Warm up

Rewrite in radical form:

1. $x^{3/4}$

$\sqrt[4]{x^3}$

2. Evaluate $8^{-4/3}$

$\sqrt[3]{8}^{-4} = (2)^{-4}$

$\frac{1}{2^4} = \frac{1}{16}$

3. Rewrite in rational exponent form... simplify if possible

$\sqrt[6]{64x^{15}y^{12}} = (64x^{15}y^{12})^{1/6}$

$64^{1/6}x^{15/6}y^{12/6}$

$2x^{5/2}y^2$

4. Solve $x^2 - 6x = 0$

$x(x-6)=0$

$x=0 \quad x-6=0$

$x=6$

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

$\sqrt{(x-3)^2}=\sqrt{9}$

$x-3=\pm 3$

$x=3\pm 3$ → 6, 0

*question: can you have one imaginary solution???

NO!

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

$x=\pm 3i$

Solve the following by completing the square. Derive the quadratic formula.

$ax^2 + bx + c = 0$

$ax^2+bx \;\_\_ = -c \;\_\_$

$a(x^2+\frac{b}{a}x+\frac{b^2}{4a^2}) = -c + \frac{b^2}{4a}$

$\left(\frac{b}{2a}\right)^2$

$\frac{b^2}{4a^2}$

$(x+\frac{b}{2a})(x+\frac{b}{2a})$

$x^2+\frac{2b}{2a}x+\frac{b^2}{4a^2}$

$\frac{1}{a}\cdot a(x+\frac{b}{2a})^2 = \frac{b^2-4ac}{4a}\cdot\frac{1}{a}$

$\frac{4a}{4a}\cdot\frac{-c}{1}+\frac{b^2}{4a}$

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

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

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

$-\frac{b}{2a} \quad -\frac{b}{2a}$

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

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

Solve the following by the quadratic formula.

1. $x^2 + 10x - 19 = 0$

$ax^2+bx+c=0$

$a=1 \quad b=10 \quad c=-19$

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

$x=\frac{-10\pm\sqrt{(10)^2-4(1)(-19)}}{2(1)}$ simplify b^2-4ac

$x=\frac{-10\pm\sqrt{176}}{2} \rightarrow \sqrt{16\cdot 11}$

GCF?

$x=\frac{-10\pm 4\sqrt{11}}{2} = -5\pm 2\sqrt{11}$

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2. $2x^2 - 8x + 15 = 0$

$a=2 \quad b=-8 \quad c=15$

$x=\frac{8\pm\sqrt{(-8)^2-4(2)(15)}}{2(2)} \leftarrow 64-120$

$x=\frac{8\pm\sqrt{-56}}{4} \leftarrow \sqrt{-4\cdot 14}$

$x=\frac{8\pm 2i\sqrt{14}}{4} = \frac{4\pm i\sqrt{14}}{2}$

$\frac{8}{4}\pm\frac{2i\sqrt{14}}{4}$

$2\pm\frac{i\sqrt{14}}{2}$

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3. $3x^2 - 7x - 6 = 0$

$a=3 \quad b=-7 \quad c=-6$

$x=\frac{7\pm\sqrt{(-7)^2-4(3)(-6)}}{3(2)}$

$x=\frac{7\pm\sqrt{121}}{6}=\frac{7\pm 11}{6}$

$x=\frac{7+11}{6}=3$

$x=\frac{7-11}{6}=-\frac{2}{3}$

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4. $3x^2 - 6x + 7 = 0$

The **DISCRIMINANT**

The discriminant determines the type of solution and the number of solutions:

rational or irrational real or imaginary (complex)

$b^2 - 4ac$ = **discriminant**

Positive Perfect Square Examples = 9, 25, 49	If the discriminate is a positive perfect square then the square root can be completely eliminated when the radical is simplified and no radical will be left over. So the solution can be written as ***2 REAL*** and ***RATIONAL*** number.
Positive Non Square Examples = 7, 12, 22	If the discriminate is positive but NOT a perfect square then there will still be **2 REAL** solutions but the solutions will be **IRRATIONAL** since the radical cannot be completely eliminated.
Zero Examples = 0 $\frac{4\pm\sqrt{0}}{2}=2$	If the discriminate is zero then there will be just **1 REAL RATIONAL** solution because adding or subtracting 0 is equivalent.
Negative Examples = −3, −9, −12	If the discriminate is negative then there will be **2 IMAGINARY** solutions (there will be an i in the solution).

Describe the nature of the roots using the discriminant.

1. $2x^2 - 8x - 14 = 0$

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

$(-8)^2-4(2)(-14)$

discr = 176

2 real irrational solutions

2. $3x^2 + 2x + 8 = 0$

b^2-4ac

$(2)^2-4(3)(8)$

discr = −92

2 imaginary Sol.

3. $3x^2 - 15x + 12 = 0$

$(-15)^2-4(3)(12)$

discr = 81

2 real rational Sol.

4. $3x^2 - 10x - 7 = 0$

$(-10)^2-4(3)(-7)$

discr = 184

2 real irrational Sol.

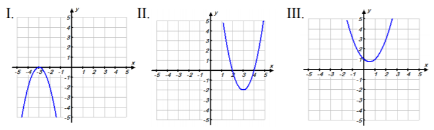
5. discr = 0 1 real sol.

5. Matching:

II a. discriminant is positive 2 real x-int.

I b. discriminant is zero 1 real x-int

III c. discriminant is negative 2 imag.



Homework~ p. 19 #1-6 and p. 17 & 18 ALL

I can solve quadratics using the quadratic formula. I can apply properties of the discriminant.