

WAMC Lab Template

Math Concept(s): Solving One- and Two-Step Equations, Systems of Equations

Source / Text: Adapted from activity by Math Giraffe (found [here](#))

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Date: Summer Conference 2022

Attach the following documents:

- Lab Instructions
- Student Handout(s)
- Rubric and/or Assessment Tool

Short Description (Be sure to include where in your instruction this lab takes place):

Students will use this as an introductory activity before beginning a unit on solving simple one- and two-step equations. They will be looking at cards with four equations using picture representations and use the four equations to assign a numerical value to each picture. Students will write down the steps they took to solve for each picture. Once they have completed 3 of the task cards (one from each level/color), they will create their own set of four equations using picture representations for another group to solve.

Lab Plan

Lab Title: Building Simple Equations

Prerequisite skills: Intuitive logic, basic writing skills

Lab objective: Students will be able to use logic to work through equations and assign numerical values to the picture representations in the equations. Later in the lesson, students will relate the steps they took intuitively to different aspects of solving equations (e.g. distributing, combining like terms, etc).

Standards: (Note SPECIFIC relationship to Science, Technology, and/or Engineering)

Mathematics K–12 Learning Standards:

- A-SSE.1: Interpret the structure of expressions
- A-CED.1: Create equations that describe numbers or relationships
- A-REI.1: Understand solving equations as a process of reasoning and explain the reasoning.

Standards for Mathematical Practice:

- MP.1. Make sense of problems and persevere in solving them
- MP.7. Look for and make use of structure
- MP.8. Look for and express regularity in repeated reasoning

K-12 Learning Standards-ELA (Reading, Writing, Speaking & Listening):

- WHST.9-12.2: Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.

K-12 Science Standards

- ETS1.A & B: Developing possible solutions

Technology

- 1.2.1 Communicate and collaborate to learn with others

Engineering

- N/A

Leadership/21st Century Skills:

<u>21st Century Interdisciplinary themes</u> (Check those that apply to the above activity.)			
<input type="checkbox"/> Global Awareness	<input type="checkbox"/> Financial/Economic/Business/Entrepreneurial Literacy	<input type="checkbox"/> Civic Literacy	
<input type="checkbox"/> Health/Safety Literacy	<input type="checkbox"/> Environmental Literacy		
<u>21st Century Skills</u> (Check those that students will demonstrate in the above activity.)			
LEARNING AND INNOVATION	INFORMATION, MEDIA & TECHNOLOGY SKILLS	LIFE & CAREER SKILLS	Productivity and Accountability
<u>Creativity and Innovation</u>	<u>Information Literacy</u>	<u>Flexibility and Adaptability</u>	<u>Accountability</u>
x Think Creatively	<input type="checkbox"/> Access and Evaluate Information	<input type="checkbox"/> Adapt to Change	<input type="checkbox"/> Manage Projects
x Work Creatively with Others	<input type="checkbox"/> Use and manage Information	<input type="checkbox"/> Be Flexible	x Produce Results
<input type="checkbox"/> Implement Innovations	<u>Media Literacy</u>	<u>Initiative and Self-Direction</u>	<u>Leadership and Responsibility</u>
<u>Critical Thinking and Problem Solving</u>	<input type="checkbox"/> Analyze Media	<input type="checkbox"/> Manage Goals and Time	x Guide and Lead Others
x Reason Effectively	<input type="checkbox"/> Create Media Products	<input type="checkbox"/> Work Independently	x Be Responsible to Others
x Use Systems Thinking	<u>Information, Communications and Technology (ICT Literacy)</u>	x Be Self-Directed Learners	
<input type="checkbox"/> Make Judgments and Decisions	<input type="checkbox"/> Apply Technology Effectively	<u>Social and Cross-Cultural</u>	
x Solve Problems		x Interact Effectively with Others	
<u>Communication and Collaboration</u>		x Work Effectively in Diverse Teams	
x Communicate Clearly			
x Collaborate with Others			

Teacher Preparation: (What materials and set-up are required for this lab?)

Materials

- Task Cards printed
- Answer sheet printed
- Student record sheets printed

Set-Up Required:

- Print and cut out Task Cards
- Tape answer sheets to board

Lab Organization Strategies:

Leadership (Connect to 21st Century Skills selected):

- Since this is an introductory lab, students will have little direction on how to proceed and solve equations. They will be given basic instructions and expectation but will be required to use intuition and logic, giving them the opportunity to think creatively and solve problems
- Students will be paired up with a partner, where they will need to work collaboratively and communicate with each other to complete the task
- students will also be required to create their own set of equations at the end to give to another pair in order for them to solve their system. This requires them to be responsible for others

Cooperative Learning:

- Students will be working with a partner throughout the activity. They will also be creating an original puzzle they will give to another pair to solve. They will confirm with the pair if their answers are correct or not.

