms for these properties.

Understand properties of multiplication and the relationship between multiplication and division.

3.OA.B.5 Apply properties of operations as strategies to multiply and divide.[5] *Examples: If* $6 \times 4 = 24$ *is known, then* $4 \times 6 = 24$ *is also known. (Commutative property of multiplication.)* $3 \times 5 \times 2$ *can be found by* $3 \times 5 = 15$*, then* $15 \times 2 = 30$*, or by* $5 \times 2 = 10$*, then* $3 \times 10 = 30$*. (Associative property of multiplication.) Knowing that* $8 \times 5 = 40$ *and* $8 \times 2 = 16$*, one can find* 8×7 *as* $8 \times (5 + 2) = (8 \times 5) + (8 \times 2) = 40 + 16 = 56$ *(Distributive property.)*

Gain familiarity with factors and multiples.

4.OA.B.4 Find all factors for a whole number in the range 1–100. Recognize that a whole number is a multiple of each of its factors. Determine whether a given whole number in the range 1–100 is a multiple of a given one-digit number. Determine whether a given whole number in the range 1–100 is prime or composite.

Geometric measurement: understand concepts of angle and measure angles.

4.MD.C.5 Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement:

a. An angle is measured with reference to a circle with its center at the common endpoint of the rays, by considering the fraction of the circular arc between the points where the two rays intersect the circle. An angle that turns through $\frac{1}{360}$ of a circle is called a "one-degree angle," and can be used to measure angles.

b. An angle that turns through n one-degree angles is said to have an angle measure of n degrees.

4.MD.C.6 Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure.

4.MD.C.7 Recognize angle measure as additive. When an angle is decomposed into non-overlapping parts, the angle measure of the whole is the sum of the angle measures of the parts. Solve addition and subtraction problems to find unknown angles on a diagram in real world and mathematical problems, e.g., by using an equation with a symbol for the unknown angle measure.

Write and interpret numerical expressions.

5.OA.A.2 Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them. *For example, express the calculation "add* 8 *and* 7*, then multiply by* 2*" as* $2 \times (8 + 7)$*. Recognize that* $3 \times (18932 + 921)$ *is three times as large as* $18932 + 921$*, without having to calculate the indicated sum or product.*

[5] Students need not use formal terms for these properties.

Analyze patterns and relationships.

5.OA.B.3 Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane. *For example, given the rule "Add* 3*" and the starting number* 0*, and given the rule "Add* 6*" and the starting number* 0*, generate terms in the resulting sequences, and observe that the terms in one sequence are twice the corresponding terms in the other sequence. Explain informally why this is so.*

Understand the place value system.

5.NBT.A.2 Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10.

Graph points on the coordinate plane to solve real-world and mathematical problems.

5.G.A.1 Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., x-axis and x-coordinate, y-axis and y-coordinate).

5.G.A.2 Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.

Understand ratio concepts and use ratio reasoning to solve problems.

6.RP.A.3 Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.

a. Make tables of equivalent ratios relating quantities with whole-number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios.

b. Solve unit rate problems including those involving unit pricing and constant speed. *For example, if it took* 7 *hours to mow* 4 *lawns, then at that rate, how many lawns could be mowed in* 35 *hours? At what rate were lawns being mowed?*

Compute fluently with multi-digit numbers and find common factors and multiples.

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. *For example, express* $36 + 8$ *as* $4(9 + 2)$.

Focus Standards for Mathematical Practice

MP.2 **Reason abstractly and quantitatively.** Students connect symbols to their numerical referents. They understand exponential notation as repeated multiplication of the base number. Students realize that 3^2 is represented as 3×3, with a product of 9, and explain how 3^2 differs from 3×2, where the product is 6. Students determine the meaning of a variable within a real-life context. They write equations and inequalities to represent mathematical situations. Students manipulate equations using the properties so that the meaning of the symbols and variables can be more closely related to the real-world context. For example, given the expression $12x$ represents how many beads are available to make necklaces, students rewrite $12x$ as $4x + 4x + 4x$ when trying to show the portion each person gets if there are three people, or rewrite $12x$ as $6x + 6x$ if there are two people sharing. Students recognize that these expressions are equivalent. Students can also use equivalent expressions to express the area of rectangles and to calculate the dimensions of a rectangle when the area is given. Also, students make connections between a table of ordered pairs of numbers and the graph of those data.

