Unit 2: Solving Equations  
Lesson 2.1: Language for Solving Equations

Get Ready:

Explain how to solve these statements using MATHEMATICAL LANGUAGE

a. What rule(s) in mathematics prove your explanation is correct?  
b. How can you check if your solution is correct?  
c. What is the most important symbol in the problems below?

1) \( 3 + y = 7 \)  
2) \( 3e - 8 = 16 \)
Solving Equations Pre-Test

1) Switch papers with a partner

2) We will be going over each question

3) To get it correct, your partner must have ALL THE PROBLEMS DONE WITH WORK SHOWN FOR FULL CREDIT
Level 1: Solve each equation.

1) $x + 8 = 9$
   
   \[
   \begin{align*}
   &\downarrow \\
   &8 \\
   \\hline
   &x = 1
   \end{align*}
   \]

2) $7 = r + 9$
   
   \[
   \begin{align*}
   &\downarrow \\
   &-9 \\
   \\hline
   &-2 = r
   \end{align*}
   \]

3) $-4 = x - 3$
   
   \[
   \begin{align*}
   &\downarrow \\
   &+3 \\
   \\hline
   &x = -1
   \end{align*}
   \]

4) $n - 9 = 1$
   
   \[
   \begin{align*}
   &\downarrow \\
   &+9 \\
   \\hline
   &n = 10
   \end{align*}
   \]
Level 2: Solve each equation.

5) \( \frac{4}{2} = \frac{-2r}{-2} \)
\[ r = -2 \]

6) \( \frac{n}{3} = 2 \cdot 3 \)
\[ n = 6 \]

7) \( \frac{-20}{5} = \frac{5a}{5} \)
\[ a = -4 \]

8) \( \frac{n}{6} = -5 \cdot 6 \)
\[ n = -30 \]
Level 3: Solve each equation.

9) \( \frac{x - 8}{11} = -2 \)  
\[ x - 8 = -2 \times 11 \]  
\[ x = -14 \]  
10) \( 0 = \frac{r - 2}{8} \)  
\[ 8(0) = (\frac{r - 2}{8}) \times 8 \]  
\[ 0 = r - 2 \]  
\[ r = 2 \]  

11) \( (x - 3) = (x - \frac{5}{6}) \)  
\[ -18 = x - 5 \]  
\[ x = -13 \]  
12) \( \frac{x - 4}{9} = 1 \)  
\[ x - 4 = 9 \]  
\[ x = 13 \]
Level 4: Solve each equation.

13) \(-9 = 6 + 3n - 6v\)

\[
-9 = 6 + 3n - 6v \\
\text{[5]} \\
-9 = 6 \\
3n = -3 \\
\frac{n}{3} = -1 \\

S = v
\]

14) \(-3x + 5x = 2\)

\[
-3x + 5x = 2 \\
\text{[1]} \\
\frac{2x}{2} = \frac{2}{2} \\
\]

\[
x = 1
\]

15) \(-15 = 5n - 4 + 6n\)

\[
-15 = 5n - 4 + 6n \\
\text{[1]} \\
-15 = 11n - 4 \\
\frac{-15 + 4}{11} = \frac{n}{11} \\
\]

\[
n = -1
\]

16) \(8n + 6n = -14\)

\[
8n + 6n = -14 \\
\text{[1]} \\
\frac{14n}{14} = \frac{-14}{14} \\
\]

\[
h = -1
\]
Level 5: Solve each equation.

17) \(-8a + 4 = -60\)
\[
\begin{align*}
8a & = -56 \\
\frac{8a}{8} & = \frac{-56}{8} \\
a & = -7
\end{align*}
\]

18) \(\frac{x}{1} + \frac{x}{6} = \frac{x}{60}\)
\[
\begin{align*}
51 & = 3b \\
b & = 17
\end{align*}
\]

19) \(-9 = \frac{x}{2} + 9\)
\[
\begin{align*}
2(0) & = \left(\frac{x}{2}\right)^2 \\
0 & = x
\end{align*}
\]
Level 6: Solve each equation.

