

# Unit 6: Expressions and Equations

Content Area: **Mathematics**  
Course(s): **Math - Grade 6**  
Time Period: **February**  
Length: **18-20 days**  
Status: **Published**

## Unit Overview

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In this unit, students learn to understand and use the terms “variable,” “coefficient,” “solution,” “equivalent expressions,” “exponent,” “independent variable,” and “dependent variable.” They begin to write coefficients next to variables without a multiplication symbol, e.g.,  $10x$  rather than  $10 * x$ , and note that  $x$  is  $1 * x$ .

## Transfer

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Students will be able to independently use their learning to solve real world situations involving:

- solving problems utilizing exponents.
- solving problems utilizing order of operations.
- algebraic reasoning.
- mental math including guess, check, and revise.

## Meaning

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## Understandings

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Students will understand:

- the vocabulary associated with the unit.
- the basics of algebraic thinking.

## Essential Questions

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- How does the structure of equations and/or inequalities help us solve equations and/or inequalities?
- How does the substitution process help in solving problems?

- Why are variables used in equations? – What might a variable represent in a given situation?
- How are inequalities represented and solved?

## **Application of Knowledge and Skill**

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### **Students will know...**

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- the vocabulary that is associated with the unit.
- which operations to use when solving real-world algebraic problems.
- how to write expressions and equations based on real-world situations.
- the difference between independent and dependent variables.

### **Students will be skilled at...**

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- representing numbers using exponents.
- using order of operations to complete problems.
- evaluating algebraic expressions.
- ex) Use the replacement set  $\{6, 12, 24\}$  to find which values will make the equation  $3x + 12 = 36 - x$  true.
- writing verbal phrases as algebraic expressions/equations.
- using properties to simplify expressions/equations.
- using the Distributive Property.
- ex) Choose the answer from the drop-down menu that correctly completes the sentence is an equivalent expression for  $3(2 - n)$ .
- ex) Which expression is equivalent to  $4 + 3(2 + 4x)$
- writing and solving one-step equations.
- writing, solving, and graphing functions and inequalities.
- completing function tables.
- writing and extending sequences.
- Diva wanted to make a flower arrangement for her friend's birthday. She wanted  $\frac{1}{3}$  of the flowers in the arrangement to be roses. She had 12 roses with her. If she used all the roses for the arrangement, how many other flowers did she need for the arrangement?

## Learning Goal

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Apply and extend previous understandings of arithmetic to algebraic expressions.

Reason about and solve one-variable equations and inequalities.

Represent and analyze quantitative relationships between dependent and independent variables.

MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.2	Reason abstractly and quantitatively.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.K-12.5	Use appropriate tools strategically.
MA.K-12.6	Attend to precision.
MA.K-12.7	Look for and make use of structure.

## Vocabulary

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value, variable, coefficient, solution to an equation, each side, balanced hanger, solve, equivalent expression, distributive property, area as a product, area as a sum, to the power, base (of an exponent), independent variable, dependent variable, coordinate plane, coordinate, horizontal axis, vertical axis, plot

## Daily Target- Lesson 1

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- Draw tape diagrams to represent equations of the forms  $x+p=q$  and  $px=q$ .
- Interpret (orally and in writing) tape diagrams that represent equations of the form  $p+x=q$  or  $px=q$ .
- Use tape diagrams to find unknown values in equations of the forms  $x+p=q$  and  $px=q$  and explain (orally) the solution method.

Desmos Tape Diagram and

Equations <https://teacher.desmos.com/activitybuilder/custom/5dd611a42d9be17d452be729>

MA.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.
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## Daily Target- Lesson 2

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- Comprehend the word “variable” to refer to a letter standing in for a number and recognize that a coefficient next to a variable indicates multiplication (in spoken and written language).
- Generate values that make an equation true or false and justify (orally and in writing) whether they are “solutions” to the equation.

- Use substitution to determine whether a given number makes an equation true.

Desmos <https://teacher.desmos.com/activitybuilder/custom/563a8ff1aff40c250ba2f204>

MA.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.
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### Daily Target- Lesson 3

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- Interpret hanger diagrams (orally and in writing) and write equations that represent relationships between the weights on a balanced hanger diagram.
- Use balanced hangers to explain (orally and in writing) how to find solutions to equations of the form  $x+p=q$  or  $px=q$ .

Desmos Balance the Hanger <https://teacher.desmos.com/activitybuilder/custom/5b92e7a407624d32bf1bf88a>

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

### Daily Target- Lesson 4

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- Interpret and coordinate sentences, equations, and diagrams that represent the same addition or multiplication situation.
- Solve equations of the form  $x+p=q$  or  $px=q$  and explain (in writing) the solution method.

