Algebra 1

Chapter 9

Section 9-6

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take note

Key Concept Quadratic Formula

Algebra

If $ax^2 + bx + c = 0$, and $a \neq 0$, then

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Example

Suppose $2x^2 + 3x - 5 = 0$. Then $a = 2$, $b = 3$, and $c = -5$. Therefore

$$x = \frac{-(3) \pm \sqrt{(3)^2 - 4(2)(-5)}}{2(2)}$$

$x = \frac{-3 \pm \sqrt{9+40}}{4}$ $\sqrt{49} \to 7$

$x = \frac{-3 \pm 7}{4}$

$x = \frac{-3+7}{4}$ $x = \frac{-3-7}{4}$

$x = \frac{4}{4}$ $x = \frac{-10}{4}$

$x = 1$ $x = -\frac{5}{2}$

$x = 1, -\frac{5}{2}$

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Solve using the quadratic formula.

$-3x^2 + 7x - 2 = 0$

$a = -3 \quad b = 7 \quad c = -2$

$$x = \frac{-(7) \pm \sqrt{7^2 - 4(-3)(-2)}}{2(-3)}$$

$$x = \frac{-7 \pm \sqrt{49 - 24}}{-6}$$

$$x = \frac{-7 \pm \sqrt{25}}{-6}$$

$$x = \frac{-7 \pm 5}{-6}$$

$x = -\frac{1}{3}, -2$

$$x = \frac{-7+5}{6} \qquad x = \frac{-7-5}{6}$$

$$x = \frac{-2}{6} \qquad x = \frac{-12}{6}$$

$$x = -\frac{1}{3} \qquad x = -2$$

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Solve using the quadratic formula.

$20x^2 + 7x - 3 = 0$

$a = 20 \quad b = 7 \quad c = -3$

$$x = \frac{-7 \pm \sqrt{7^2 - 4(20)(-3)}}{2(20)}$$

$$x = \frac{-7 \pm \sqrt{49 + 240}}{40}$$

$$x = \frac{-7 \pm \sqrt{289}}{40}$$

$$x = \frac{-7 \pm 17}{40}$$

$x = \frac{1}{9}, \frac{-3}{5}$

$$x = \frac{-7+17}{40} \qquad x = \frac{-7-17}{40}$$

$$x = \frac{10}{40} \qquad x = \frac{-24}{40}$$

$$x = \frac{1}{4} \qquad x = \frac{-3}{5}$$

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Solve using the quadratic formula.

$5^2 - 8 + 1 = 0$

$a=5 \quad b=-8 \quad c=1$

$$x=\frac{+(8)\pm\sqrt{(-8)^2-4(5)(1)}}{2(5)}$$

$$x=\frac{8\pm\sqrt{64-20}\sqrt{44}}{10}$$

$$x=\frac{8\pm 6.63}{10}$$

$$x=\frac{8+6.63}{10} \qquad x=\frac{8-6.63}{10}$$

$$x=\frac{14.63}{10} \qquad x=\frac{1.37}{10}$$

$$x=1.46 \qquad x=0.14$$

$$x=1.46, .14$$

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Solve using the quadratic formula.

$^2 - = 2$

$-2 \quad -2$

$x^2-x-2=0$

$a=1 \quad b=-1 \quad c=-2$

$$x=\frac{+(1)\pm\sqrt{(-1)^2-4(1)(-2)}}{2(1)}$$

$$x=\frac{1\pm\sqrt{1+8}9}{2}$$

$$x=\frac{1\pm 3}{2} \qquad x=2,-1$$

$$x=\frac{1+3}{2} \qquad x=\frac{1-3}{2}$$

$$x=\frac{4}{2} \qquad x=\frac{-2}{2}$$

$$x=2 \qquad x=-1$$

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Recall and Solve:

$\sqrt{\quad}\sqrt{\quad}$ $\sqrt{\quad}\sqrt{\quad}$ $\sqrt{\quad}$ ~~$\sqrt{\quad}$~~

$x = 7, -7$ $x = 0$ no solution

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Discriminant: Expression under the radical of quadratic formula

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

2 ans

0 ans

1 ans

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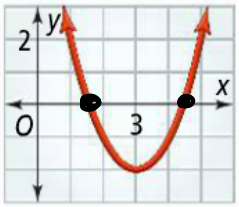
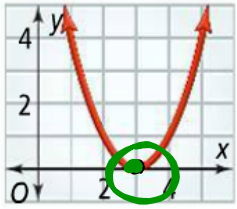
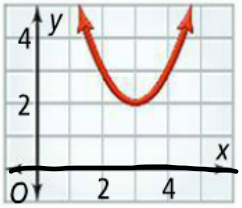
Discriminant	$b^2 - 4ac > 0$	$b^2 - 4ac = 0$	$b^2 - 4ac < 0$
Example	$x^2 - 6x + 7 = 0$ The discriminant is $(-6)^2 - 4(1)(7) = 8$, which is positive. 	$x^2 - 6x + 9 = 0$ The discriminant is $(-6)^2 - 4(1)(9) = 0$. 	$x^2 - 6x + 11 = 0$ The discriminant is $(-6)^2 - 4(1)(11) = -8$, which is negative. 
Number of Solutions	There are two real-number solutions.	There is one real-number solution.	There are no real-number solutions.

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Determine the number of real solutions for each quadratic equation.

$3^2 + 4 + 13 = 0$

$b^2 - 4ac$

$4^2 - 4(3)(13)$

$16 - 156$

-140

none

$1.25^2 - 5 + 5 = 0$

$b^2 - 4ac$

$(-5)^2 - 4(1.25)(5)$

$25 - 25$

0

1 solution

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