MP.6 **Attend to precision.** Students are precise in defining variables. They understand that a variable represents one number. For example, students understand that in the equation $a + 4 = 12$, the variable a can only represent one number to make the equation true. That number is 8, so $a = 8$. When variables are represented in a real-world problem, students precisely define the variables. In the equation $2w = 18$, students define the variable as weight in pounds (or some other unit) rather than just weight. Students are precise in using operation symbols and can connect between previously learned symbols and new symbols (3×2 can be represented with parentheses $3(2)$ or with the multiplication dot $3 \cdot 2$; similarly $3 \div 2$ is also represented with the fraction bar $\frac{3}{2}$). In addition, students use appropriate vocabulary and terminology when communicating about expressions, equations, and inequalities. For example, students write expressions, equations, and inequalities from verbal or written descriptions. "A number increased by 7 is equal to 11" can be written as $x + 7 = 11$. Students refer to $7y$ as a term or expression, whereas $7y = 56$ is referred to as an equation.

MP.7 **Look for and make use of structure**. Students look for structure in expressions by deconstructing them into a sequence of operations. They make use of structure to interpret an expression's meaning in terms of the quantities represented by the variables. In addition, students make use of structure by creating equivalent expressions using properties. For example, students write $6x$ as $x + x + x + x + x + x$, $4x + 2x$, $3(2x)$, or other equivalent expressions. Students also make sense of algebraic solutions when solving an equation for the value of the variable through connections to bar diagrams and properties. For example, when there are two copies of $a + b$, this can be expressed as either $(a + b) + (a + b)$, $2a + 2b$, or $2(a + b)$. Students use tables and graphs to compare different expressions or equations to make decisions in real-world scenarios. These models also create structure as students gain knowledge in writing expressions and equations.

MP.8 **Look for and express regularity in repeated reasoning**. Students look for regularity in a repeated calculation and express it with a general formula. Students work with variable expressions while focusing more on the patterns that develop than the actual numbers that the variable represents. For example, students move from an expression such as $3 + 3 + 3 + 3 = 4 \cdot 3$ to the general form $m + m + m + m = 4 \cdot m$, or $4m$. Similarly, students move from expressions such as $5 \cdot 5 \cdot 5 \cdot 5 = 5^4$ to the general form $m \cdot m \cdot m \cdot m = m^4$. These are especially important when moving from the general form back to a specific value for the variable.

Terminology

New or Recently Introduced Terms

- **Equation** (An *equation* is a statement of equality between two expressions.)
- **Equivalent Expressions** (Two simple expressions are *equivalent* if both evaluate to the same number for every substitution of numbers into all the letters in both expressions.)
- **Exponential Notation for Whole Number Exponents** (Let m be a non-zero whole number. For any number a, we define a^m to be the product of m factors of a, i.e., $a^m = \underbrace{a \cdot a \cdot a \cdot a. . . \cdot a}_{m \text{ times}}$. The number a is called the *base,* and m is called the *exponent,* or *power* of a.)
- **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.)
- **Simple Expression** (A *simple expression* is a number, a letter that represents a number, a product whose factors are either numbers or letters 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.*)
- **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*.)

Familiar Terms and Symbols[6]

- Distribute
- Expand
- Factor
- Number Sentence
- Product
- Properties of Operations (distributive, commutative, associative)
- Quotient
- Sum

[6] These are terms and symbols students have seen previously.

- Term
- True or False Number Sentence
- Variable or Unknown Number

Suggested Tools and Representations

- Bar model
- Geometric figures
- Protractors

Rapid White Board Exchanges

Implementing a RWBE requires that each student be provided with a personal white board, a white board marker, and a means of erasing his or her work. An economic choice for these materials is to place sheets of card stock inside sheet protectors to use as the personal white boards and to cut sheets of felt into small squares to use as erasers.

A RWBE consists of a sequence of 10 to 20 problems on a specific topic or skill that starts out with a relatively simple problem and progressively gets more difficult. The teacher should prepare the problems in a way that allows him or her to reveal them to the class one at a time. A flip chart or PowerPoint presentation can be used, or the teacher can write the problems on the board and either cover some with paper or simply write only one problem on the board at a time.

The teacher reveals, and possibly reads aloud, the first problem in the list and announces, "Go." Students work the problem on their personal white boards as quickly as possible and hold their work up for their teacher to see their answers as soon as they have the answer ready. The teacher gives immediate feedback to each student, pointing and/or making eye contact with the student and responding with an affirmation for correct work such as, "Good job!", "Yes!", or "Correct!", or responding with guidance for incorrect work such as "Look again," "Try again," "Check your work," etc. In the case of the RWBE, it is not recommended that the feedback include the name of the student receiving the feedback.