Desmos <https://teacher.desmos.com/activitybuilder/custom/580fd91bf2e5c8170bb342b4>

MA.6.NS.B.3	Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.
MA.6.EE.B	Reason about and solve one-variable equations and inequalities.
MA.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.
MA.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.
MA.6.EE.B.7	Solve real-world and mathematical problems by writing and solving equations of the form $x + p = q$ and $px = q$ for cases in which $p$ , $q$ and $x$ are all nonnegative rational numbers.

## Daily Target- Lesson 5

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- Comprehend that the notation  $a/b$  can be used to represent division generally, and the numerator and denominator can include fractions, decimals, or variables.
- Describe (orally) a situation that could be represented by a given equation of the form  $x+p=q$  or  $px=q$ .
- Express division as a fraction (in writing) when solving equations of the form  $px=q$ .

Desmos <https://teacher.desmos.com/activitybuilder/custom/5e934cd6f920b50c57e5376f>

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

## Daily Target- Lesson 6

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- Explain (orally) how to create and solve an equation that represents a situation with an unknown amount.
- Write an expression with a variable to generalize the relationship between quantities in a situation.

MA.6.EE.A.2a	Write expressions that record operations with numbers and with letters standing for numbers.
MA.6.EE.A.2c	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).
MA.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.

## Daily Target- Lesson 7

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- State explicitly what the chosen variable represents when creating an equation.
- Use equations to solve problems involving percentages and explain (orally) the solution method.
- Write equations of the form  $px=q$  or equivalent to represent situations where the amount that corresponds to 100% is unknown.

MA.6.RP.A.3c	Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent.
MA.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.

MA.6.EE.B.7

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

### Daily Target- Lesson 8

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- Draw a diagram to represent the value of an expression for a given value of its variable.
- Explain (in writing) that some pairs of expressions are equal for one value of their variable but not for other values.
- Justify (orally, in writing, and through other representations) whether two expressions are “equivalent”, i.e., equal to each other for every value of their variable.

MA.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).

MA.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.

### Daily Target- Lesson 9

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- Generate equivalent numerical expressions that are related by the distributive property, and explain (orally or using other representations) the reasoning.
- Use an area diagram to make sense of equivalent numerical expressions that are related by the distributive property.

Desmos Distributive Property <https://teacher.desmos.com/activitybuilder/custom/56c92f3ea9c85b9a17666fac>

Desmos <https://teacher.desmos.com/activitybuilder/custom/57d97c909beb21eb11442e0b>

<https://teacher.desmos.com/activitybuilder/custom/5dacbcdee3dae749bfb7a300>

<https://teacher.desmos.com/activitybuilder/custom/57d993f984b707d107e48b5c>

MA.6.EE.A.3

Apply the properties of operations to generate equivalent expressions.

MA.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).

### Daily Target- Lesson 10

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- Generate algebraic expressions that represent the area of a rectangle with an unknown length.
- Justify (orally and using other representations) that algebraic expressions that are related by the distributive property are equivalent.

Desmos <https://teacher.desmos.com/activitybuilder/custom/5bc9d9a2eae18114ff2d2bc>

Desmos <https://teacher.desmos.com/activitybuilder/custom/58163ec50e29d52e2749782f>

MA.6.EE.A.2	Write, read, and evaluate expressions in which letters stand for numbers.
MA.6.EE.A.3	Apply the properties of operations to generate equivalent expressions.
MA.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).

### **Daily Target- Lesson 11**

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- Draw a diagram to justify that two expressions that are related by the distributive property are equivalent.
- Explain (orally) how to use the distributive property to identify or generate equivalent algebraic expressions.
- Use the distributive property to write equivalent algebraic expressions, including where the common factor is a variable.

Desmos <https://teacher.desmos.com/activitybuilder/custom/5bca1656063bf01100c43a9a>

<https://teacher.desmos.com/activitybuilder/custom/5acc3c10066bf355282851c1>

MA.6.EE.A.2	Write, read, and evaluate expressions in which letters stand for numbers.
MA.6.EE.A.3	Apply the properties of operations to generate equivalent expressions.
MA.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).

### **Daily Target- Lesson 12**

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- Describe (orally and in writing) a pattern that could be expressed using repeated multiplication.
- Generate and evaluate numerical expressions involving whole-number exponents.
- Interpret expressions with exponents larger than 3, and comprehend the phrase “to the power” or “to the” (in spoken language).