Expectations:

- Students will complete all 3 task cards of varying difficulty. They will be showing their work on their record sheet and will write down their steps to solving the problem for each card they will complete.
- Students will then create their own original set of equations and give to another pair. They will help the pair work through as needed, and confirm correct answers.

Timeline:

- Students will start this activity on a short day, where they will work through 2-3 cards, complete with explanation of steps.
- On the second day, students will wrap up the task cards and explanations. They will move to creating their own set of equations and exchanging with another group. A group discussion will take place and the lesson will continue this day, following the completion of the lab.

Post Lab Follow-Up/Conclusions:

Discuss real world application of learning from lab

- Critical thinking and persevering through problems. Solving problems and communicating clearly.

Career Applications

- Entrepreneurship

Optional or Extension Activities

- This is an introductory activity, aimed at encouraging students to use logic and intuition to solve problems. This type of activity and thinking can lead into any other activity or subject where students will connect and apply their previous knowledge (developed outside of school) to any school subject or material.

Lab Instructions

1. Show students task cards and explain the different levels of cards. Give directions on how students must work in pairs or small groups to complete one card of each level. Do not give any direction on how they go about solving the cards, emphasize they use their critical thinking skills to accomplish this.
2. Show students where to record the numerical values for each picture representation on the cards (located on the board).
3. Pass out student record packets and have students take 1 minute to look it over and identify where they show any work they need for each card. Take some time to give instruction on how students are supposed to write (in complete sentences) each step they took in order to solve the set of equations on each card.
4. Have students turn to the final page of the packet and discuss with them what their final task is (create their own set of picture equations).
5. Have students find their partners or small groups and grab their first task card and start working.
6. Walk around the room and listen in on students' thinking and strategies. Make sure not to give major hints or clues to students, and continue to encourage them to persevere and keep thinking through the puzzle. Ensure students stay on task and that they are completing the task correctly.
7. As students complete their task cards, check in early with them to make sure they are completing the writing portion correctly. Help students talk through what they logically worked through to solve the problems. Students may need help putting those thoughts into words. Adding some helpful sentence starters or an example available would be helpful.
8. Once students have designed their own set of equations, have them bring them to you to check over. Make sure they are correct and that they are able to be solved.
9. If you approve their set of equations, give them a half sheet to draw their official set of equations on, that will be traded with another pair or group of students.
10. Once groups of students reach that point, have them start trading puzzles to complete and discuss with each other when finished.

Rubric:

4–Advanced	3–Proficient	2–Basic	1–Developing
Student consistently demonstrates clear and in-depth understanding of lab and concepts.	Student demonstrates good understanding of lab and concepts.	Student demonstrates basic understanding of lab and concepts.	Student demonstrates little to no understanding of lab and concepts.

Name: _____

Task Card 1 (Square):
Show your work in the box below

In complete sentences, record your steps to solving the task card below:

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

Task Card 2 (Circle):
Show your work in the box below

In complete sentences, record your steps to solving the task card below:

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

Task Card 3 (Star):

Show your work in the box below

In complete sentences, record your steps to solving the task card below:

