Equal Balance

Big Ideas

Content

Life without equality would be chaotic.

Inquiry

People have historically used equality to organize and balance objects, and to purchase goods and services.

Nature of the Field

People use equality when they take a trip to the movies.

Enduring Outcomes

(What will students need to recall, know or do to demonstrate understanding of the Big Idea?

Include a connected set of <u>Analytical, Creative & Practical</u> Outcomes for this Big Idea

Define, brainstorm, and discuss how equality is an important part of our lives.

Evaluate and explain why equality is important in basic algebraic equations.

Make one recipe using equalities and another recipe not using equalities.

Include a connected set of <u>Analytical, Creative & Practical</u> Outcomes for this Big Idea

Use catalog to purchase goods to demonstrate the concept of equality.

Determine the value of given objects and participate in a trade activity.

Use manipulatives to demonstrate equality.

Include a connected set of <u>Analytical, Creative & Practical</u> Outcomes for this Big Idea

Brainstorm how the value of money relates to equality during a trip to the movie theatre.

Consider options for raising sufficient funds for a trip to the movie theatre.

Utilize technology to create a graphic illustration of equality after a trip to the movie theatre.

Evidence of Enduring Outcomes

What **Evidence** will show that each of these outcomes has been achieved and what kinds of **tasks** will be necessary to generate this evidence?

Task1: small groups of students collaborate to create a chart illustrating with drawings and words how equality is used in everyday life.

Task2: On same chart, groups illustrate how equality is used in algebra and why it is important for everyday life.

Evidence1: Completed chart, group is able to discuss with class and answer questions.

Task3: groups create cookie recipes using actual ingredients and appropriate measurement devices. One recipe is measured (flavors are equal, therefore balanced), the second is not measured(flavors not equal, thus unbalanced)

Evidence2: completed cookies show equal/balanced flavors or not

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What **Evidence** will show that each of these outcomes has been achieved and what kinds of **tasks** will be necessary to generate this evidence?

Task1: students work together, using a catalog of items and a set amount of money to purchase items.

Evidence1: students show how to distribute the amount of money allotted to purchase goods by using an order form.

Task2: using a drawing of a scale and several sets of different items such as number cubes, jacks, poker chips, etc, students model how to balance an equation.

Evidence2: students show they are able to balance simple equations by moving the manipulatives from either side.

What **Evidence** will show that each of these outcomes has been achieved and what kinds of **tasks** will be necessary to generate this evidence?

Task1: students make a chart showing options when attending a movie theater, making a list of items and the purchase price.

Evidence1: students present chart with itemized choices and values when attending a movie theater.

Task2: students make a list of ways to generate enough money to go to the movie theater. Included on list is anticipated payment per hour of various ways to make money.

Evidence2: students present their charts to demonstrate how the two are related to idea of equality.

Essential Questions

Is it possible to make dissimilar things achieve balance?

How do people assign value to goods and services?

Is the use of a monetary system more or less equitable than the barter system?

How can we determine a fair way to assign value to goods and services?

Instructional Blueprint

Lesson Topics	Content Standards	Measurable/Observable Learning Objectives (What should students know, understand and/or be able to do?)	Instructional Strategies/Tasks to Support Differentiation (Include a balance of *analytical, creative*, and *practical* activities)	Assessments that match objectives
1 What is Equality?	1.1 Write and solve one-step linear equations in one variable. 1.2 Write and evaluate an algebraic expression for given situation,	SWBAT derive their own reasons why balance or equality is important in life.	1. Students will be asked to reflect on a situation or time in their lives when they <u>think</u> they may have used balance or equality (Analytical). 2. Students will then be asked to share their experiences with their partners.	1. Discussions 2. Observation 3. Pair-Share 4. Index card activity

