The Quadratic Formula ...

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

For Quadratic Equations

$$ax^2 + bx + c = 0$$

Solving Quadratics via Quad Formula

Like factoring-
-Needs to equal zero
-be written in descending order
-imaginary solutions written in standard form
-exact answers (radicals simplified)

Solve- $2x^2 - 11x + 5 = 0$

$$x = \frac{11 \pm \sqrt{121 - 4(2)(5)}}{2(2)}$$

$$= \frac{11 \pm \sqrt{81}}{4}$$

$$= \frac{11 \pm 9}{4}$$

$$= \frac{20}{4} \qquad = 2/4$$

$$x = 5 \qquad = 1/2$$

Solve- $2x^2 + 1 = 6x$

$$2x^2 - 6x + 1 = 0$$

$$x = \frac{6 \pm \sqrt{36 - 4(2)(1)}}{4}$$

$$= \frac{6 \pm \sqrt{28}}{4}$$

$$= \frac{6 \pm 2\sqrt{7}}{4} = \frac{3 \pm \sqrt{7}}{2}$$

$$\left\{ \frac{3-\sqrt{7}}{2}, \frac{3+\sqrt{7}}{2} \right\}$$

$3x^2 - 2x + 4 = 0$

$\sqrt{-1} = i$

$$x = \frac{2 \pm \sqrt{4-4(3)(4)}}{6}$$

$$= \frac{2 \pm \sqrt{-44}}{6} = \frac{2 \pm \sqrt{-1 \cdot 4 \cdot 11}}{6}$$

$$= \frac{2 \pm 2i\sqrt{11}}{6}$$

complex

$a+bi$

$$= \frac{1 \pm i\sqrt{11}}{3}$$

$$= \frac{1}{3} \pm \frac{\sqrt{11}}{3} i$$

$a \quad b \quad i$

$x^2 - 2x = 6$

2 solns
real
irrational

$$x^2 - 2x - 6 = 0$$

$$x = \frac{2 \pm \sqrt{4 - 4(-6)}}{2}$$

$$= \frac{2 \pm \sqrt{28}}{2} = \frac{2 \pm 2\sqrt{7}}{2}$$

$4 \cdot 7$

$$= 1 \pm \sqrt{7}$$

$\{1-\sqrt{7}, 1+\sqrt{7}\}$

$4x^2 = 8x - 5$

$$4x^2 - 8x + 5 = 0$$

$$x = \frac{8 \pm \sqrt{64 - 4(4)(5)}}{8}$$

$$= \frac{8 \pm \sqrt{-16}}{8} = \frac{8 \pm 4i}{8}$$

$-1 \cdot 16$

$$= \frac{2 \pm i}{2}$$

$$1 \pm \frac{1}{2} i$$

$-2x = -x^2 - 19$

$$x^2 - 2x + 19 = 0$$

$$x = \frac{2 \pm \sqrt{4 - 4(19)}}{2}$$

$$= \frac{2 \pm \sqrt{-72}}{2} = \frac{2 \pm \sqrt{-1 \cdot 36 \cdot 2}}{2}$$

$$= \frac{2 \pm 6i\sqrt{2}}{2}$$

$$= 1 \pm 3i\sqrt{2}$$

$$1 \pm 3\sqrt{2}\,i$$

Regarding the discriminate.... if it's...

positive.....two real solutions

equal to zero.....one real solution $\rightarrow \frac{4}{2}$

negative.....two imaginary solutions

$$\boxed{b^2-4ac}$$

Suggested practice...

Sec 1.5

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65-74, 75,77,79,81

You should be able to, with precision, simplify each scenario:

-discriminant is a whole positive number resulting in two real solutions

-discriminant is negative resulting in imaginary solutions, expressing answer in a+bi form

-discriminant has a perfect square factor and can be simplified

-entire solution expression can be either reduced or completely divided resulting in only the numerator

65. $-5, -3$

66. $-6, -2$

67. $\dfrac{-5 \pm \sqrt{13}}{2}$

68. $\dfrac{-5 \pm \sqrt{17}}{2}$

69. $\dfrac{3 \pm \sqrt{57}}{6}$

70. $\dfrac{-1 \pm \sqrt{41}}{10}$

71. $\dfrac{1 \pm \sqrt{29}}{4}$

72. $\dfrac{3 \pm \sqrt{6}}{3} = 1 \pm \frac{1}{3}\sqrt{6}$ ok

73. $3 \pm i$

74. $1 \pm 4i$

75. 2 real solutions

77.
2
real
solutions

79.
1
real
solution

81.
2
real