A.REI.D.11: Quadratic Inequalities 1

1 The length of a rectangle is three feet less than twice its width. If x represents the width of the rectangle, in feet, which inequality represents the area of the rectangle that is *at most* 30 square feet?
1) $x(2x-3) \le 30$
2) $x(2x-3) \ge 30$
3) $x(3-2x) \le 30$
4) $x(3-2x) \ge 30$

2 The solution set of $x^2 - 3x < 0$ is
1) $0 < x < 3$
2) $x > 3$
3) $x < 0$ or $x > 3$
4) $x < 0$

3 What is the solution of the inequality $9 - x^2 < 0$?
1) $\{x \mid -3 < x < 3\}$
2) $\{x \mid x > 3 \text{ or } x < -3\}$
3) $\{x \mid x > 3\}$
4) $\{x \mid x < -3\}$

4 What is the solution set of the inequality $x^2 + 4x - 5 < 0$?
1) $\{x \mid x < -1 \text{ or } x > 5\}$
2) $\{x \mid x < -5 \text{ or } x > 1\}$
3) $\{x \mid -1 < x < 5\}$
4) $\{x \mid -5 < x < 1\}$

5 The solution set for the inequality $x^2 + 4x - 5 \ge 0$ is
1) $-5 \le x \le 1$
2) $x \le -1$ or $x \ge 5$
3) $x \le -5$ or $x \ge 1$
4) $-1 \le x \le 5$

6 What is the solution set for $x^2 - 4x - 5 < 0$?
1) $\{x \mid -1 < x < 5\}$
2) $\{x \mid -5 < x < 1\}$
3) $\{x \mid x > 5 \text{ or } x < -1\}$
4) $\{x \mid x < -1\}$

7 What is the solution of the inequality $x^2 - x - 6 < 0$?
1) $-3 < x < -2$
2) $-2 < x < 3$
3) $1 < x < 6$
4) $-3 < x < 2$

8 What is the solution set of $x^2 - 3x - 28 \ge 0$?
1) $x \ge 7$ or $x \le -4$
2) $x \le 7$ or $x \ge -4$
3) $-4 \le x \le 7$
4) $-4 < x < 7$

9 What is the solution of the inequality $x^2 + 2x - 15 < 0$?
1) $x < -5$ or $x > 3$
2) $-5 < x < 3$
3) $x < -3$ or $x > 5$
4) $-3 < x < 5$

10 The solution set of the inequality $x^2 - 3x > 10$ is
1) $\{x \mid -2 < x < 5\}$
2) $\{x \mid 0 < x < 3\}$
3) $\{x \mid x < -2 \text{ or } x > 5\}$
4) $\{x \mid x < -5 \text{ or } x > 2\}$

11 What is the solution set for the inequality $x^2 - 2x < 8$?
1) $-2 < x < 4$
2) $-4 < x < 2$
3) $x < -2$ or $x > 4$
4) $x < -4$ or $x > 2$

12 What is the solution set of the inequality $x^2 - x > 20$?
1) $\{x > 5\}$
2) $\{-4 < x < 5\}$
3) $\{x > 5 \text{ or } x < -4\}$
4) $\{x > 0\}$

13 What is the solution set of the inequality $x^2 + 3x - 10 > 8$?
1) $\{x \mid -6 < x < 3\}$
2) $\{x \mid x < -6 \text{ or } x > 3\}$
3) $\{x \mid -3 < x < 6\}$
4) $\{x \mid x < -3 \text{ or } x > 6\}$

14 What is the solution set of the inequality $-2x^2 + 3x + 5 > 0$?
1) $\{x \mid -1 < x < 2.5\}$
2) $\{x \mid -2.5 < x < 1\}$
3) $\{x \mid x < -1 \text{ or } x > 2.5\}$
4) $\{x \mid x < -2.5 \text{ or } x > 1\}$

