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| **GRADE: 7th**  |
| **Unit Title: Equations****Lesson Title:** Solving One-Step Equations using Addition or Subtraction**Estimated Duration:** 1 Day | **Real-World Purpose:** Student will use computational methods to find a numerical solution. Equations are also used in the medical field for medications, for different businesses (profit = selling price – cost), and for aircraft (calculate how to load the plane correctly with people and baggage). |
| ***I Can: -*** apply order of operations and inverse operations to solve equations.**Standard(s):\_\_\_7.EE.4\_\_\_\_\_**  **-** constructan argument to justify my solution process. |
| **Performance Objective: (Evidence of Learning)**Students will solve equations by adding or subtracting by completing an exit ticket with a 70% accuracy.Students will be able to use equations to find missing information by completing an exit ticket with a 70% accuracy. |
| **Prerequisite Skills:*** An equation is a sentence stating that two quantities are equal.
* The solution of an equation is the value of a variable that makes the equation true.
* The coefficient is the numerical factor of a term that contains a variable.
* Addition property of equality.
* Subtraction property of equality.
* How to define a variable and use appropriate units.
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| **Materials/Resources:**    * Pencils/paper for notes
* “One Step Equations” worksheet for each student

(Guided/Independent Practice Problems)-Student will work in small group to complete guided practice problems and will work individually to complete independent practice.One-Step Equations Worksheet- Handout.docx 2.docx* Whiteboard
* Chrome Books
* Exit Ticket: Student will complete exit ticket and turn in before they leave (handout).
 | **Key Vocabulary:** * One-step equations
* Addition property of equality
* Subtraction property of equality
* Equations
* Inverse Operation
* Isolate
* Constant
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| **Elements of Rigor:*** Conceptual understanding of key concepts
* Procedural skill and fluency
* Rigorous application of mathematics in real-world contexts
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| **Lesson Introduction** |
| **How will you introduce the lesson?** I will begin with the essential question: What is an equation?What does it mean to balance an equation?**Student Exploration Activity**Students will view the video Equations with Variables on BrainPOP.<https://www.brainpop.com/>Class discussion after video:* What are those letters inside of algebra equations?
* How do you isolate the variable on one side of the equals sign?
* Why do we substitute numbers you don’t know for letters?
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| **Lesson Activities** |
| 1. Introduce the lesson on One-Step Equations with one of the essential questions.
2. Explain to students that we are about to solve one-step equations using addition and subtraction.
3. I will explain that equations are just like a scale.  Both sides of a scale need to be equal to balance, and both sides of an equation need to be equal to balance.
4. I will write the first example on the board and explain the steps of the procedure used to solve the equation:
	1. I will write on the board: x + 5 = 10
	2. “First, we want to have the variable all by itself.  To do this, we need to reverse what was done to x in the equation.  Because the problem adds 5 to x, I will subtract 5.  Remember that we need to keep the equation balanced.  What I do on one side of equation, I must do on the other side.  So, I have +5 –5 which = 0, and I have 10 – 5= 5.  The answer to my problem is x = 5.”

On board:x  + 5 = 10                                                                       -5     -5                                                                   x        =  5-   “To check your answer, substitute it back into the original equation.  For this problem, we would replace the x with 5.”-   On board: x  + 5 = 10 5 + 5 = 10-   “Because this is correct, we know that our answer is correct.”1. I will model a second example with the variable and the constant in the reverse order, explaining that the procedure is the same:
* “To get the variable by itself, we need to subtract 14 from both sides.”

-   Write on the board:  14 + x = 18                  - 14        - 14                            x  = 4 Students will be required to write explanations of the steps they used to solve problems.  I will model this by writing on the board:-   Because 14 was added to x on the left side of the equation, I subtracted 14 on the left side.  To keep the equation in balance, I also subtracted 14 from 18 on the right side.  This gave me a value of 4 for x.1. I will now write the third example on the board:
	1. I will write on the board: x − 8 = 30
	2. “Remember”, we want to have the variable all by itself.  To do this, we need to reverse what was done to x in the equation.  Because the problem subtracts 8 from x, I will add 8.  Remember that we need to keep the equation balanced.  What I do on one side of the equation, I must do on the other side.  So, I have −8 +8 which = 0, and I have 30 + 8= 38.  The answer to my problem is x = 38.”

