**Topic:** Discriminant and Quadratic Formula

**What am I learning today?**

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**Warm Up**

Solve by Factoring

1) \(7x^3 - 21x = 0\)
\[
\frac{7x}{7} \cdot (x^2 - 3) = 0
\]
\[
x = 0, \quad x^2 - 3 = 0
\]
\[
x = \pm \sqrt{3}
\]

2) \(8x^2 - 24x + 10 = 0\)
\[
(4x^2 - 10x + 5)(2x - 5) = 0
\]
\[
(2x - 5)(2x - 5) = 0
\]
\[
x = \frac{5}{2}
\]

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**Notes**

The Discriminant

You can determine the ___________ and ___________ of solutions by evaluating the discriminant.

\[\text{Discriminant} = (b)^2 - 4ac\]

If the discriminant is:

- **POSITIVE:** There are ___________ solutions.
- **NEGATIVE:** There are ___________ solutions.
- **ZERO:** There is ___________ solution.

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**Examples.**

Find the discriminant and state the number and types of solutions.

1) \(x^2 - 6x - 9\)
\[
\text{Disc}: b^2 - 4ac = (-6)^2 - 4(1)(-9) = 72
\]
\[
2 \text{ Real}
\]

2) \(-6x^2 - 2x - 27\)
\[
\text{Disc}: (-2)^2 - 4(-6)(-27) = -644
\]
\[
2 \text{ Imaginary}
\]

3) \(7x^2 - 10x + 3\)
\[
\text{Disc}: (-10)^2 - 4(7)(3) = 16
\]
\[
2 \text{ Real}
\]

4) \(-5x^2 + x - 6\)
\[
\text{Disc}: (1)^2 - 4(-5)(-6) = -119
\]
\[
2 \text{ Imaginary}
\]
**Notes**
The Quadratic Formula

You can solve a quadratic using the following methods:
1. **Factoring**
2. **Quadratic Formula**

If a problem cannot be factored you have to use the **Quad. Form**.

**The Quadratic Formula**

\[ x = \frac{-b \pm \sqrt{(b)^2 - 4(a)(c)}}{2(a)} \]

**Steps**
1. Put your equation in **Standard Form** \((= 0)\)
2. Identify \(a, b, \) and \(c\).
3. Substitute into the formula and simplify.

**Examples**

**Factoring Trinomials**

1) \(x^2 - 6x - 9 = 0\)
   \[ a = 1 \quad b = -6 \quad c = -9 \]
   \[ x = \frac{-(-6) \pm \sqrt{(-6)^2 - 4(1)(-9)}}{2(1)} \]
   \[ x = \frac{6 \pm \sqrt{36 + 36}}{2} \]
   \[ x = \frac{6 \pm 6}{2} \]
   \[ x = 3, \quad x = -3 \]

2) \(-6x^2 - 2x - 27 = 0\)
   \[ a = ____ \quad b = ____ \quad c = ____ \]
   \[ x = \frac{-(-2) \pm \sqrt{(-2)^2 - 4(-6)(-27)}}{2(-6)} \]
   \[ x = \frac{2 \pm \sqrt{4 - 216}}{-12} \]
   \[ x = \frac{2 \pm \sqrt{-212}}{-12} \]

3) \(7x^2 - 10x = -3\)
   \[ 7x^2 - 10x + 3 = 0 \]
   \[ x = \frac{-(-10) \pm \sqrt{(-10)^2 - 4(7)(3)}}{2(7)} \]
   \[ x = \frac{10 \pm \sqrt{100 - 84}}{14} \]
   \[ x = \frac{10 \pm 6}{14} \]
   \[ x = \frac{16}{14}, \quad x = \frac{4}{14} \]

4) \(-5x^2 + 2x + 2 = x + 8\)

**Summary**

Summarize the lesson in your own words