Chapter 2:

Note: The steps I show here might be a little different from your steps. That is okay as long as your work is accurate and complete.

Solve each equation.

16. $3x - 7 = 5x + 11$

$-5x \quad = -5x$

$-2x - 7 = 11$

$+7 = +7$

$-2x = 18$

$\frac{-2x}{-2} = \frac{18}{-2}$

$x = -9$

We can check the answer $x = -9$ if we want:

$3(-9) - 7 = 5(-9) + 11$

$-27 - 7 = -45 + 11$

$-34 = -34$ ✓

This confirms that -9 is the solution

17. $5(x - 2) + 2x = 9x + 10 - 7x$

$5x - 10 + 2x = 9x - 7x + 10$

$5x + 2x - 10 = 2x + 10$

$7x - 10 = 2x + 10$

$-2x \quad = -2x$

$5x - 10 = 10$

$+10 = +10$

$5x = 20$

$\frac{5x}{5} = \frac{20}{5}$

$x = 4$

The check for #17 is not included here.

18. $\frac{3x}{2} - 3 = x - \frac{5}{2}$

19. $x + \frac{1}{6} = \frac{x}{2} - \frac{1}{3}$

For #18-19, we must first identify the Least common denominator (LCD), and then multiply each side by that LCD. For terms without a denominator, it is helpful to make each "over 1".

#18 LCD = 2:

$\frac{3x}{2} - \frac{3}{1} = \frac{x}{1} - \frac{5}{2}$ ← multiply each side by $\frac{2}{1}$

$\frac{2}{1} \cdot \left(\frac{3x}{2} - \frac{3}{1}\right) = \frac{2}{1} \cdot \left(\frac{x}{1} - \frac{5}{2}\right)$ ← distribute

$\frac{2}{1} \cdot \frac{3x}{2} - \frac{2}{1} \cdot \frac{3}{1} = \frac{2}{1} \cdot \frac{x}{1} - \frac{2}{1} \cdot \frac{5}{2}$ ← multiply and simplify.

$3x - 6 = 2x - 10$

$-2x \quad = -2x$

$x - 6 = -10$

$+6 = +6$

$x = -4$

$x = -4$

#19 LCD = 6:

$\frac{6}{1} \cdot \left(\frac{x}{1} + \frac{1}{6}\right) = \frac{6}{1}\left(\frac{x}{2} - \frac{1}{3}\right)$

$\frac{6}{1} \cdot \frac{x}{1} + \frac{6}{1} \cdot \frac{1}{6} = \frac{6}{1} \cdot \frac{x}{2} - \frac{6}{1} \cdot \frac{1}{3}$

$6x + 1 = 3x - 2$

$-3x \quad = -3x$

$3x + 1 = -2$

$-1 = -1$

$3x = -3$

$\frac{3x}{3} = \frac{-3}{3}$

$x = -1$

Reminder: the steps presented here might be different than yours.

20. $0.4x + 3.2 = 1.2x - 0.8$

21. $0.1x - 0.06 = 0.04x + 1.2$

For #20-21, it is best to make all terms have the same decimal place. In #20, they already have one decimal place each; we multiply by 10 to "clear the decimals." In #21, some have two decimal places, so we need to "build up" the first and last terms; the multiply by 100.

#20

$10(0.4x + 3.2) = 10(1.2x - 0.8)$

$4x + 32 = 12x - 8$

$-12x \quad = -12x$

$-8x + 32 = -8$

$\quad -32 = -32$

$-8x = -40$

$\frac{-8x}{-8} = \frac{-40}{-8}$

$\boxed{x = 5}$

#21

$0.10x - 0.06 = 0.04x + 1.20$

multiply each side by 100.

$100(0.10x - 0.06) = 100(0.04x + 1.20)$

$10x - 6 = 4x + 120$

$-4x \quad = -4x$

$6x - 6 = 120$

$+6 = +6$

$6x = 126$

$\frac{6x}{6} = \frac{126}{6}$

$\boxed{x = 21}$

$6\overline{)126}$ $\quad 21$

-12

06

-6

0

Solve each proportion.

22. $\frac{x+1}{4x-2} = \frac{2}{5}$

23. $\frac{8}{2x-2} = \frac{6}{x+2}$

For #22-23, cross-multiply like this: $\frac{A}{B} \quad \frac{C}{D}$

#22

$(x+1) \cdot 5 = (4x-2) \cdot 2$

$5x + 5 = 8x - 4$

$-8x \quad = -8x$

$-3x + 5 = -4$

$\quad -5 = -5$

$-3x = -9$

$\frac{-3x}{-3} = \frac{-9}{-3}$

$\boxed{x = 3}$

#23

$8 \cdot (x+2) = (2x-2) \cdot 6$

$8x + 16 = 12x - 12$

$-12x \quad = -12x$

$-4x + 16 = -12$

$\quad -16 = -16$

$-4x = -28$

$\frac{-4x}{-4} = \frac{-28}{-4}$

$\boxed{x = 7}$

Solve each inequality and draw its graph on the number line.

24. $6x - 3 > -9 + 4x$

$6x - 3 > -9 + 4x$

$-4x \quad \leftrightarrow \quad -4x$

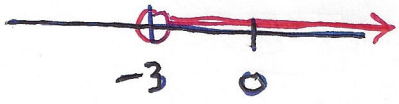
$2x - 3 > -9$

$+3 \leftrightarrow +3$

$2x > -6$

$\frac{2x}{2} > \frac{-6}{2}$

$\boxed{x > -3}$



25. $2(y - 1) \geq 8 + 4y$

$2y - 2 \geq 8 + 4y$

$-4y \quad \leftrightarrow \quad -4y$

$-2y - 2 \geq 8$

$+2 \quad \leftrightarrow +2$

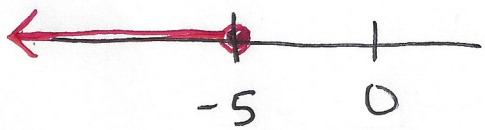
$-2y \geq 10$

At this point, because the variable term is negative, I'm going to multiply each side by -1. This has the effect of "taking the opposite of everything, including the inequality direction."

$2y \leq -10$ now it is "safe" to divide by 2.

$\frac{2y}{2} \leq \frac{-10}{2}$

$\boxed{y \leq -5}$



Note: For #25, we could have kept the variable term positive by adding $-2y$ to each side, as shown here:

$2y - 2 \geq 8 + 4y$

$-2y \quad \leftrightarrow \quad -2y$

$-2 \geq 8 + 2y$

$-8 \leftrightarrow -8$

$-10 \geq 2y$

$\frac{-10}{2} \geq \frac{2y}{2}$

$-5 \geq y$

Before graphing, we must write the variable on the left side by "switching sides." the inequality signs switches, too. $\boxed{y \leq -5}$