On board:x – 8 = 30                                                                      +8    + 8                                                                   x        =  38-   “To check your answer, substitute it back into the original equation.  For this problem, we would replace the x with 38.”-   On board: x – 8 = 30 38 − 8 = 30-   “Because this is correct, we know that our answer is correct.”1. I will model a fourth example, explaining that the procedure is the same:
* “To get the variable by itself, we need to add 9 to both sides.”

-   Write on the board: x − 9 = 11                   + 9        +9                            x  =  20-   “To check your answer, substitute it back into the original equation.  For this problem, we would replace the x with 20.”-   On board: x − 9 = 11 20 − 9 = 11-   “Because this is correct, we know that our answer is correct.”1. Students will be required to write explanations of the steps they used to solve problems.
2. Guided Practice: Students work with partners
3. Independent Practice: Students will work independently and silently
4. Exit Ticket: Before students take the exit ticket, I will ask them to summarize how to solve one-step equations.  After a quick discussion, students will complete the exit ticket

**Exit Ticket:** The exit ticket is to be completed the last 5 minutes of class and turned in as students leave class. Students must complete exit ticket with a 70% accuracy.1. Define in your own words what an equation is.
2. Solve:

x – 25 = 10x $+$ 17 $=$ 581. What is the inverse of +19?

What is the inverse of $-$7? |
| **Lesson Closure** |
| At the end of the lesson, I will ask the students several questions:* Who can define an equation?
* What are inverse operations?
* How can you use inverse operations to solve equations?
* Why did we use addition or subtraction to solve the equations?
* Why do we need to do the same thing to both sides of an equation?
* How do we check our answers?
 | **Essential Questions:*** What is an equation?
* How do equations help us in finding missing information?
* What does it mean to balance an equation?
* How can we use inverse operations to solve one-step equations?
* In what ways can the problem be solved and why should one method be chosen over another?
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| **Standards for Mathematical Practice** (select all that apply) |
| * Make sense of problems and persevere in solving them.
* Model with mathematics.
* Attend to precision.
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| **Supplemental Activities** |
| **Intervention****ACTIVITY:****The students who do not master solving one-step equation and need more practice or help will practice by completing level problems on [www.thatquiz.com](http://www.thatquiz.com). Once students have complete the assignment in [www.thatquiz.com](http://www.thatquiz.com), they will go to the next lesson on [www.nearpod.com](http://www.nearpod.com). If time permits, students will end the practice session with** [www.mathgoodies.com](http://www.mathgoodies.com)**. The students will also be able to continue practicing at home.** * Go to **www.thatquiz.com**
* Click on algebra (under integers)
* Choose the length you want (10 is the minimum)
* Choose the level you want. Level 1 is simple one-step equations
* Check Solve (x) only
* **[www.nearpod.com](http://www.nearpod.com)**

students will follow instruction on white board* **[www.mathgoodies.com](http://www.mathgoodies.com)**

Students will follow instruction on white board* Teacher will provide a checklist with step by step instruction on how to solve one-step equations.
 | **Enrichment****ACTIVITY:****The students who master solving one-step equation and are ready to move on, will practice by completing higher level problems on [www.thatquiz.com](http://www.thatquiz.com). Once students have complete the assignment in [www.thatquiz.com](http://www.thatquiz.com), they will go to the next lesson on [www.quia.com](http://www.quia.com). If time permits, students will end the practice session with <http://hcpssfamilymath.weebly.com/>. The students will also be able to continue practicing at home.** * Go to**[www.thatquiz.org](http://www.thatquiz.org/)**
* Click on algebra (under integers)
* Choose the length you want (10 is the minimum)
* Choose the level you want. Level 5 is simple one-step equations
* Check Solve (x) only
* **[www.IXL.com](http://www.IXL.com)**

Students will follow instruction on white board * **<http://hcpssfamilymath.weebly.com/>**

Students will follow instruction on white board* Students have to create 3 equations word problems and share with class.
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| **Performance Based Assessment Task**  |

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| **Math Task**-Students will complete the performance task, Fencing. -Student may solve the equation in various ways, possibly including solution of the simultaneous equations. -Students will have to justify that they have the correct answer to the performance task. -Students will have to complete performance task with a 75% accuracy.-A rubric is provided to help grade the task.* Fencing

fencing\_task.pdf* Teacher will review the result of the performance task with students
* Students will continue practicing solving one-step equations

[www.mapshell.org](http://www.mapshell.org) | **Rubric/ Plausible Student Response(s)**Scoring Guide* Fencing Rubric

fencing\_rubrics.pdf Answer.pdf |