			3. Students will be given a large index card and asked to write other words that come to mind when they think of equality or balance, then to draw a picture of what came to mind on the back of the index card (Creative).	
	using up to three variables.		4. I will write categories (Money, Weight, Trading, Other) on the board and ask each student to tape their index cards to the board under the category where they think it belongs (Practical).	
			5. We will have a class discussion about some of the cards and categories on the board, I will asked some of the students about their word and why they put it in the category they did and if they would change their mind or if possibly they index card fits more than one category.	
2 Fair Trade Solving one-step equations involves balancing equations and	1.3 Write and solve one-step linear equations in one variable. 1.4 Write and evaluate an algebraic expression for	SWBAT derive different ways of representing balance and equality in everyday life.	1. Some students will be given different items or a piece of paper saying DVD, Flat Screen TV, bag of chips, candy bar, mow the lawn, babysit, clean room, etc. 2. Students will be asked to go around the room and find someone who has something that they feel is a comparable trade. (practical) 3. Students will Think-Pair-Share with	1. Think-Pair-Share 2. Written response 3. Discussion 4. Observation

understanding that the equal signs means that both sides of the equations are equal whether it be variables, constants or coefficients. All components of the equation will be used to find the value of the variable(s) that balances the equation.	given situation, using up to three variables.		their partner and the class why they think it is a fair trade and how does balance or equality play a role in this transaction. 4. Student will circulate the room again to find an item that may not seem like a fair trade. 5. Students will Think-Pair-Share with their partner and class why they think it is an unfair trade. In addition, students will think about in what situation might this same transaction be a fair trade as well and explain which partner is benefitting the most. (analytical) 6. Students will submit their response to step 5 on paper. 7. Students will have an opportunity to explain with an illustration or demonstration to the class what equality means to them.	
3 How do we make items of different value	AF 1.0 Students write verbal expressions and sentences as	Students will demonstrate their knowledge of balancing equations by using a representational scale and	A. Demonstrate parts of the scale, where the fulcrum is and why it is important, and how the objects are placed on the scale. B. Teach students the difference between a Legal	1. Check for understanding that all students understand the concept of

| balance in real life? | algebraic expressions and equations; they evaluate algebraic expressions, solve simple linear equations, and graph and interpret their results.

AF 1.1 Write and solve one-step linear equations in one variable | sets of objects. | Move and an Illegal Move.

C. Show students how to place objects on scale to achieve balance

D. Students demonstrate comprehension and mastery by working out problems using the items and the scale.

E. Teacher and students translate balanced items on scales to written equations.

1. Memory and Practical: Students learn that in order to achieve balance, both sides of the scale must match. They learn that physical items on a scale can be represented by symbols, variables, and numbers.
2. Analytical: Students will work together in teams to compare each other's equations on the scale. After students and teacher have translated physical equations to those written as representations on paper, students may quiz each other to define terms, legal moves, illegal moves, on both the scale and on paper.
3. Creative: Students invent their own representation of balancing equations by designing a poster, writing a reader's theater script, or writing a rap song illustrating how to balance equations using real-life items instead of objects, symbols, variables, and paper. | balance, how a scale works (one side must have the same value as the other side in order to balance). Clarify what constitutes a legal move versus an illegal move.
2. Monitor group work, interact with students to challenge groups and assist others who are struggling.
3. As a whole class, translate items on scales to symbolic representations that can be written on paper. Check for understanding that students see the items on the scale can be represented on paper as symbols in the form of equations.' |

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4 Introducing Variables: Without equality, life would be chaotic	1.5 Write and solve one-step linear equations in one variable. 1.6 Write and evaluate an algebraic expression for given situation, using up to three variables.	SWBAT identify variables in a one-step linear equation.	1. I will put an equation on the board (x+4=7) and ask the students what could this equation represent. 2. To further scaffold their discovery, based on responses from question #1, I will rewrite the equation replacing the 7 with magnetic red bingo chips on the white board. I will chunk my questions and ask the students again what could the variable x represent? The 4? If necessary I will replace the 4 with 4 magnetic red bingo chips. This will also give me the opportunity to discuss units and let them know that in this particular situation we are using bingo chips, but it could very well be balloons or apples (analytical). 3. I will pass out bingo chips and white boards to each set of partners and ask them to show me the equation using only bingo chips. I will	1. Discussions 2. Observation 3. Pair-Share 4. Bingo chip activity 5. Homework