21) \(-18 = -3(9 + h)\)

\[
\begin{align*}
-18 &= -27 - 3h \\
\frac{9}{3} &= \frac{-3h}{3} \\
\frac{-3}{3} &= b
\end{align*}
\]

22) \((-1) = \frac{p - 1}{20}\)

\[
\begin{align*}
-20 &= p - 1 \\
\frac{+1}{+1} &= \frac{+1}{+1}
\end{align*}
\]

23) \(162 = -6(v - 8)\)

\[
\begin{align*}
162 &= -6v + 48 \\
\frac{-48}{-6} &= \frac{-6v}{-6} \\
-19 &= v
\end{align*}
\]

24) \((0) = \frac{-10 + n}{2}\)

\[
\begin{align*}
0 &= -10 + n \\
\frac{+10}{+10} &= \frac{+10}{+10}
\end{align*}
\]
Level 7: Solve each equation.

25) \(1 + \frac{k}{4} = 2\)

\[\begin{align*}
|4| \quad \frac{k}{4} &= \frac{2}{4} \\
\text{or} \quad k &= 8 \\
\underline{k = 4}
\end{align*}\]

26) \(-104 = -8(x + 8)\)

\[\begin{align*}
|5| \quad -104 &= -8x - 64 \\
\text{or} \quad -8x &= -40 \\
\text{or} \quad x &= 5
\end{align*}\]

27) \(-54 = -3(r + 1)\)

\[\begin{align*}
|17| \quad -54 &= -3r - 3 \\
\text{or} \quad -3r &= -51 \\
\text{or} \quad r &= 17
\end{align*}\]

28) \(2 + 6x = -82\)

\[\begin{align*}
|14| \quad 2 + 6x &= -82 \\
\text{or} \quad 6x &= -84 \\
\text{or} \quad x &= -14
\end{align*}\]
Level 8: Solve each equation.

29) \(6a - 8 = 5a - 9\)

\[
\begin{align*}
\cancel{6a} - 8 &= \cancel{5a} - 9 \\
\underline{+8} & \underline{+8} \\
6a &= 5a - 1 \\
-5a &= -5a \\
\underline{\underline{a = -1}}
\end{align*}
\]

30) \(8 + 5a = -6a + 7a\)

\[
\begin{align*}
8 + 5a &= -6a + 7a \\
-3a &= -2a \\
\underline{\underline{a = -2}}
\end{align*}
\]

31) \(-2 + 7k = 5k - 8\)

\[
\begin{align*}
-2 + 7k &= 5k - 8 \\
-2k &= -8 \\
\underline{\underline{k = 3}}
\end{align*}
\]

32) \(v - 1 = -5 - 3v\)

\[
\begin{align*}
v - 1 &= -5 - 3v \\
4v &= -4 \\
\underline{\underline{v = -1}}
\end{align*}
\]
Level 9: Solve each proportion.

33) \( \frac{4}{x} = \frac{8}{6} \)  
\[ \frac{8n}{8} = \frac{24}{8} \]  
\[ n = 3 \]

34) \( \frac{4}{10} = \frac{b}{7} \)  
\[ \frac{14}{10} = \frac{28}{10} \]  
\[ b = \frac{14}{5} \]

35) \( \frac{4}{3} = \frac{2}{n} \)  
\[ \frac{4n}{4} = \frac{6}{4} \]  
\[ n = \frac{3}{2} \]

36) \( \frac{x}{6} = \frac{2}{4} \)  
\[ \frac{3}{4} = \frac{4x}{4} \]  
\[ 3 = x \]
Level 10: Solve each equation.

37) $106 = 5n + 6(n + 3)$
   
   \[ n = 8 \]

38) $254 = 8(1 - 5k) - k$
   
   \[ k = -6 \]

39) $-8(1 + 2r) = -136$
   
   \[ r = 8 \]

40) $1 + 4(4x - 6) = -135$
   
   \[ x = -7 \]
Solving Equations Gateway
Solving Equations Gateway

You will be working in the Solving Equations Gateway for the next few weeks. Everyone will be working on their own at their own level. You are responsible for completing the correct level when assigned to do so. You should watch the video for the level, take notes from what you watched, and then complete the practice problems. You should check your practice problems with the answers at the bottom of the assignment to make sure your answers are correct. You should then complete the Challenge Problems (make sure they are clearly marked in your notebook). DO NOT work on advanced levels if you have not completed the lower levels. Keep all work organized in your notebook.

In class, I will be checking:

1. That you took notes on the videos
2. That you completed at least 10 practice problems – you MUST show your work
3. That your answers to the challenge questions are all correct – you MUST show your work

You can work on up to THREE LEVELS each night if you want to get ahead.

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Solving Equations & Mathematical Language

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Web Quest