Polynomial Equations and Their Applications

A _____ is an equation that can be written in the form:

$ax^2 + bx + c = 0$ (this is called _____)

where a, b, and c are real #'s and $a \neq 0$.

ex: $x^2 - 12x + 27 = 0$

To solve, we'll make use of the _____:

If $AB = 0$, then _____ or _____.

ex: Here's how to solve $x^2 - 12x + 27 = 0$:
$(x - 3)(x - 9) = 0$ (factor LHS)
$x - 3 = 0$ or $x - 9 = 0$ (by the zero-product principle)
$x = 3$ or $x = 9$
So, the solution set is $\{3, 9\}$.

Ex 1.
Solve: $2x^2 - 9x = 5$

Ex 2.
Solve: $(x - 2)(x + 3) = 6$

Polynomial Equations

Ex 3.

Solve by factoring: $2x^3 + 3x^2 = 8x + 12$

Applications

Ex 4.

You throw a duck straight up from a rooftop 384 feet high with an initial speed of 32 feet per second. The function

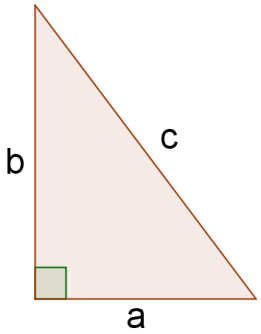
$s(t) = -16t^2 + 32t + 384$

describes the duck's height above the ground, $s(t)$, in feet, t seconds after you throw it. How long will it take for the duck to hit the ground?

Ex 5.

A rectangular duck launchpad measures 14 feet by 12 feet. A path of uniform width is to be added so as to surround the entire launchpad. The mad scientist doing the work wants the launchpad and path to cover an area of 360 square feet. How wide should the path be?

Pythagorean Theorem



The **Pythagorean Theorem** says that for right triangles:

(where a and b are the lengths of the legs, and c is the length of the hypotenuse)

Ex 6.

A guy wire runs from the top of a telephone pole to the ground. The length of the wire is 1 foot greater than the height of the pole. The distance from the base of the pole to the stake that holds the wire in the ground is 1 foot less than the height of the pole. What is the length of the wire?

Practice

1. Solve: $3x^2 = 2x$
2. Solve: $x^2 + 7 = 10x - 18$
3. Solve: $x(x - 4) = 21$
4. A pool measuring 3 meters by 5 meters is surrounded by a path of uniform width. If the area of the pool and the path combined is 143 square meters, what is the width of the path?
5. A piece of wire measuring 20 feet is attached to a telephone pole as a guy wire. The distance along the ground from the bottom of the pole to the end of the wire is 4 feet greater than the height where the wire is attached to the pole. How far up the pole does the guy wire reach?

Q: What has many keys but can't open any doors?