			ask them how many bingo chips do they think they will need to set up the equation (on whiteboards). Different partners will share their discoveries (practical). 4. After walking around and observing partners, I will ask the students what does the variable or the unknown 'x' represent in this equation. If necessary, I will remind them to include the units we have been working with (bingo chips). We will repeat this activity with a different equation, and then ask the students to make up their own equation on the white boards and then show me what it looks like using only bingo chips (creative). 5. I will close with a reminder of the big idea of equality and ask them how it relates to the equations we have been working on.	
5 Exploring Like Terms Using Menu Math	AF 1.0 Students write verbal expressions and sentences as algebraic expressions and equations; they	Students will demonstrate their knowledge of balancing equations by combining like terms.	A. Whole-group warm up activity, ask students how we could put everyday things into similar categories, Think-Pair-Share (TPS) to determine some categories such as electronic items, clothing, printed material, sports items, food. Students offer items that could be put under a heading. B. Project a copy of a typical hamburger	1. Continuously check for understanding that students know how to create categories of items that may be further refined

evaluate algebraic expressions, solve simple linear equations, and graph and interpret their results. AF 1.1 Write and solve one-step linear equations in one variable		style restaurant on screen and pass out a copy for each student. Allow time for students to peruse menu. C. Students TPS to decide what they would like to order. Reporter for each group writes down order for each student. D. Instructor writes a sequence on the board that looks similar to H+H+Ch+H+X+FF+H+Ch+FF+FF+X+FF+OR+L+L+M E. Instructor sends students back to TPS groups to see if they can come up with a meaning for these letters. F. Students offer what they have determined is meaning of letter sequence. G. Instructor and whole group discuss how they figured out that H represents Hamburger, Ch represents Cheeseburger, FF represents French Fries, OR represents Onion Rings, and M, L, and X represent Medium, Large, and Extra-large drinks. H. Discuss if this short hand is useful, and how could it be written more clearly by using real-life examples. I. Write new headings on whiteboard, Hamburger, Cheeseburger, French Fries, Onion Rings, and all drink sizes. Tally each item from list. J. Ask students how we might order four hamburgers in a restaurant. Would we say "I'd like a hamburger and a hamburger and a hamburger and a hamburger?" Ask how we would order in a restaurant to tell the order person what we want. Solicit responses and record ideas on board using tally marks. K. Students translate letter sequence to	and grouped. 2. Monitor group work, make sure that students know how to interpret a menu. 3. As a whole class, translate list of items to meaningful groups and check to see that students know what the symbols refer to. 4. Challenge students to rewrite the bill for the food in the shortest form possible, as homework.

4 hamburgers, 2 cheeseburgers, 4 orders French fries, 1 order onion rings, 1 medium drink, 2 large drinks, and 1 extra-large drink.

L. Ask groups to rewrite the number sequence using abbreviations.
M. Explain the use of like terms in a mathematical equation.
N. Solicit ways that we could figure out how much we would need to pay for this meal.
O. Demonstrate how to combine items and prices.

1. Memory and Practical: Students learn that things may be grouped if they are the same category, and categories may be refined into homogeneous items. They learn that by combining like items (like terms), people are better able to communicate. They learn that symbols have meaning, and that like symbols (terms) may be combined in a mathematical equation that has meaning.
2. Analytical: Students work together in teams to determine categories and symbols to represent items in each category. Once they have created a set of symbols, they look for ways the symbols may be grouped so they may be understood by someone with knowledge in that category.
3. Creative: Students may challenge each other to create new symbols for items they are likely to encounter and find ways to group them in a mutually meaningful manner.

6 Bartering to A System of Monetary Exchange	AF 1.0 Students write verbal expressions and sentences as algebraic expressions and equations; they evaluate algebraic expressions, solve simple linear equations, and graph and interpret their results. AF 1.1 Write and solve one-step linear equations in one variable	Students will demonstrate how various items are assigned value that translates to a mutually-agreed system of monetary exchange.	1. Review Lesson #2 Fair Trade terms: value, equality, and idea of trading goods and services without using money. 2. Instructor discusses various professions with students and creates categories on white board. 3. Students Think-Pair-Share (TPS) to discover other professions, goods, and services, instructor records more items to existing list. 4. Instructor addresses whole group, posing the problem of how a baker of bread might pay a shoemaker for his or her services. What problems might happen? 5. Students TPS to discover possible problems by comparing how different trades might pay each other with comparable goods and services. 6. Problem is posed to group, is the time of the year a factor in determining relative worth of goods and services? For example, a person may have a difficult time selling enough firewood in summer months, and a food seller may run out of supplies after a hard winter. 7. Students TPS how having too much of a good or service is different that having not enough. How does this affect value? 8. Instructor gives each student an envelope describing that student's profession and items written on cards that they may trade for things they need to meet their own needs and that of their family. Students have five minutes to meet with other students to make the best trade they are able	1. Instructor continuously checks for understanding that students know how to establish the value of goods and services, and understand the issues involved in a trade-for-barter system. 2. Instructor monitors groups for dialogue on establishing trade values for goods and services. 3. Students individually write a paragraph outlining their suggestion for a monetary system, what it's based on, and what problems they are able to anticipate. 4. Students create an advertisement to

