



HANDS-ON EQUATIONS® LEVEL III RESEARCH DOCUMENT

Dear Colleague,

You will soon be introducing your students to Level III of Hands-On Equations. **Would you like to have achievement results to let you know whether or not this program has been effective in teaching your students the concepts of Level III?** Below you will find a procedure to consider, including the actual pre-test, post-test after Lesson #24, post-test after Lesson #25, instructions for administering the tests, and a summary form in which to enter the data.

We recommend that the initial **pre-test** be given to the students without any introductory comments of any kind at the completion of Level II and prior to introducing Level III. If you have already introduced Level III of Hands-On Equations to your class, this study design will be of little value to you. **Note:** Both the pre and the post-tests have a place for the student to write in the value of x , that value of star, and the value of the check. Nonetheless, the scoring of tests will be based exclusively on the values for x that the student provides (except for question #1, where only a value for star is sought). The student kits are to be provided to the students for the pre-test, as well as for the post-test after Lesson #24. The post-test after Lesson #25 is done pictorially..

Once the pre-test is administered, the teacher is to teach the students Lesson #17 through Lesson #24 of the program. By "lesson" it is understood a typical 40 to 50-minute lesson in which the teacher introduces the concept of the lesson using the Teachers Demonstration Balance Scale and game pieces and then provides the students with the opportunity to complete the accompanying worksheet using the student game pieces. The post-test administered after Lesson #24 may be administered to the students either immediately at the conclusion of Lesson #24, later that same day, or the next day. Please indicate which you do on the reverse side of the Summary Form. The students are encouraged to use the student game pieces for this post-test.

Next, please teach Lesson #25 which uses the pictorial notation. Then administer the post-test following Lesson #25 either immediately at the conclusion of Lesson #25, later that same day, or the next day. Please indicate which you do on the reverse side of the Summary Form. The student kits are **not** to be used for this post-test.

Attached you will find the pre-test, the post-test after Lesson #24, and the post-test after Lesson #25. You will also find a Summary Form. Please assign each student a code number or code name to be used on each of the pre and post-tests, as well as for recording their responses on this Summary Form. **IT IS ESSENTIAL THAT YOU KEEP CAREFUL RECORD OF THIS CODE**, since all the scores on any horizontal line must belong to the same student.

If a student is classified as gifted or learning disabled, please enter the symbols “GT” or “LD” after the student code for that student on the Summary Form. If the student response is correct, that is, he/she has the correct value for x , (except for question #1 where the value for star is requested) please place a check mark in the appropriate box. If it is not correct, please place a horizontal dash, “-”, in the appropriate box. (The correct responses are provided below.)

Please tally the number of correct responses for each student for each test and enter that number in the last column of each test, the column labeled “# Correct”. Please tally the number of correct responses for each test for the entire class by adding up the numbers in each column labeled “# correct.”

Please tally the number of correct responses for each item for your class by adding up the number of check marks in each column and entering that number in the last row of the column, the row labeled, “Item Summary Results.” The data will also enable you to compare how the students did on any particular item on each of the tests.

By dividing the total number of correct responses for each test by the number of students who took the test, you will be able to obtain a percentage score for the class on each test. This data will enable you to compare how the students did on each of the tests.

If you have questions about this study, please write to info@borenson.com or call 800-993-6284.

Correct Responses to the Questions

<u>Pre-Test</u>	<u>Post-Test after Lesson #24</u>	<u>Post-Test after Lesson #25</u>
1. $x = -1$	1. $x = -2$	1. $x = -4$
2. $x = 2$	2. $x = 1$	2. $x = 3$
3. $x = -4$	3. $x = -5$	3. $x = -7$
4. $x = 2$	4. $x = 4$	4. $x = +1$
5. $x = 3$	5. $x = 1$	5. $x = 4$
6. $x = 2$	6. $x = 3$	6. $x = 1$

We wish you continued success with Hands-On Equations.

Sincerely,



Henry Borenson, Ed. D.

HANDS-ON EQUATIONS PRE-TEST: LEVEL III

Student's Name: _____

Code: _____

Teacher's Name: _____

I am in grade: _____

Today's Date: _____

Instructions to the Student:

Soon you will be introduced to Level III of Hands-On Equations. Before introducing the program to you, we wish to know how much you already know about this topic. For this reason, we are simply giving you this pre-test without any instructions on how to answer the questions.

Please look over the questions and write down the answers to those problems you already know how to do. You will have 20 minutes to complete this pre-test. **You may use the student kits to help you.** How you do on this test will not affect your grade in any way.

<u>QUESTION</u>	<u>ANSWER</u>	<u>CHECK</u>
1. $2x + (-5) = -7$	$x =$ _____	Check: _____
2. $3x - (-2) = 8$	$x =$ _____	Check: _____
3. $x - 2 = 6 + x$	$x =$ _____	$x =$ _____ Check: _____
4. $2(x-1) + 4x = x + (-8)$	$x =$ _____	$x =$ _____ Check: _____
5. $x - 2(x + 2) = 5$	$x =$ _____	$x =$ _____ Check: _____
6. $x - 2(-x) - 3 = 5 + (-x)$	$x =$ _____	$-x =$ _____ Check: _____

HANDS-ON EQUATIONS POST-TEST: LESSON #24

Student's Name: _____

Code: _____

Teacher's Name: _____

I am in grade: _____

Today's Date: _____

Instructions to the Student:

You have now completed Lesson #24 of Hands-On Equations. We wish to know if this program was effective and if it helped you to learn something you did not know before. Please look over the questions below and write down the answers to those problems you are able to do. You will have 20 minutes to complete this post-test. **You may use your student kits for this post-test.** How you do on this test will not affect your grade in any way. Thank you for your participation.