15 Solve for x: $x^2 - 7x + 10 < 0$

16 Find the solution of the inequality $x^2 - 4x > 5$, algebraically.

17 Solve the inequality $x^2 - 3x - 4 > 0$ algebraically for x.

18 Determine algebraically the solution to $4x^2 - 5x \geq 6(5 - 4x)$.

A.REI.D.11: Quadratic Inequalities 1
Answer Section

1 ANS: 1 REF: 011513ia
2 ANS: 1 REF: 019833siii
3 ANS: 2

$9 - x^2 < 0$

$x^2 - 9 > 0$

$(x+3)(x-3) > 0$

$x+3 > 0$ and $x-3 > 0$

$x > -3$ and $x > 3$

$x > 3$

or $x+3 < 0$ and $x-3 < 0$

$x < -3$ and $x < 3$

$x < -3$

REF: 061507a2
4 ANS: 4

$x^2 + 4x - 5 < 0$ $(x+5)(x-1) < 0$ For the product of these binomials to be negative, either: 1. $(x+5)$ must be negative AND $(x-1)$ must be positive; or 2. $(x+5)$ must be positive AND $(x-1)$ must be negative	CASE 1 $x+5 < 0$ AND $x-1 > 0$ $x < -5$ AND $x > 1$ CASE 2 $x+5 > 0$ AND $x-1 < 0$ $x > -5$ AND $x < 1$ The answer is the second case, $-5 < x < 1$. The first case is not possible, as x cannot be both greater than 1 and less than -5.

REF: 080713b
5 ANS: 3 REF: 010232siii
6 ANS: 1 REF: 068930siii
7 ANS: 2

$x^2 - x - 6 < 0$ $(x-3)(x+2) < 0$ For the product of these binomials to be negative, either: 1. $(x-3)$ must be negative AND $(x+2)$ must be positive; or 2. $(x-3)$ must be positive AND $(x+2)$ must be negative	CASE 1 $x-3 < 0$ AND $x+2 > 0$ $x < 3$ AND $x > -2$ CASE 2 $x-3 > 0$ AND $x+2 > 0$ $x > 3$ AND $x < -2$ The answer is the first case, $-2 < x < 3$. The second case is not possible, as x cannot be both greater than 3 and less than -2.

REF: 010904b
8 ANS: 1 REF: 019633siii

9 ANS: 2 REF: 080018siii

10 ANS: 3

$x^2 - 3x - 10 > 0$ or

$(x-5)(x+2) > 0$ $x - 5 < 0$ and $x + 2 < 0$

$x - 5 > 0$ and $x + 2 > 0$ $x < 5$ and $x < -2$

$x > 5$ and $x > -2$ $x < -2$

$x > 5$

REF: 011115a2

11 ANS: 1 REF: 089823siii

12 ANS: 3 REF: 080233siii

13 ANS: 2 REF: 010032siii

14 ANS: 1 REF: 010430siii

15 ANS:

$2 < x < 5$. $x^2 - 7x + 10 < 0$. $x - 5 < 0$ and $x - 2 > 0$

$(x-5)(x-2) < 0$ $x < 5$ and $x > 2$

REF: 061024b

16 ANS:

$x < -1$ or $x > 5$. $x^2 - 4x - 5 > 0$. $x - 5 > 0$ and $x + 1 > 0$ or $x - 5 < 0$ and $x + 1 < 0$

$(x-5)(x+1) > 0$ $x > 5$ and $x > -1$ $x < 5$ and $x < -1$

$x > 5$ $x < -1$

REF: 011228a2

17 ANS:

$x^2 - 3x - 4 > 0$. $x - 4 > 0$ and $x + 1 > 0$ or $x - 4 < 0$ and $x + 1 < 0$

$(x-4)(x+1) > 0$ $x > 4$ and $x > -1$ $x < 4$ and $x < -1$

$x > 4$ $x < -1$

REF: 011735a2

18 ANS:

$4x^2 - 5x \geq 30 - 24x$ $4x - 5 \geq 0$ and $x + 6 \geq 0$ or $4x - 5 \leq 0$ and $x + 6 \leq 0$

$4x^2 + 19x - 30 \geq 0$ $x \geq \frac{5}{4}$ and $x \geq -6$ $x \leq \frac{5}{4}$ and $x \leq -6$

$(4x-5)(x+6) \geq 0$

$x \geq \frac{5}{4}$ $x \leq -6$

REF: 081637a2