1. _____

2. _____

3. _____

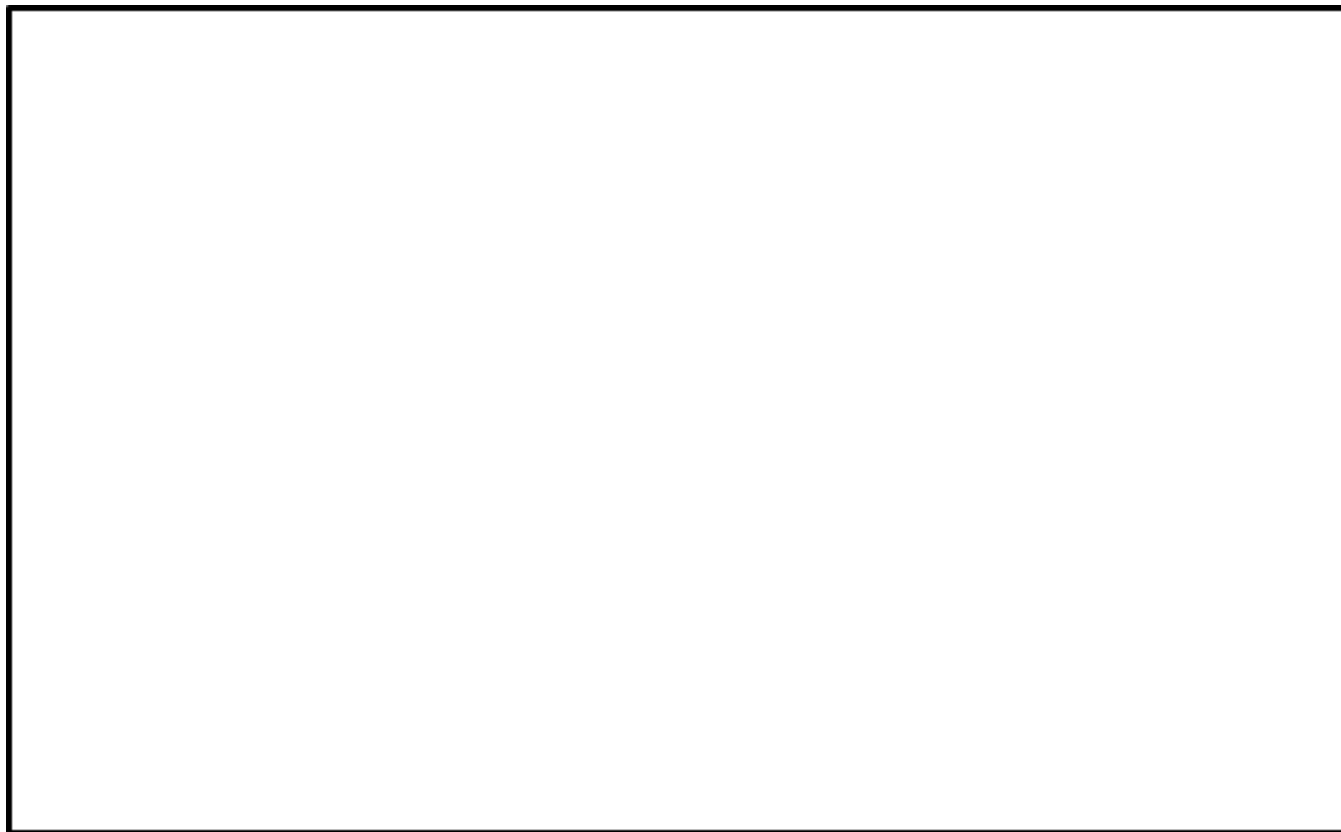
4. _____

5. _____

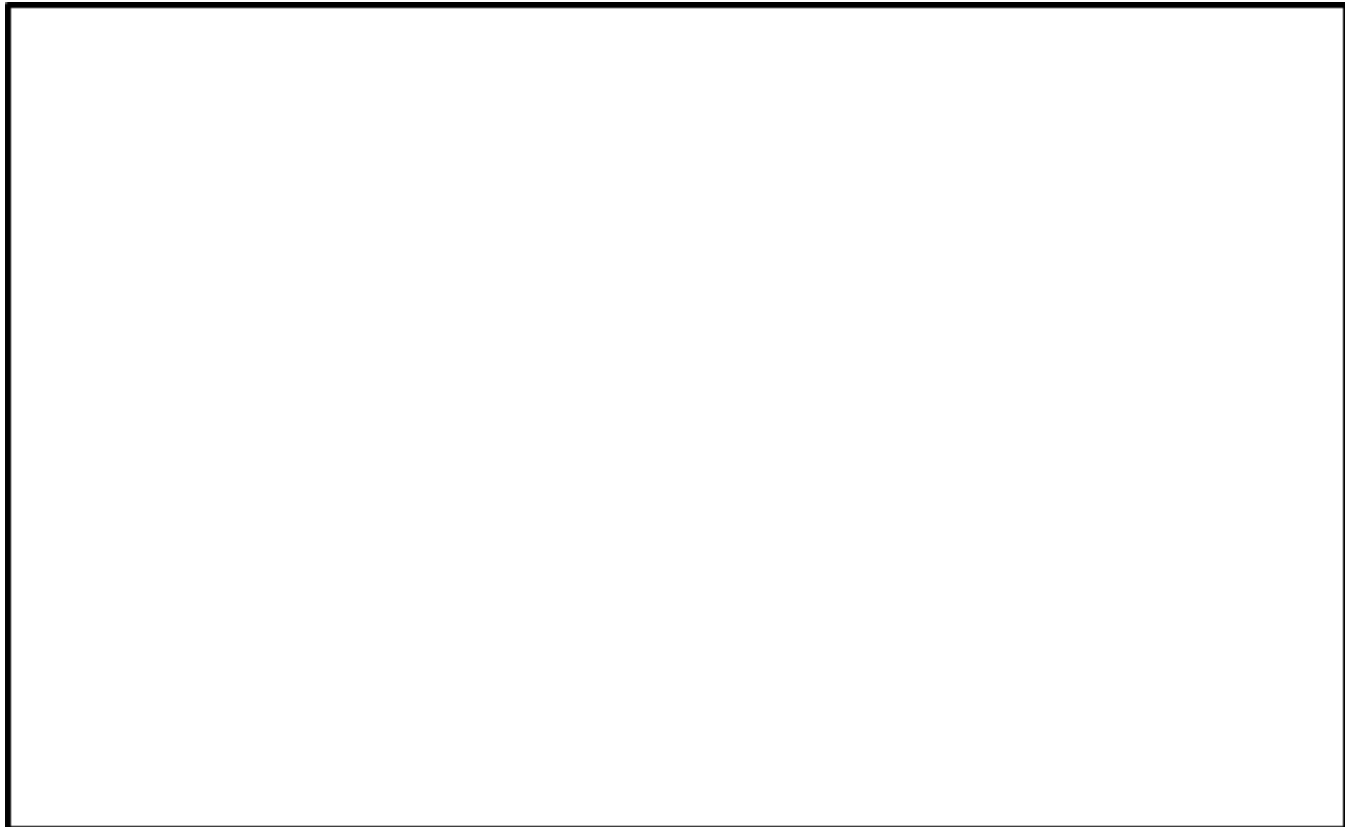
6. _____

Create your own set of four equations below! **You must have at least four pictures represented throughout your four equations.** Remember, someone else will solve your set of equations! Show your work here, and put your final picture equations on the half sheet given.

Solve the following set of equations! Record your answers on the back of this sheet.



Solve the following set of equations! Record your answers on the back of this sheet.



WAMC Lesson Plan

Name(s): Aaron Smith & Jess Christensen

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Lesson Title: Introduction to Solving Equations

Date: Summer Conference 2022

Text: None

STEM Correlation:

Lesson Length: 1 Class

Big Idea (Cluster): A-SSE, A.CED, A.REI	
Mathematics K–12 Learning Standards: A-SSE.1, A.CED.1, A.REI.1	
Mathematical Practice(s): MP.1, MP.7, MP.8	
Content Objectives: Solving one- and two-step equations	Language Objectives (ELL): Explain your thinking
Vocabulary: Equals	Connections to Prior Learning: Logic
Questions to Develop Mathematical Thinking: <ul style="list-style-type: none"> How did you come to the conclusion? What steps did you take to solve the equations? 	Common Misconceptions: <ul style="list-style-type: none"> None

Assessment (Formative and Summative):

- Formative: students completing task
- Summative: Creation of original set of equations

Materials:

- Task cards

Instruction Plan:

Introduction: Introduction to unit. Explain the task–solve problems on task cards to assign numerical value to each picture
Explore: Task cards. Students will have no direction on how to get started or finish the task cards. They will solely rely on logic and intuition
When I observe students: Ask guiding questions to help students come up with ideas on how to solve the puzzle
Questions to Develop Mathematical Thinking as you observe: How did you come to the conclusions, what steps did you take?