			to, but what they trade for must be relevant to their needs. 9. After five minutes trading time, students take seats, TPS, describe their best and worst (least useful) trade. They share why this was/was not easy, fair, difficult, and how time of year might affect the trades they made. 10. To whole group, instructor proposed an easier system of trading for goods and services, solicits ideas from group what might facilitate trade (money 11. Students go to TPS groups to work on a form of money that would be equitable to all involved. 12. After groups share ideas, instructor solicits students to come up with potential problems of their money idea. (ease of stealing, fraud, counterfeiting, inequitable values, et cetera, per student responses) 13. Instructor challenges students to develop a standard unit of currency, such as a stone of a certain size or weight, and solicits ideas from group. 14. Instructor asks group what they know about the US monetary system, and what problems having a standard system of money presents. 1. Memory and Practical: Students explore what they know about trading for goods and services, as well as how the idea of value is determined by different people, depending on the time of year (idea that value may change depending on circumstances). 2. Analytical: Students work together to	a destination of their choice. They must describe what type of amenities will be available and will invent an exchange system. Each student presents to the class and describes rational for exchange system.

			determine the relative wealth of goods and services in a bartering situation, as well as think about the complications that such a system presents (value according to whom?). They work on the idea of a mutually agreed-upon system of money to replace the bartering system and discuss the advantages and disadvantages of such a system. 3. Creative: Students create their own system of money that represents varying amounts of goods and services, as well as debate the benefits and pitfalls of their proposed system.	
7 Relating Equality to Mathematics	1.7 Write and solve one-step linear equations in one variable. 1.8 Write and evaluate an algebraic expression for given situation, using up to three variables.	SWBAT solve for a variable balancing a one-step linear equation.	1. I will ask the students if they see another way we could solve for the variable using my original equation (x+4=7) from lesson 4 without using bingo chips. 2. Depending on their responses, I will continue where they lead me or try to redirect them without telling them the steps. 3. I will direct them again to the big idea of equality. If necessary, I will remind them the equal sign means that both sides of the equation are equal or must balance as they learned in lesson 3. I will draw a scale over the	1.Observation 2.Homework 3. Share aloud

equal sign to represent balance.

4. Since the students already know the value of the variable from a prior lesson I will pass out white boards and asked students to manipulate the equation to see how we can get the same results. I will give them a hint that balancing means what we do to one side of the equation we must do to the other side of the equation.

5. After walking around and observing whiteboards I will ask the students to share with someone next to them what they discovered.

6. Depending on their responses, I will ask students if there are any questions they would like to ask me before I ask some of them to walk me through the process of balancing an equation to solve for the variable. I will model where there is confusion.

7. I will ask the students if they can convert the equation into a sentence using whatever units they would like, example: 'If I have 4 flowers and buy 3 more, I now have 7 flowers. I will have some of the students share their sentences.

			8. I will give the students a few more equations to workout on their whiteboards and then assign some problems for homework.	
8				
9			*Add as many rows as you have lessons.*	**Click "Tab" on your keyboard while in this cell to add additional rows.**

Attachments

Attachment 1: Context form that addresses the "context" prompts.

Attachment 2: Standards (state and/or national content standards) this unit will address.

Attachment 3: One detailed assessment related to a single lesson selected from the instructional blueprint. This should include any instructions or prompts you will provide to the students. Also include a rubric and/or other applicable evaluation criteria used to assess levels of mastery related to quality, proficiency, performance, and/or understanding.

Attachment 4: A 2 to 3 page, double-spaced reflective analysis that address the "reflective analysis" prompts.