Jessica Fauser
November 24, 2009
EDUC - 230
Complete Lesson Plan # 1

Solving Linear Equations

Lesson: Solving Linear Equations
Length: 45 minutes
Age or Grade Level Intended: High School - 9th grade

Academic Standard(s):
A1.2.1
Solve linear equations

Performance Objective(s):
Given linear equations, students will solve the equations using the appropriate methods with 90 percent accuracy.

Assessment:
Students will be given a worksheet on solving linear equations for homework. They will complete the homework and turn it in at the beginning of class the next day.

Advanced Preparation by Teacher:
The teacher will need to create a worksheet worth 20 points on solving linear equations to be given out for homework. The teacher will also need to prepare at least twenty incomplete math sentences for the board races and make sure there is enough chalk at the board.

Procedure:
Introduction-
Board Races - Students will be paired up and asked to find a space at the chalk board. The teacher will then ask them to write down a predetermined incomplete math sentence. When the teacher says "go", the students will work together as partners against the other pairs. Once a pair has completed the sentence, they will raise their hands. First pair to raise their hands and have the correct answer will receive one point. First pair to 5 points wins.
Example incomplete math sentences:
__ + 5 = 34
__ - 7 = 18
15 - __ = -2
3/2 + __ = 5/4
*Be sure to increase the difficulty as you go.
(Gardner: Visual-Spatial, Logical-Mathematical, and Interpersonal Intelligences)

Plan-
1. Ask the students what a equation is. (Bloom: Level I - Knowledge)
2. Define equation: An equation is two expressions set equal to each other. To demonstrate this, use a couple of the completed math sentences

from the Board Race activity.

3. Now define a linear equation: Is an equation that is in the form $ax + b = c$ where a, b, and c are any value. The value of the unknown variable x is what we are looking for when solving linear equations.
4. How do you solve linear equations? (Bloom: Level III-Application)
   A) Simplify the equation by using the distribution property and combining like terms.
   B) Use addition and subtraction properties to get the variable term to one side by itself. Remember that what you do to one side, you must do the same to the other.
   C) Now use multiplication and division properties to isolate the variable (get x by itself).
   D) Plug the value you received for the variable (x) back into the original equation to check your answer.
5. Now give some examples of solving linear equations using these steps.

Example 1 -

$3x + 1 = 4$

A) Simplify the equation.

This equation is already simplified.

$3x + 1 = 4$

B) Get the variable term on one side by itself.

$3x + 1 = 4$

$-1 \quad -1$ Subtract 1 from both sides.

$3x = 3$

C) Isolate the variable.

$3x = 3$

$3x/3 = 3/3$ Divide each side by 3.

$x = 1$

D) Check your answer. Plug the value of x back into the original equation.

$3(1) + 1 = 4$

$3 + 1 = 4$

$4 = 4$

Example 2 -

$2(x - 1) + x = 10$

A) Simplify the equation.

$2(x - 1) + x = 10$

$2x - 2 + x = 10$ Distribute the 3.

$3x - 2 = 10$ Combine like terms.

B) Get the variable term on one side by itself.

$3x - 2 = 10$

$+2 \quad +2$ Add 2 to both sides.

$3x = 12$

C) Isolate the variable.

$3x = 12$
$3x/3 = 12/3$ Divide each side by 3.
$x = 4$

D) Check your answer.
$2(4 - 1) + 4 = 10$
$2(3) + 4 = 10$
$6 + 4 = 10$
$10 = 10$

Example 3 -
$10(x - 2) + 2 = 6 + 2x$

A) Simplify the equation.
$10(x - 2) + 2 = 6 + 2x$
$10x - 20 + 2 = 6 + 2x$ Distribute the 10.
$10x - 18 = 6 + 2x$ Combine like terms.