Desmos <https://teacher.desmos.com/activitybuilder/custom/5eb99f5efc14957dda98570e>

<https://teacher.desmos.com/activitybuilder/custom/5e80d6cc54a96263c2306136>

MA.6.EE.A.1	Write and evaluate numerical expressions involving whole-number exponents.
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### **Daily Target- Lesson 13**

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- Critique (orally and in writing) arguments that claim two different numerical expressions are equal.
- Justify (orally and in writing) whether numerical expressions involving whole-number exponents are equal.

Desmos Exponents <https://teacher.desmos.com/activitybuilder/custom/5ab3eb7571560309b68f7977>

**Daily Target- Lesson 14**

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- Evaluate numerical expressions that have an exponent and one other operation, and justify (orally) the process.
- Explain (orally and in writing) that the convention is to evaluate the exponent before the other operations in an expression with no grouping symbols.
- Interpret expressions with exponents that represent the surface area or volume of a cube.

MA.6.EE.A.1

Write and evaluate numerical expressions involving whole-number exponents.

MA.6.EE.A.2c

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).

**Daily Target- Lesson 15**

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- Describe (orally) the values that result from evaluating expressions in which a fraction is raised to a power.
- Determine whether a given value is a solution to an equation that includes an exponent.
- Evaluate expressions that have a variable, an exponent, and one other operation for a given value of the variable, carrying out the operations in the conventional order.

MA.6.EE.A.1

Write and evaluate numerical expressions involving whole-number exponents.

MA.6.EE.A.2c

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).

MA.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.

**Daily Target- Lesson 16**

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- Compare and contrast (orally) graphs and equations that represent a relationship between the same quantities but have the independent and dependent variables switched.
- Comprehend the terms “independent variable” and “dependent variable” (in spoken and written language).
- Create a table, graph, and equation to represent the relationship between quantities in a set of equivalent ratios.

MA.6.RP.A.3b

Solve unit rate problems including those involving unit pricing and constant speed.

MA.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.

## Daily Target- Lesson 17

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- Create a table, graph, and equation to represent the relationship between distance and time for an object moving at a constant speed.
- Identify (in writing) the independent and dependent variable in a equation.
- Interpret (orally and in writing) an equation that represents the relationship between distance and time for an object moving at a constant speed.

MA.6.RP.A.3b

Solve unit rate problems including those involving unit pricing and constant speed.

MA.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.

## Daily Target- Lesson 18

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- Coordinate (orally and in writing) graphs, tables, and equations that represent the same relationship.
- Create an equation and a graph to represent the relationship between two variables that are inversely proportional.
- Describe and interpret (orally and in writing) a graph that represents a nonlinear relationship between independent and dependent variables.

MA.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.

## Daily Target- Lesson 19

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- Apply understanding of surface area to estimate the amount of fabric in a tent, and explain (orally and in writing) the estimation strategy.
- Compare and contrast (orally) different tent designs.
- Interpret information (presented in writing and through other representations) about tents and sleeping bags.

MA.K-12.1

Make sense of problems and persevere in solving them.

MA.6.G.A.1

Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems.

MA.6.G.A.4

Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems.

## **Formative Assessment and Performance Opportunities**

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Use the Lists tab.

- Academic Game
- BrainPop
- Centers
- Class Discussions
- Clickers
- Do Now
- Exit Ticket
- Graphic Organizer
- LinkIT
- Project
- Quiz
- Self-Assessment
- Student Teacher
- Teacher Interview
- Teacher Observation
- Think, Pair, Share

## **Summative Assessment**

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Group Presentation

End of Unit Assessment (located in shared google drive)

Chapter Project

## **21st Century Life and Careers**

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CRP.K-12.CRP1

Act as a responsible and contributing citizen and employee.

CRP.K-12.CRP1.1

Career-ready individuals understand the obligations and responsibilities of being a member of a community, and they demonstrate this understanding every day through their interactions with others. They are conscientious of the impacts of their decisions on others and the environment around them. They think about the near-term and long-term consequences of their actions and seek to act in ways that contribute to the betterment of their teams, families, community and workplace. They are reliable and consistent in going beyond the minimum expectation and in participating in activities that serve the greater good.

CRP.K-12.CRP2

Apply appropriate academic and technical skills.

CRP.K-12.CRP2.1

Career-ready individuals readily access and use the knowledge and skills acquired through

experience and education to be more productive. They make connections between abstract concepts with real-world applications, and they make correct insights about when it is appropriate to apply the use of an academic skill in a workplace situation.

CRP.K-12.CRP4

Communicate clearly and effectively and with reason.