If many students have struggled to get the answer correct, go through the solution of that problem as a class before moving on to the next problem in the sequence. Fluency in the skill has been established when the class is able to go through each problem in quick succession without pausing to go through the solution of each problem individually. If only one or two students have not been able to successfully complete a problem, it is appropriate to move the class forward to the next problem without further delay; in this case find a time to provide remediation to that student before the next fluency exercise on this skill is given.

Sprints

Sprints are designed to develop fluency. They should be fun, adrenaline-rich activities that intentionally build energy and excitement. A fast pace is essential. During Sprint administration, teachers assume the role of athletic coaches. A rousing routine fuels students' motivation to do their personal best. Student recognition of increasing success is critical, and so every improvement is acknowledged. (See the Sprint Delivery Script for the suggested means of acknowledging and celebrating student success.)

One Sprint has two parts with closely related problems on each. Students complete the two parts of the Sprint in quick succession with the goal of improving on the second part, even if only by one more.

Sprints are not to be used for a grade. Thus, there is no need for students to write their names on the Sprints. The low-stakes nature of the exercise means that even students with allowances for extended time can participate. When a particular student finds the experience undesirable, it is recommended that the student be allowed to opt out and take the Sprint home. In this case, it is ideal if the student has a regular opportunity to express the desire to opt in.

With practice, the Sprint routine takes about 8 minutes.

Sprint Delivery Script

Gather the following: stopwatch, a copy of Sprint A for each student, a copy of Sprint B for each student, answers for Sprint A and Sprint B. The following delineates a script for delivery of a pair of Sprints.

This sprint covers: *topic.*

Do not look at the Sprint; keep it turned face down on your desk.

There are xx problems on the Sprint. You will have 60 seconds. Do as many as you can. I do not expect any of you to finish.

On your mark, get set, GO.

60 seconds of silence.

STOP. Circle the last problem you completed.

I will read the answers. You say "YES" if your answer matches. Mark the ones you have wrong. Don't try to correct them.

Energetically, rapid-fire call the answers ONLY.

Stop reading answers after there are no more students answering, "Yes."

Fantastic! Count the number you have correct, and write it on the top of the page. This is your personal goal for Sprint B.

Raise your hand if you have 1 or more correct. 2 or more, 3 or more...

Let us all applaud our runner-up, [insert name], with x correct. And let us applaud our winner, [insert name], with x correct.

You have a few minutes to finish up the page and get ready for the next Sprint.

Students are allowed to talk and ask for help; let this part last as long as most are working seriously.

Stop working. I will read the answers again so you can check your work. You say "YES" if your answer matches.

Energetically, rapid-fire call the answers ONLY.

Optionally, ask students to stand, and lead them in an energy-expanding exercise that also keeps the brain going. Examples are jumping jacks or arm circles, etc., while counting by 15's starting at 15, going up to 150 and back down to 0. You can follow this first exercise with a cool down exercise of a similar nature, such as calf raises with counting by one-sixths $\left(\frac{1}{6}, \frac{1}{3}, \frac{1}{2}, \frac{2}{3}, \frac{5}{6}, 1 \ldots\right)$.

Hand out the second Sprint, and continue reading the script.

Keep the Sprint face down on your desk.

There are xx problems on the Sprint. You will have 60 seconds. Do as many as you can. I do not expect any of you to finish.

On your mark, get set, GO.

60 seconds of silence.

STOP. Circle the last problem you completed.

I will read the answers. You say "YES" if your answer matches. Mark the ones you have wrong. Don't try to correct them.

Quickly read the answers ONLY.

Count the number you have correct, and write it on the top of the page.

Raise your hand if you have 1 or more correct. 2 or more, 3 or more, ...

Let us all applaud our runner-up, [insert name], with x correct. And let us applaud our winner, [insert name], with x correct.

Write the amount by which your score improved at the top of the page.

Raise your hand if you improved your score by 1 or more. 2 or more, 3 or more, ...

Let us all applaud our runner-up for most improved, [insert name]. And let us applaud our winner for most improved, [insert name].

You can take the Sprint home and finish it if you want.

Assessment Summary

Assessment Type	Administered	Format	Standards Addressed
Mid-Module Assessment Task	After Topic E	Constructed response with rubric	6.EE.A.1, 6.EE.A.2, 6.EE.A.3, 6.EE.A.4
End-of-Module Assessment Task	After Topic H	Constructed response with rubric	6.EE.A.2, 6.EE.B.5, 6.EE.B.6, 6.EE.B.7, 6.EE.B.8, 6.EE.C.9