Concept Check *Decide whether each statement is* true *or* false. *If it is false, explain why.*

1. The union of the solution sets of $x + 1 = 6$, $x + 1 < 6$, and $x + 1 > 6$ is $(-\infty, \infty)$.

2. The intersection of the sets $\{x|x \geq 9\}$ and $\{x|x \leq 9\}$ is $\emptyset$.

3. The union of the sets $(-\infty, 7)$ and $(7, \infty)$ is $\{7\}$.

4. The intersection of the sets $(-\infty, 7]$ and $[7, \infty)$ is $\{7\}$.

5. The intersection of the set of rational numbers and the set of irrational numbers is $\{0\}$.

6. Let $A = \{1, 2, 3, 4, 5, 6\}$, $B = \{1, 3, 5\}$, $C = \{1, 6\}$, $D = \{4\}$. Specify each set.

a) $B \cap A$ b) $A \cup B$ c) $A \cap D$
d) $B \cap C$ e) $B \cup C \cup D$ f) $A \cap \emptyset$
g) $D \cup \emptyset$ h) $B \setminus C$ i) $C \setminus D$

7. Express each set in the simplest interval form.

a) $(-\infty, -1] \cap [-4, \infty)$ b) $(-\infty, -6) \cap [-4, \infty)$ c) $(-\infty, 3) \cup (-\infty, -2)$
d) $[3, 6] \cup (4, 6)$ e) $(-\infty, 5] \cap (-3, \infty)$ f) $(-\infty, 3] \cap [3, \infty)$
g) $(-7, 5] \cap (-\infty, 6)$ h) $(-7, 5] \cup (-\infty, 6)$ i) $[1, 4) \cup (2, 6]$

8. For each compound inequality, give the solution set in both interval and graph form.

a) $x + 5 \leq 11 \;\; and \;\; x - 3 \geq -1$ b) $x + 1 > 3 \;\; or \;\; x + 4 < 2$
c) $\begin{cases} 3x - 4 \leq 8 \\ -4x + 1 \geq -15 \end{cases}$ d) $-2 < \frac{1-3x}{-2} < 7$
e) $2 \leq 4 - \frac{1}{2}(x - 8) < 10$ f) $4x + 1 \geq -7 \;\; or \;\; -2x + 3 \geq 5$
g) $x < 5 \;\; or \;\; x < -3$ h) $x < 5 \;\; and \;\; x < -3$
i) $-3x \leq -6 \;\; and \;\; -3x \geq 0$ j) $x + 1 \geq 5 \;\; or \;\; x - 2 < 10$
k) $\frac{7-3x}{5} < -4 \;\; or \;\; \frac{7-3x}{5} > 4$

9. *Discussion*: If $-x$ is between a and b, then what can you say about x?

10. *Discussion*: For which of the inequalities is the notation used correctly?

a) $-2 \leq x < 3$ b) $-4 \geq x < 7$ c) $-1 \leq x > 0$
d) $6 < x \leq -8$ e) $5 \geq x \geq -9$ f) $3 < x < -1$

11. The formula $C = \frac{5}{9}(F - 32)$ can be used to convert Fahrenheit temperatures F to Celsius temperatures C. Gold is a liquid for Celsius temperatures C such that $1063° \leq C < 2660°$. Find such an inequality for the corresponding Fahrenheit temperatures.

12. State:

a) The set of expenses that are greater than \$10000 for private schools *or* greater than \$4000 for public schools.
b) The set of expenses that are less than \$10000 for private schools *and* more than \$4000 for public schools

College Expenses (in Dollars), 4-Year Institutions

Type of Expense	*Public Schools (in-state)*	*Private Schools*
Tuition and fees	5950	21,588
Board rates	3402	3993
Dormitory charges	4072	4812

13. ***Groupwork:***

With partner, discuss how you can solve the following inequalities and then solve them.

a) $-4x < 2x - 18 < -x$

b) $7x - 5 \leq 4x - 3 \leq 8x - 3$