

Learning Project 4 Algebra/Using Equations

Inquiry Activity 4-2: Solving Equations and using Inverse Operations

(Note: *Italicized portions should be directed to students.*)

1. Identifying the Problem (Item #3, PA) Calculator Use Allowed. (Teacher directed.)

Read the question carefully, as you would if taking the actual test.

3. If $3x - 6 = 12$, what is the value of x ?

Mark your answer in the circles in the grid on your answer sheet.

Here are some problem clarification questions you may want to consider when reading test questions.

What words and/or symbols might be important to understand to answer this problem and what are they telling you?

What words and/or symbols are unfamiliar and what do you think they mean?

**Calculator
Allowed**



2. Becoming Familiar with the Problem

On your own, ask yourself questions like these about the problem, taking note of the ones that were especially helpful so that you can remember to use them when you take the test.

Re-read the question. What is it asking you to find?

The value of x , a number that, if used in place of “ x ”, will make the equation true.

What do you know about problems like this?

3. Planning, Assigning and Performing Tasks

Try to answer the test question any way you can, even if you have to guess, but try to be aware of the reasoning and operations that you are using. The following questions can be helpful. This may be done individually or in small groups.

Figure the answer in your head and/or using pencil and paper, remembering all the steps you used.

Some students will puzzle out this answer, similar to Inquiry Activity 4-1, using common sense and trial and error (3 times what? minus 6, is 12?) Others who may understand some algebra principles may say $3x - 6 + 6 = 12 + 6$ and then, $3x = 18$, and then, $18 / 3 = 6$, but that would be advanced for most students.

Think about how you could have used the calculator in this problem. Be ready to share your ideas.

Is your answer reasonable?

Bubble in your answer in the answer grid provided.

Be ready to defend your answer, how you found it, both without a calculator and with one, and the way you bubbled in your answer on the answer grid.



4. Sharing with Others

Telling other people what you know helps you to understand the material better. So take this opportunity not only to share the knowledge, but also to learn it more completely.

Small groups: Compare your answer to others in the group and explain why and how you found your answer, and why you think it is correct.

There should be several ways to think about this equation.

Agree on the correct answer choice and come to an agreement on what you believe is the best way to approach it. Choose a reporter to explain your approach step-by-step to the whole group.

Using several answer grids, bubble in the correct answer in several ways. Choose another reporter from your group to show the various ways this number may be placed in the grid, and still be acceptable on the test.

Whole groups: Report your answer choice, method, and how the answer was bubbled in for your group.

5. Reflecting, Extending and Evaluating

Reflecting: Think about what you learned. (A group or instructor led.)

Here are some questions to start you thinking about the experience you just had. Thinking about what you have learned and experienced is part of the learning process. When the focus is only on the answer, you don't get much time to think about what was learned.

The purpose of the following discussion is for the learner to connect the idea of undoing, using opposite operations that the learners learned in the previous activity, with the new idea of balancing equations. Since this item is purely symbolic, they do not have a real situation giving hints as to what to do. You should make every effort to connect their common sense ideas from the last item to the formal rules of equations in algebra that are used here. As always, use the questions below that best fit the level of understanding that your class has shown in their responses to the item.

In mathematical terms, your answer of 6 is called the solution to the equation, $3x - 6 = 18$, and the process of finding it is called solving an equation. Focus first on the word equation. What is the root of the word equation?

Equal.

In your own words, what is the equation $3x - 6 = 18$ telling (or asking) you?

It is telling you that the expressions on both sides of the equals sign are equal. It is asking you which number will make that a true statement. The bottom line boils down to "What is x?"

Complete this sentence in your own words. "To solve an equation, ..."

To solve an equation, find the number that makes it true. Or, find out what x is.

How do you know when you are finished solving an equation?

You are finished when you know what x is, in this case, when you know that "x = 6". You should write this final equation so that everyone sees that this is the goal of solving an equation, noting that the variable, x, is all alone on its side of the equation.

So, let's look at a process we can use to keep the two sides of an equation balanced while we try to get to the bottom line, that is, $x = \text{some number}$.

To make this easier to follow, imagine there is a seesaw which is perfectly balanced, with 3 kids sitting happily on side A, and 2 on side B.



GED as Project

Pathways to Passing the GED

Read the instructions for calculator use that comes with the Practice GED test. (Your instructor will pass out the instructions.)

Follow the instructions provided there and determine if these instructions are helpful in solving this problem with a calculator.

Individually: Research algebra equations in your resource books that match these types of problems. In addition to the purely numerical problems, find a few word problems. Solve a few sample problems, reminding yourself of what you are doing and why.

They should know that they are getting the variable by itself by using the opposite operation than what is originally shown and taking care to keep the equation balanced by doing the same thing to both sides.

Make up similar equation problems on your own.

It will be interesting (but more difficult to check) if the students make up equations where the answer is a fraction. If your class is shaky on the concepts, you may want to avoid this complication for now.

Small groups: Trade your problem you found with a partner, and solve and discuss each other's sample problems.

Evaluating: Assess what you learned and how you learned it.

In this last step, you get a chance to review the content of what you learned and the methods used to learn. There are no right or wrong answers to these questions; it is your chance to look more closely at your learning style and the opportunity to state how you benefited or didn't benefit from the content and/or the methods to help you pass the GED test.

Which do you like better: solving algebraic equations from just numbers, or with word problems and a real-life situation? Why?

When does the calculator help most with these types of problems?

Have you been able to do any mental math with some of the steps in this Inquiry? If so, what is the advantage? If not, what can you do to become more comfortable with mental math?

... such as $3x = 18$, $x/3 = 18/3$, $x = 6$