<u>QUESTION</u>	<u>ANSWER</u>	<u>CHECK</u>
1. $2x + (-3) = -7$	$x =$ _____	Check: _____
2. $3x - (-4) = 7$	$x =$ _____	Check: _____
3. $x - 4 = 6 + x$	$x =$ _____	$x =$ _____ Check: _____
4. $2(x+3) + 4x = x + (-6)$	$x =$ _____	$x =$ _____ Check: _____
5. $x - 2(x + 1) = 1$	$x =$ _____	$x =$ _____ Check: _____
6. $x - 4(-x) - 2 = 16 + (-x)$	$x =$ _____	$-x =$ _____ Check: _____

HANDS-ON EQUATIONS POST-TEST: LESSON #25

Student's Name: _____

Code: _____

Teacher's Name: _____

I am in grade: _____

Today's Date: _____

Instructions to the Student:

You have now completed Lesson #25 of Hands-On Equations. We wish to know if this program was effective and if it helped you to learn something you did not know before. Please look over the questions below and write down the answers to those problems you are able to do. You will have 20 minutes to complete this post-test. **You may not use your student kits for this post-test**, but you may use the pictorial notation. How you do on this test will not affect your grade in any way. Thank you for your participation. **You may use extra paper if needed.**

<u>QUESTION</u>	<u>ANSWER</u>	<u>CHECK</u>
1. $2x + (-1) = -9$	$x =$ _____	Check: _____
2. $3x - (-3) = 12$	$x =$ _____	Check: _____
3. $x - 4 = 10 + x$	$x =$ _____	$x =$ _____ Check: _____
4. $2(x-3) + 4x = x + (-9)$	$x =$ _____	$x =$ _____ Check: _____
5. $x - 2(x + 3) = 6$	$x =$ _____	$x =$ _____ Check: _____
6. $x - 3(-x) - 4 = 1 + (-x)$	$x =$ _____	$-x =$ _____ Check: _____

TEACHER QUESTIONNAIRE

Name: _____ School: _____

1. The students were provided with the Level III pre-test after completing Level II and before beginning Level III. Yes _____ No _____ If not, please explain.
2. Please indicate below the amount of time given to each lesson?

	<u>Introduction of Lesson</u>	<u>Worksheet</u>
Lesson #17		
Lesson #18		
Lesson #19		
Lesson #20		
Lesson #22		
Lesson #23		
Lesson #24		
Lesson #25		

3. Which of the following is the best approximation to the length of time that it took for most of the students to complete the test or to stop trying?

Pre-Test: 10 minutes _____ 15 minutes _____ 20 minutes _____

Post-Test after Lesson #24: 10 minutes _____ 15 minutes _____ 20 minutes _____

Post-Test after Lesson #25 10 minutes _____ 15 minutes _____ 20 minutes _____

4. The Post Test after Lesson #24 was administered: immediately _____ one hour _____ one day _____ after Lesson #24 was taught.
5. The Post Test after Lesson #25 was administered: immediately _____ one hour _____ one day _____ after Lesson #25 was taught.
6. How many years have you been teaching Hands-On Equations? _____
7. What is the highest degree you have: Bachelors _____ Masters _____ Other _____
8. Have you received formal training in Hands-On Equations? _____ If so, how many years ago was this training received? _____ Was this training provided by Borenson and Associates? _____ Was this training provided by school district personnel? _____
9. If you did not receive formal training on the program, how did you learn to use the program? from the written manuals _____ from the video manual _____ from a colleague _____
10. Did you teach Hands-On Equations according to the instructional manuals? Yes _____ No _____
11. Did you provide the students with the opportunity to use the student kits for lessons #17 - #25 of the program? Yes _____ No _____
12. If you have made modifications to the program, can you indicate what modifications you have made?

Signature: _____ Date: _____

Teacher's Name: _____ How long have you been teaching Hands-On Equations? _____

School/District Name: _____ City: _____ State: _____

Contact Phone #: _____ E-Mail Address: _____

Grade Level: _____ Type of Students: Average: _____ Gifted: _____ LD: _____ Total # of Students: _____

Please place **GT** or **LD** next to the student code **below** for *any* students in these *categories*;

Instructions: Place a check mark in the box if the student had a correct response for the item; place a horizontal line in the box if the student had an incorrect response for the item.

Add the number of correct responses for each student for each test and place the sum in the "# Correct" column.

See instructions above for adding LD or GT next to the student code		Pre-Test after Lesson #16							Post-Test after Lesson #24							Post-Test after Lesson #25						
		Date of Test:							Date of Test:							Date of Test:						
#	Student Code	1	2	3	4	5	6	"# Correct"	1	2	3	4	5	6	"# Correct"	1	2	3	4	5	6	"# Correct"
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Item Summary Results: Please Place Total # of correct responses for each column on this line																						