

Imaginary Solutions & The Quadratic Formula - NOTES

Date _____

1) The Discriminant:

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

IF DISCRIMINANT: - IS GREATER THAN 0, THERE ARE 2 REAL SOLUTIONS (ZEROS)
 - IS LESS THAN 0, THERE ARE 0 REAL SOLUTIONS
 - IS EQUAL TO 0, THERE IS 1 REAL SOLUTION.

Use the discriminant to determine the number of real solutions to each equation.

2) $-6x^2 + 8x + 8 = 0$

$(8)^2 - (4 \cdot -6 \cdot 8)$

$64 - (-192)$

$64 + 192 = 256 \rightarrow$ 2 REAL SOLUTIONS

3) $-5a^2 - 8a - 5 = 0$

$(-8)^2 - (4 \cdot -5 \cdot -5)$

$64 - 100 = -36 \rightarrow$

0 REAL SOLUTIONS AKA 2 IMAGINARY SOLUTIONS

4) $-3m^2 - 6m - 12 = -9$

$-3m^2 - 6m - 3 = 0$

$(-6)^2 - (4 \cdot -3 \cdot -3)$

$36 - 36 = 0 \rightarrow$

1 REAL SOLUTION

5) $-11r^2 - 4r = -9r^2 + 10$

$-2r^2 - 4r - 10 = 0$

$(-4)^2 - (4 \cdot -2 \cdot -10)$

$16 - 80 = -64 \rightarrow$

0 REAL SOLUTIONS AKA 2 IMAGINARY SOLUTIONS

Solve each equation by taking square roots.

6) $6 - 7m^2 = -36$

$-7m^2 = -42$

$m^2 = 6$

$m = \pm \sqrt{6}$

7) $6x^2 - 10 = -58$

$6x^2 = -48$

$x^2 = -8$

$x = \pm \sqrt{-8}$

$x = \pm \sqrt{-4 \cdot 2}$

$x = \pm 2i\sqrt{2}$

8) $4r^2 + 10 = -1$

$4r^2 = -11$

$r^2 = \frac{-11}{4}$

$r = \frac{\pm \sqrt{-11}}{\sqrt{4}}$

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

9) $7k^2 + 9 = -41$

$7k^2 = -50$

$k^2 = \frac{-50}{7}$

$k = \frac{\pm \sqrt{-50}}{\sqrt{7}}$

$k = \frac{\pm \sqrt{-25 \cdot 2}}{\sqrt{7}}$

$k = \frac{\pm 5i\sqrt{2}}{\sqrt{7}}$

$\frac{\pm 5i\sqrt{14}}{7}$