



3.1 + and ...

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### 3.1 Solving Equations using Addition and Subtraction

**Vocabulary:**

- 1) Equivalent Equations - equations that have the same solution
- 2) Linear equation - has a variable with an exponent of 1
- 3) Inverse Operations - operations that undo each other

**Example 1:** Are the following equations linear?

- a)  $2x + 12 = 50$      b)  $2a + 3b = 12c - 5$      c)  $a^2 + 2 = 5$   
 linear                          linear                          not linear

**Example 2:** State the inverse operation.

- a) Add 10     b) Subtract 3     c) Add (-4)     d) Subtract (-2)  
 Subtract 10     Add 3     Subtract (-4)     Add (-2)

To solve equations we ISOLATE the variable (get the variable by itself on one side)

**Example 3:** Solve the following equations. Show your "undo" step on BOTH SIDES to keep the equation balanced. The work is more important than the final answer.

- a)  $x - 3 = 5$      b)  $10 = x + 6$      c)  $x = 8 - 3$   
~~+3~~ +3     -6     ~~=6~~      $x = 5$   
 $x = 8$       $4 = x$

**Example 4:** Solve and check.

- a)  $x - 5 = -13$      ck:  $x - 5 = -13$      b)  $-8 = n - (-4)$       $-8 = n - (-4)$   
~~+5~~ +5      $-8 - 5 = -13$       $-8 = n + 4$       $-8 = -12 - (-4)$   
 $x = -8$       $-13 = -13$      ~~-4~~      $-8 = -8$   
                    ✓      $-12 = n$       $-8 = -8$   
    ✓

**Your Turn:** 1 - 6 Page 133 (Be sure to show all steps!!)

- 1)  $-2 = x - 4$      ck:  $-2 = x - 4$      2)  $x - (-9) = 6$      ck:  $x - (-9) = 6$   
~~+4~~ +4      $-2 = x - 4$      scc      $x + 9 = 6$       $-3 - (-9) = 6$   
 $-2 = -2$      ✓      $-9 - 9$       $6 = 6$   
 $x = -2$      ✓      $x = -3$      ✓

$$3) \begin{array}{r} y+5=-1 \\ -5 \quad -5 \\ y=-6 \end{array}$$

$$\text{ck: } \begin{array}{r} y+5=-1 \\ -6+5=-1 \\ -1=-1 \end{array}$$

$$4) \begin{array}{r} t-7=30 \\ +7 \quad +7 \\ t=37 \end{array}$$

$$\text{ck: } \begin{array}{r} t-7=30 \\ 37-7=30 \\ 30=30 \\ \checkmark \end{array}$$

$$5) \begin{array}{r} -8=x+14 \\ -14 \quad -14 \\ -22=x \end{array}$$

$$\text{ck: } \begin{array}{r} -8=x+14 \\ -8=-22+14 \\ -8=-8 \\ \checkmark \end{array}$$

$$\begin{array}{c} \text{S C C} \\ 6) \begin{array}{r} 3=x-(-11) \\ 3=x+11 \\ -11 \quad -11 \\ -8=x \end{array} \end{array}$$

$$\text{ck: } \begin{array}{r} 3=x-(-11) \\ 3=-8-(-11) \\ 3=3 \\ \checkmark \end{array}$$