CHAPTER 12
Inequalities

12.1 Inequalities in the Number Line

1)

a) Any real number between $^{-}2$ and 6 (inclusive) is a solution.

b) Yes. Both values are contained in the solution interval $[^{-}2, 6]$.

3)

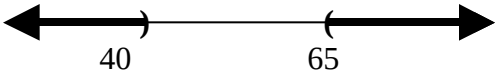
a) Two individual solutions: $x = 250\,\text{min}$, $x = 300\,\text{min}$. Mrs. Chang can talk on her phone for any length of time over 200 minutes, up to and including 400 minutes.

b) $\{x : x > 200 \text{ and } x \le 400\}$

You could also write the solution set this way: $\{x : 200 < x \le 400\}$.

c) $(200, 400]$

5)

a) 

b) $\{x \mid x < 40 \text{ or } x > 65\}$

c) $[0, 40)$ $(65, \infty)$

7)

a) $\{x : x \text{ is a real number}\}$

b) $\{x : -5 < x \le 10\}$

9) $2x - 3 < 15$
$2x < 18$
$x < 9$

11) $4 + x \le 2 - (7x + 1)$
$4 + x \le 2 - 7x - 1$
$4 + 8x \le 1$
$8x \le -3$
$x \le -\frac{3}{8}$

13) $5 \le 20 - 3x$ and $20 - 3x > 12$
$3x + 5 \le 20$ and $20 - 3x > 12$
$3x \le 15$ and $-3x > -8$
$x \le 5$ and $x < \frac{8}{3}$

Solution Set: $\{x \mid x < \frac{8}{3}\}$

15) Let l and w denote the length and width (in meters) of the rectangle, respectively.

a) $P = 2l + 2w$
$P = 2l + 2(40)$ ← Substitute 40 for w
$P = 2l + 80$

b) [ ] and $2l + 80 \le 300$

c) [ ] and $2l + 80 \le 300$
$2l \ge 120$ and $2l \le 220$
$l \ge 60$ and $l \le 110$

The rectangle's length can be no less than 60 m and no more than 110 m.

Skill and Review

17) $y = 5x^2$
$20 = 5x^2$
$x^2 = 4$
$x = 2$ ← Ignore negative root for variation

19) Original Vertex: (0,0)
Vertex after shifting 3 units left then $\frac{15}{7}$ units down: $(-3, -\frac{15}{7})$