B) Get the variable term on one side by itself.
$10x - 18 = 6 + 2x$
$-2x \quad -2x$ Subtract $2x$ from both sides.
$8x - 18 = 6$
$+18 \quad +18$ Add 18 to both sides.
$8x = 24$

C) Isolate the variable.
$8x = 24$
$8x/8 = 24/8$ Divide each side by 8.
$x = 3$

D) Check your answer.
$10(3 - 2) + 2 = 6 + 2(3)$
$10(1) + 2 = 6 + 2(3)$
$10 + 2 = 6 + 6$
$12 = 12$

Closure-

Have the students pair back up, this time at their desks. Ask them to create and solve their own linear equation. Be sure to walk around and answer any questions they might have. Once they are done, pass out the worksheet on linear equations for homework. Have them complete it and turn in at the beginning of class the next day. (Bloom: Level V-Synthesis) (Gardner: Logical-Mathematical and Interpersonal Intelligences)

Adaptations/Enrichments:

Learning disabilities in reading comprehension - No reading from the book is required for this lessons. Instructions on how to solve linear equations are written on the board, however oral instructions are also given.

ADHD - The board races at the beginning of the lesson allows this student to

move around. During the lesson, this student, if needed, can come up to the board to help solve the example problems.

Gifts/Talents in Creativity - Encourage this student to lead their pair when it is time to create their own equation. Have the student think of a way to remember the steps in solving linear equations.

Self-Reflection:

Were the board races an effective attention getter? How time consuming were the board races? How many students understood this lesson? Are the students able to solve linear equations? Were the students able to create their own equations? Did the students cooperate with each other? How does this tie into the next lesson? Did I engage the whole class? What would I do differently next time to improve the lesson.

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Name:_____ **Solving Linear Equations**

Worksheet

***Point values for each question are in parentheses.**

1.(4) List the steps for solving linear equations.

Solve the following linear equations. Show all steps and be sure to <u>check</u> your work.

2.(2) $2x + 4 = 10$

3.(2) $4(x - 2) + 3x = 20$

4.(2) $5(x - 1) + 1 = 3 + 2x$

5.(2) $12(3x + 1) = 24$

6.(3) $2(3x - 7) + 4(3x + 2) = 6(5x + 9) + 3$

Solve the following story problems by using linear equations.

7.(2) Together, Sally and Sam bought a total of 15 apples. If Sally bought 6 apples, how many did Sam buy? Use x as your variable to set up the equation, then solve.

8.(3) Billy is 12 years old. He is 4 times as old as his little brother. How old is Billy's little brother? Use x as your variable to set up the equation, then solve.

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KEY

Solving Linear Equations
Worksheet
***Point values for each question are in parentheses.**

1.(4) List the steps for solving linear equations.

1) Simplify the equation.
2) Get the variable term on one side by itself.
3) Isolate the variable.
4) Check your answer.

Solve the following linear equations. Show all steps and be sure to <u>check</u> your work.

2.(2) $2x + 4 = 10$

$-4 \quad -4$
$2x = 6$
$2x/2 = 6/2$
$x = 3$

Check:
$2(3) + 4 = 10$
$6 + 4 = 10$
$10 = 10$ ✔

3.(2) $4(x - 2) + 3x = 20$

$4x - 8 + 3x = 20$
$7x - 8 = 20$
$+8 \quad +8$
$7x = 28$
$x = 4$

Check:
$4(4 - 2) + 3(4) = 20$
$4(2) + 3(4) = 20$
$8 + 12 = 20$
$20 = 20$ ✔

4.(2) $5(x - 1) + 1 = 3 + 2x$

$5x - 5 + 1 = 3 + 2x$
$5x - 4 = 3 + 2x$
$+4 \quad +4$
$5x = 7 + 2x$
$-2x \quad -2x$
$3x = 7$
$3x/3 = 7/3$
$x = 7/3$

Check:
$5(7/3 - 1) + 1 = 3 + 2(7/3)$
$5(4/3) + 1 = 3 + 2(7/3)$
$20/3 + 1 = 3 + 14/3$
$23/3 = 23/3$ ✔

5.(2) $12(3x + 1) = 24$

$36x + 12 = 24$
$-12 \quad -12$
$36x = 12$
$36x/36 = 12/36$
$x = 12/36$
$x = 1/3$