CRP.K-12.CRP4.1

Career-ready individuals communicate thoughts, ideas, and action plans with clarity, whether using written, verbal, and/or visual methods. They communicate in the workplace with clarity and purpose to make maximum use of their own and others' time. They are excellent writers; they master conventions, word choice, and organization, and use effective tone and presentation skills to articulate ideas. They are skilled at interacting with others; they are active listeners and speak clearly and with purpose. Career-ready individuals think about the audience for their communication and prepare accordingly to ensure the desired outcome.

CRP.K-12.CRP6

Demonstrate creativity and innovation.

CRP.K-12.CRP6.1

Career-ready individuals regularly think of ideas that solve problems in new and different ways, and they contribute those ideas in a useful and productive manner to improve their organization. They can consider unconventional ideas and suggestions as solutions to issues, tasks or problems, and they discern which ideas and suggestions will add greatest value. They seek new methods, practices, and ideas from a variety of sources and seek to apply those ideas to their own workplace. They take action on their ideas and understand how to bring innovation to an organization.

CRP.K-12.CRP8

Utilize critical thinking to make sense of problems and persevere in solving them.

CRP.K-12.CRP8.1

Career-ready individuals readily recognize problems in the workplace, understand the nature of the problem, and devise effective plans to solve the problem. They are aware of problems when they occur and take action quickly to address the problem; they thoughtfully investigate the root cause of the problem prior to introducing solutions. They carefully consider the options to solve the problem. Once a solution is agreed upon, they follow through to ensure the problem is solved, whether through their own actions or the actions of others.

CAEP.9.2.8.B.3

Evaluate communication, collaboration, and leadership skills that can be developed through school, home, work, and extracurricular activities for use in a career.

CAEP.9.2.8.B.6

Demonstrate understanding of the necessary preparation and legal requirements to enter the workforce.

TECH.8.1.8.B

Creativity and Innovation: Students demonstrate creative thinking, construct knowledge and develop innovative products and process using technology.

TECH.8.1.8.B.CS2

Create original works as a means of personal or group expression.

TECH.8.1.8.D

Digital Citizenship: Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior.

TECH.8.1.8.D.CS1

Advocate and practice safe, legal, and responsible use of information and technology.

## **Accommodations and Modifications**

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- Teacher provides notes for student(s)
- Teacher will modify test for student(s)
- Students may use graph paper to help organize data
- A word bank can be provided
- Leveled centers can be used
- Small group instruction can be utilized
- Calculators may be used
- Extra Practice Board can be utilized to review pre-requisite skills
- Interactive games/websites may be used to practice skills

- Teacher can conference with student(s) to "check-in"
- Utilize items in the room to demonstrate skills as they relate to their life (book to wrap for SA, etc.)
- Use coordinate plane to count spaces for area and surface area
- Use blocks to help visualize volume of 3D shapes

- Calculators
- Compass Learning
- Extra Practice Board
- Interactive Games/Websites
- Leveled Centers
- Manipulatives
- Modify Assessments
- Provide Notes
- Teacher Conferences
- Word Bank

## **Unit Resources**

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Mr. Morgan's Math Help <https://sites.google.com/view/mrmorgansmathhelp/illustrative-mathematics/math-6/unit-1-area-and-surface-area>

Mid Unit Kahoot <https://create.kahoot.it/share/unit-6-mid-unit-review-lessons-1-11-open-up-resources-illustrative-math/948f0d12-3abc-4db1-9a5f-1d1f62852606?fbclid=IwAR3IPWQeaa-NC1tvhW3OsZwVJKHwgZiLQVrqRZgBTZv0cT-Scf2-OKyoLHU>

Kahoot Review for Unit 6 [https://create.kahoot.it/share/unit-6-end-of-unit-review-open-up-resources-illustrative-math/4f614eb2-651c-4587-b9b5-01dc19be8f43?fbclid=IwAR0BTTU11\\_pjZ9X-cTEui4bxyQUN90LX6Jm7v5NepfQFT6f5PtSlzAzPRew](https://create.kahoot.it/share/unit-6-end-of-unit-review-open-up-resources-illustrative-math/4f614eb2-651c-4587-b9b5-01dc19be8f43?fbclid=IwAR0BTTU11_pjZ9X-cTEui4bxyQUN90LX6Jm7v5NepfQFT6f5PtSlzAzPRew)

Quizizz for the first half of Gr. 6, Unit 6 Expressions & Equations <https://quizizz.com/admin/quiz/5c940c08b821ee001a78a4bc/equivalent-expressions?fbclid=IwAR1BTiM6odktfX2BDKtLei4xHeuQ1WEFZ6DKOqfWKC7Ojed-2EMZ9KZWEiU>

## **Interdisciplinary Connections**

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