Math in Living C O L O R !!

1.06 Solving Inequalities

Intermediate Algebra: One Step at a Time, **Pages 77 - 82: #5, 10.**

Pages 88 - 90: #6, 7, 8, 14, Extra.

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See Section 1.06 with explanations, examples, and exercises, coming soon!

P. 80. # 5. Solve for x. Give answers in interval notation:

$$5 - 3(x - 4) \le 2(x - 4)$$

Solution:

$$5 - 3(x - 4) \le 2(x - 4)$$

Remove parentheses:

$$5 - 3x + 12 \le 2x - 8$$

Combine like terms:

$$17 - 3x \le 2x - 8$$

Subtract 2x from each side:

$$17 - 3x \le 2x - 8$$
$$\underline{-2x \quad -2x}$$
$$17 - 5x \le \quad -8$$

Subtract 17 from each side:

$$17 - 5x \le -8$$
$$\underline{-17 \qquad -17}$$
$$-5x \le -25$$

Divide both sides by -5:

$$\frac{-5x}{-5} \le \frac{-25}{-5}$$

Reverse the Inequality:

$$x \ge 5$$

Final answer in interval notation:

$$\longleftarrow \qquad [\longrightarrow$$
$$[5, \infty)$$

P. 81. # 10. Solve for x. Give answers in interval notation:

$$-2(2+3x) \geq 3(5-x)+8$$

Solution: $\qquad\qquad -2(2+3x) \geq 3(5-x)+8$

Remove parentheses: $\qquad -4-6x \geq 15-3x+8$

Combine like terms: $\qquad -4-6x \geq 23-3x$

$\qquad\qquad\qquad\qquad\qquad -4-6x \geq 23-3x$

Add **+3x** to each side: $\qquad \underline{+3x \qquad\quad +3x}$

$\qquad\qquad\qquad\qquad\qquad -4-3x \geq 23$

$\qquad\qquad\qquad\qquad\qquad -4-3x \geq 23$

Add **+4** to each side: $\qquad \underline{+4 \qquad\qquad +4}$

$\qquad\qquad\qquad\qquad\qquad -3x \geq 27$

Divide both sides by **-3**: $\qquad \dfrac{-3x}{-3} \geq \dfrac{27}{-3}$

Reverse the Inequality: $\qquad\qquad x \leq -9$

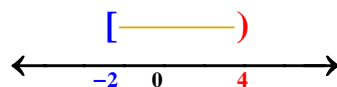**Final answer in interval notation**

$$(-\infty, -9]$$

P. 89. #6. Solve for x. Give answers in interval notation:

$$x < 4 \qquad \text{and} \qquad x \geq -2$$
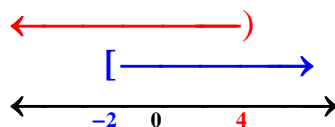
Solution: $\qquad (-\infty, 4) \cap [-2, \infty)$

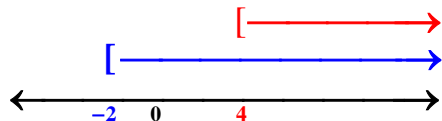**"And"** means **"intersection"**, so choose only the region that is **common to both**:

Interval notation: $\qquad$ **[-2, 4)**

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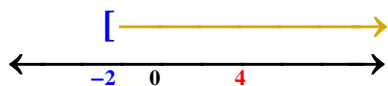# P. 89. #7. Solve for x. Give answers in interval notation:

$$x \geq 4 \quad \text{or} \quad x \geq -2$$

Solution: $\quad [4, \infty) \cup [-2, \infty)$

```
                    [——————————→
          [——————————————————→
  ←————————————————————————————————→
        −2   0      4
```

"**Or**" means "**union**", so choose **ALL the regions** that are shaded:

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          [——————————————→
  ←————————————————————————→
        −2   0      4
```
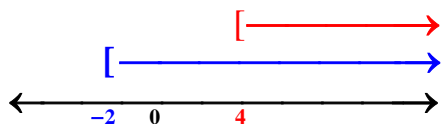
Interval notation: **[-2, ∞)**

p. 89. #8. Solve for x. Give answers in interval notation:

$$x \geq 4 \quad \text{and} \quad x \geq -2$$
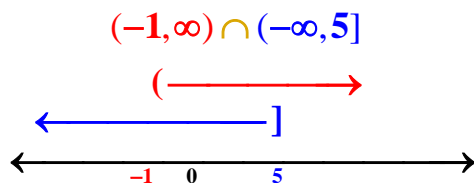
Solution: $\quad [4, \infty) \cap [-2, \infty)$

```
                  [——————————→
          [——————————————→
  ←————————————————————————→
        −2   0      4
```

"**And**" means "**intersection**", so choose only regions that are **common to both**:

```
                  [——————→
  ←————————————————————————→
        −2   0      4
```
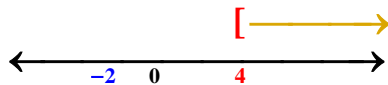
Interval notation: **[4, ∞)**

P. 90. #14. Solve for x. Give answer in interval notation:

$$-4x < 4 \quad \text{and} \quad x - 7 \leq -2$$

Solution:

$$\frac{-4x}{-4} < \frac{4}{-4} \quad \text{and} \quad \begin{array}{c} x - 7 \leq -2 \\ \underline{+7 \quad +7} \end{array}$$

$$x > -1 \quad \text{and} \quad x \leq 5$$

$$(-1, \infty) \cap (-\infty, 5]$$

"**And**" means "**intersection**", so choose only the regions that are **common to both**. This means the "**overlapping region**", between -1 and 5.
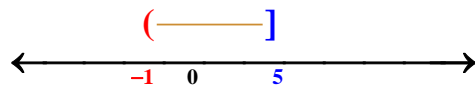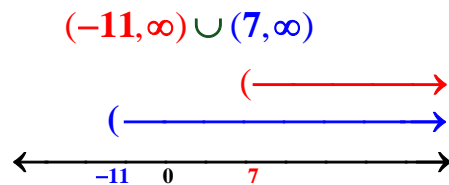

Interval notation: **(-1, 5]**

Extra Problem from Julie

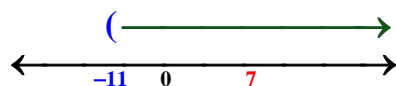Solve for x. Give answers in interval notation:

$$h + 2 > -9 \quad \cup \quad h + 2 > 9$$

Solution:

$$h > -11 \quad \cup \quad h > 7$$

$$(-11, \infty) \cup (7, \infty)$$

"**Or**" means "**union**", so choose **ALL the regions** that are shaded:

Interval notation: **(−11, ∞)**

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