Check:
$12[3(1/3) + 1] = 24$
$12(1 + 1) = 24$
$12(2) = 24$
$24 = 24$ ✔

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6.(3) $2(3x - 7) + 4(3x + 2) = 6(5x + 5)$ Check:

$6x - 14 + 12x + 8 = 30x + 30$

$18x - 6 = 30x + 30$

$+6 \quad +6$

$18x = 30x + 36$

$-30x \quad -30x$

$-12x = 36$

$-12x/-12 = 36/-12$

$x = -36/12$

$x = -3$

$2[3(-3) - 7] + 4[3(-3) + 2] = 6[5(-3) + 5]$

$2(-9 - 7) + 4(-9 + 2) = 6(-15 + 5)$

$2(-16) + 4(-7) = 6(-10)$

$-32 + -28 = -60$

$-60 = -60$ ✔

Solve the following story problems by using linear equations.

7.(2) Together, Sally and Sam bought a total of 15 apples. If Sally bought 6 apples, how many did Sam buy? Use *x* as your variable to set up the equation, then solve.

$6 + x = 15$ Check:

$-6 \quad -6$ $6 + 9 = 15$ Sam bought 9 apples.

$x = 9$ $15 = 15$ ✔

8.(3) Billy is 12 years old. He is 4 times as old as his little brother. How old is Billy's little brother? Use *x* as your variable to set up the equation, then solve.

$4x = 12$ Check:

$4x/4 = 12/4$ $4(3) = 12$ Billy's brother is 3 years old.

$x = 3$ $12 = 12$ ✔

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Manchester College
Lesson plans- EDUC 230

Name: _____ Teacher: Dr. Korrine Gust

Date : _____ Title of Work: _____

	Criteria				Points
	1	2	3	4	
MC Lesson Plan Format with explicitly stated Academic Standards. **C1-** Plans informative, developmentally appropriate lessons and/or units INTASC 2, 3, 4, 7	Lesson does not follow MC format or state academic standards.	Lesson does not follow MC format but does state academic standards.	Lesson plan follows most of the MC format and explicitly states academic standards.	Lesson plan follows MC format correctly and explicitly states academic standards.	4
Lesson Plan Objectives **C1-** Plans informative, developmentally appropriate lessons and/or units INTASC 2, 3, 4, 7	Objectives are not included.	Objectives are included, but are not correctly written or do not relate to the stated academic standard (s).	Objectives are included, relate to stated academic standard(s), but are not written correctly.	Objectives are well written, and correlate well to stated academic standard(s).	4
Assessment **A1-** Develops appropriate tools to assess learning INTASC 4, 8	No assessment is planned.	Planned assessment does not match learning objectives.	Planned assessment matches learning objectives, but is not a part of the procedures for the lesson.	Planned assessment matches learning objectives and is embedded in the procedures for the lesson.	4
Procedures are thoroughly written, including Gardner's MI and Bloom's Taxonomy questions. **C6-** Uses effective questioning strategies INTASC 4, 5, 7	Procedures are unclear and do not include Gardner or Bloom references.	Procedures are mostly clear and attempts to include Gardner and Bloom references.	Procedures are clear and references to Gardner and Bloom are attempted.	Procedures can be easily replicated by others including Bloom's questions and the use of Gardner's MI.	4
Adaptations/Modifications and Enrichment Opportunities **E1-** Differentiates learning opportunities that respond to individual learning styles and learning challenges INTASC 2, 3, 4, 5	Lesson does not include reasonable adaptations, modifications and/or enrichment opportunity.	Lesson includes one reasonable adaptation and/or modification and an enrichment opportunity.	Lesson includes more than one reasonable adaptation and/or modifications and an enrichment opportunity.	Lesson thoroughly details reasonable adaptations, modifications, and enrichment opportunities that are exemplary.	4
Grammar and Spelling **R5-** Models appropriate written	5 or more errors in grammar and/or	3-4 errors in grammar and/or spelling are	1-2 errors in grammar and/or spelling are	No errors in grammar and/or spelling are	4

communication skills INTASC 6	spelling are present.	present.	present.	present.	
				Total---->	24

Teacher Comments:

Excellent!