Answers: Answers will vary, but will be math related even though they don't think/know they're doing math

Career Application(s):

- Entrepreneurship

Leadership/21st Century Skills:

21st Century Interdisciplinary themes (Check those that apply to the above activity.)			
<input type="checkbox"/> Global Awareness	<input type="checkbox"/> Financial/Economic/Business/Entrepreneurial Literacy	<input type="checkbox"/> Civic Literacy	
<input type="checkbox"/> Health/Safety Literacy	<input type="checkbox"/> Environmental Literacy		
21st Century Skills (Check those that students will demonstrate in the above activity.)			
LEARNING AND INNOVATION <u>Creativity and Innovation</u>	INFORMATION, MEDIA & TECHNOLOGY SKILLS <u>Information Literacy</u>	LIFE & CAREER SKILLS <u>Flexibility and Adaptability</u>	Productivity and Accountability
X Think Creatively	<input type="checkbox"/> Access and Evaluate Information	<input type="checkbox"/> Adapt to Change	<input type="checkbox"/> Manage Projects
X Work Creatively with Others	<input type="checkbox"/> Use and manage Information	<input type="checkbox"/> Be Flexible	<input type="checkbox"/> Produce Results
<input type="checkbox"/> Implement Innovations		Initiative and Self-Direction	Leadership and Responsibility
Critical Thinking and Problem Solving		<input type="checkbox"/> Manage Goals and Time	

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<input checked="" type="checkbox"/> Reason Effectively	<u>Media Literacy</u>	<input type="checkbox"/> Work Independently	<input type="checkbox"/> Guide and Lead Others
<input checked="" type="checkbox"/> Use Systems Thinking	<input type="checkbox"/> Analyze Media	<input type="checkbox"/> Be Self-Directed Learners	<input type="checkbox"/> Be Responsible to Others
<input type="checkbox"/> Make Judgments and Decisions	<input type="checkbox"/> Create Media Products	<u>Social and Cross-Cultural</u>	
<input checked="" type="checkbox"/> Solve Problems	<u>Information, Communications and Technology (ICT Literacy)</u>	<input type="checkbox"/> Interact Effectively with Others	
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