Solve each problem using the Square Root Property

1. \( x^2 = 81 \)
2. \( (x - 3)^2 = 1 \)
3. \( (2x - 5)^2 = 9 \)
4. \( x^2 + 16x + 64 = 24 \)
5. \( (3x + 6)^2 = 54 \)
6. \( x^2 - 6x + 9 = 20 \)

Find the value of \( c \) that makes each trinomial a perfect square trinomial. Then factor the trinomial.

7. \( x^2 - 14x + c \)
8. \( x^2 + 8x + c \)
9. \( x^2 - 10x + c \)

Solve each equation by completing the square.

10. \( x^2 - 4x - 5 = 0 \)
11. \( x^2 + 6x + 24 = 0 \)
12. \( x^2 + 10x + 17 = 0 \)

Complete all steps for each equation below.

a. Find the value of the Discriminant.
b. State the number and nature of the roots.
c. Find the exact solutions to the equation using the Quadratic Formula.

13. \( x^2 - 11x - 26 = 0 \)
14. \( 2x^2 - 3x = -2 \)
15. \( 6x^2 - 1 = 2x \)
16. \( 9x^2 - 24x + 16 = 0 \)

For each parabola written in vertex form, determine the transformations, vertex, axis of symmetry, and if the parabola opens up or down. Then use this information to GRAPH the parabola.

17. \( y = (x + 6)^2 - 3 \)
18. \( y = -2(x - 3)^2 + 4 \)

Write each equation in vertex form. Then identify the transformations, vertex, axis of symmetry, and direction of opening.

19. \( y = x^2 - 8x + 2 \)
20. \( y = 2x^2 + 16x - 3 \)
21. \( y = -3x^2 - 18x - 5 \)

Write an equation for the parabola with the given vertex that passes through the given point.

22. \( \text{Vertex} (-2, 11) \quad \text{Pt} (-3, 16) \)
23. \( \text{Vertex} (4, 5) \quad \text{Pt} (8, -43) \)
24. \( \text{Vertex} (-6, -17) \quad \text{Pt} (-2, -9) \)
Graph each of the following quadratic inequalities in \textit{two variables}.

25. \( y > x^2 - 12x + 31 \)

26. \( y \geq -x^2 + 4x + 5 \)

Solve each of the quadratic inequalities in \textit{one variable}.

27. \( x^2 - 8x + 12 \leq 0 \)

28. \( x^2 - 4 > 0 \)

29. \( 2x^2 - 9x - 18 > 0 \)

30. A rectangular plot of land is to be extended \( x \) ft. to the east and to the south as pictured. If the total area of the new plot of land cannot exceed 168 square feet, how far can the land be extended? Write an inequality and solve.
THE ANSWERS

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<tr>
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<tbody>
<tr>
<td>1.</td>
<td>$x = \pm 9$</td>
<td>2.</td>
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<tr>
<td>4.</td>
<td>$x = -8 \pm 2\sqrt{6}$</td>
<td>5.</td>
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<tr>
<td>7.</td>
<td>$49; (x - 7)^2$</td>
<td>8.</td>
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<tr>
<td>10.</td>
<td>$x = 5, -1$</td>
<td>11.</td>
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<tr>
<td>13.</td>
<td>a) $225$</td>
<td>b) 2 rational roots</td>
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<tr>
<td>14.</td>
<td>a) $-7$</td>
<td>b) 2 complex roots</td>
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<tr>
<td>15.</td>
<td>a) $28$</td>
<td>b) 2 irrational roots</td>
</tr>
<tr>
<td>16.</td>
<td>a) $0$</td>
<td>b) 1 rational root</td>
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17. Left 6, Down 3; $(-6, -3); x = -6$; up

18. Right 3, Vertical Expansion by 2, Reflect over $x$-axis, Up 4; $(3, 4); x = 3$; down

19. Right 4, Down 14; $y = (x - 4)^2 - 14; (4, -14); x = 4$; up

20. Left 4, Vertical Expansion by 2, Down 35; $y = 2(x + 4)^2 - 35; (-4, -35); x = -4$; up

21. Left 3, Vertical Expansion by 3, Reflect over $x$-axis, Up 22; $y = -3(x + 3)^2 + 22; (-3, 22); x = -3$; down

22. $y = 5(x + 2)^2 + 11$

23. $y = -3(x - 4)^2 + 5$

24. $y = \frac{1}{2}(x + 6)^2 - 17$

25. $[2, 6]$

26. $(-\infty, -2) \cup (2, \infty)$

27. $(-\infty, -\frac{3}{2}) \cup (6, \infty)$

28. $(x + 10)(x + 12) \leq 168; 0 \leq x \leq 2$ - Up to 2 feet.