

Algebra 2 4.6

Solve quadratic equations by using the quadratic formula

Use the discriminant to determine the number and type of roots for a quadratic equation

standard form (of a quadratic) $\frac{24 \pm \sqrt{240}}{8}$
 discriminant

quadratic formula

complex number

conjugate pair

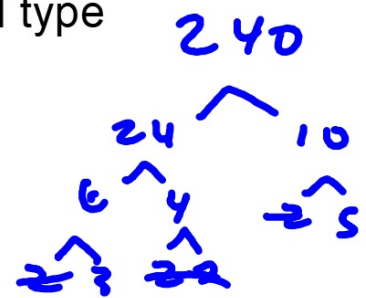
irrational number

exact answer

QF song

$$\frac{24 \pm 4\sqrt{15}}{8} \quad 2.2\sqrt{15}$$

$$3 \pm \frac{\sqrt{15}}{2}$$



whiteboards

Guided Practice

Solve each equation by using the Quadratic Formula.

4A. $3x^2 + 5x + 4 = 0$

$$\frac{-5 \pm \sqrt{25 - 4 \cdot 3 \cdot 4}}{2 \cdot 3}$$

$$= \frac{-5 \pm \sqrt{25 - 48}}{6}$$

$$= \frac{-5 \pm \sqrt{23} i}{6}$$

$$= -\frac{5}{6} \pm \frac{\sqrt{23} i}{6} \quad -\frac{5}{6} \pm \frac{i\sqrt{23}}{6}$$

4B. $x^2 - 4x = -13$

$$x^2 - 4x + 4 = -13 + 4$$

$$\sqrt{(x-2)^2} = \sqrt{9}$$

$$x - 2 = \pm 3i$$

$$+2 \quad +2$$

$$x = 2 \pm 3i$$

2 Roots and the Discriminant In the previous examples, observe the relationship between the value of the expression under the radical and the roots of the quadratic equation. The expression $b^2 - 4ac$ is called the **discriminant**.

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

$d = \text{pos}$ real + rational
P.S.

$d > 0$ real irrat

$d = 0$ 1 real (DR) rational

$d = \text{neg}$ 2 imag

Just the part in RED!

Guided Practice

5A. $-5x^2 + 8x - 1 = 0$

5B. $-7x + 15x^2 - 4 = 0$

$15x^2 - 7x - 4 = 0$

Discriminant: number and type of roots

$(b^2 - 4ac)$

$64 - 4 \cdot 5 \cdot -1$

$= 64 - 20 = 44$

Solve by CTS

$$\frac{9}{2} \cdot \frac{9}{2} \quad \frac{2x^2}{2} + \frac{18x}{2} + \frac{12}{2} = 0$$

$$x^2 + 9x + 6 = 0$$

Quiz 4.5-4.6 $x^2 + 9x + \frac{81}{4} = -6 + \frac{81}{4} = 14\frac{1}{4}$

$$\begin{array}{r} 57 \\ 19 \overline{) 57} \\ \underline{19} \\ 3 \end{array}$$

$$\sqrt{\left(x + \frac{9}{2}\right)^2} = \sqrt{\frac{57}{4}}$$

$$x + \frac{9}{2} = \pm \frac{\sqrt{57}}{2}$$

$$x = -\frac{9}{2} \pm \frac{\sqrt{57}}{2}$$

$$\frac{2}{2}$$

SRP

CTS

QF

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