Quadratic Formula Review NOTES

Why/When:	**Quadratic Formula**
To find x-intercepts	$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$

Use the quadratic formula to find the roots.

2 Real

1. $y = 3x^2 + 5x - 8$

$a=3$, $b=5$, $c=-8$

$\frac{-5 \pm \sqrt{5^2-4(3)(-8)}}{2(3)}$

$\sqrt{25+96}$, $\sqrt{121}$, 11

$\frac{-5 \pm 11}{6}$

$\frac{6}{6}$ $\quad \frac{-16}{6}$

$x = 1$ $\quad x = -\frac{8}{3}$

2. $y = 5x^2 - 10x + 2$

$a=5$, $b=-10$, $c=2$

$\frac{10 \pm \sqrt{(-10)^2-4(5)(2)}}{2(5)}$

$\sqrt{100-40}$, $\sqrt{60}$, $\sqrt{4}\sqrt{15}$, $2\sqrt{15}$

$x = \frac{10 \pm 2\sqrt{15}}{10}$

or

$x = \frac{5 \pm \sqrt{15}}{5}$

2 Real (1 double root)

3. $y = 49x^2 - 14x + 1$

$a=49$, $b=-14$, $c=1$

$\frac{14 \pm \sqrt{(-14)^2-4(49)(1)}}{2(49)}$

$\sqrt{196-196}$, $\sqrt{0}$, 0

$\frac{14 \pm 0}{98}$

$\frac{14}{98}$ $\quad x = \frac{1}{7}$

4. $y = 16x^2 + 24x + 9$

$a=16$, $b=24$, $c=9$

$\frac{-24 \pm \sqrt{(24)^2-4(16)(9)}}{2(16)}$

$\sqrt{576-576}$, $\sqrt{0}$, 0

$\frac{-24 \pm 0}{32}$

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

2 Imaginary

5. $y = 4x^2 + 6x + 5$

$a=4$, $b=6$, $c=5$

$$\frac{-6 \pm \sqrt{6^2-4(4)(5)}}{2(4)}$$

$\sqrt{36-80}$

$\sqrt{-44}$

$\sqrt{-1}\,\sqrt{4}\,\sqrt{11}$

$2i\sqrt{11}$

$$x = \frac{-6 \pm 2i\sqrt{11}}{8}$$

or

$$x = \frac{-3 \pm i\sqrt{11}}{4}$$

6. $y = 3x^2 - 4x + 8$

$a=3$, $b=-4$, $c=8$

$$\frac{4 \pm \sqrt{(-4)^2-4(3)(8)}}{2(3)}$$

$\sqrt{16-96}$

$\sqrt{-80}$

$\sqrt{-1}\,\sqrt{16}\,\sqrt{5}$

$4i\sqrt{5}$

$$x = \frac{4 \pm 4i\sqrt{5}}{6}$$

or

$$x = \frac{2 \pm 2i\sqrt{5}}{3}$$

Find the number and type of roots using the quadratic formula.

7. $y = 9x^2 - 6x - 4$

$a=9$, $b=-6$, $c=-4$

$$\frac{6 \pm \sqrt{(-6)^2-4(9)(-4)}}{2(9)}$$

$\sqrt{36+144}$

$\sqrt{180}$

$\sqrt{36}\,\sqrt{5}$

$6\sqrt{5}$

$$x = \frac{6 \pm 6\sqrt{5}}{18}$$

or

$$x = \frac{1 \pm \sqrt{5}}{3}$$

8. $y = 4x^2 - 12x + 25$

$a=4$, $b=-12$, $c=25$

$$\frac{12 \pm \sqrt{(-12)^2-4(4)(25)}}{2(4)}$$

$\sqrt{144-400}$

$\sqrt{-256}$

$\sqrt{-1}\,\sqrt{256}$

$16i$

$$x = \frac{12 \pm 16i}{8}$$

or

$$x = \frac{3 \pm 4i}{2}$$