Warm-Up

Page 1 of the Notes Handout!


BBC

Equation

$$(4\ bundles + 20\ units) + (2\ bundles + 10\ units) = 60\ units$$

$$(4x + 20) + (2x + 10) = 60$$

Quadratic Equations

Today's Plan

1. Lesson: Quadratic Formula.
2. Practice: Solve quadratic equations.

(K6.1) Students will know that quadratic equations may have two distinct real solutions, one real solution with multiplicity two, or two complex solutions.

(K6.2) Students will know that a quadratic function whose graph does not intersect the x-axis has roots with imaginary components.

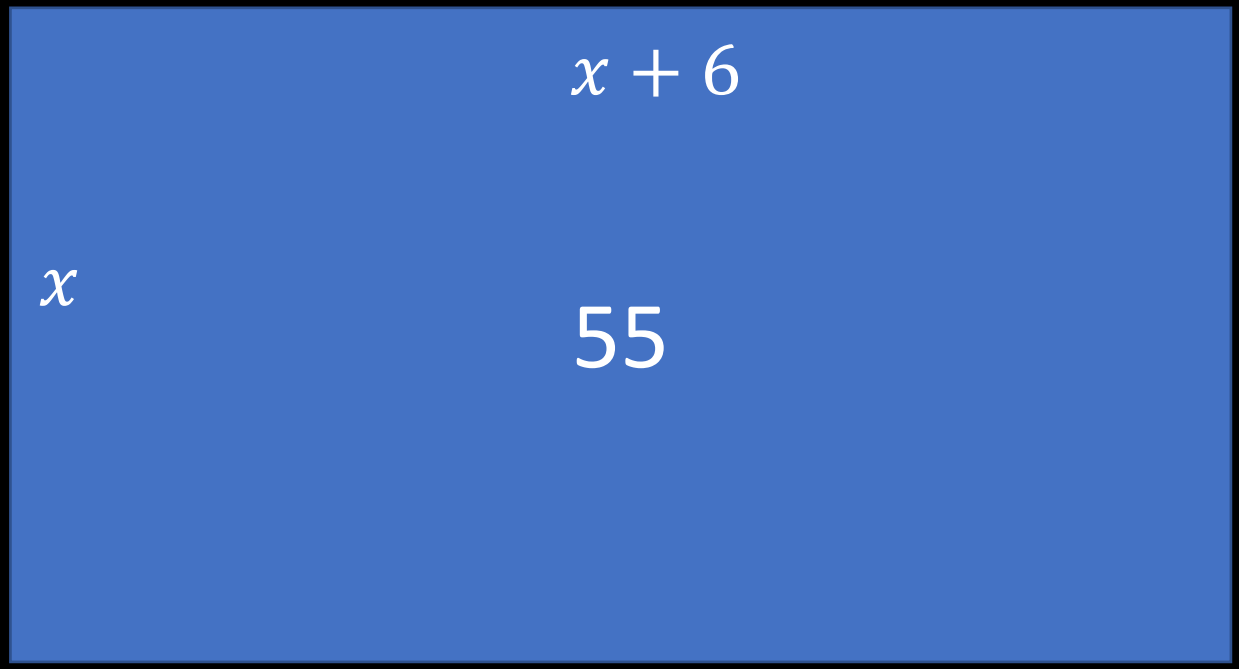
(K6.3) Students will know that the value of the discriminant can be used to determine the multiplicity and type of solutions.

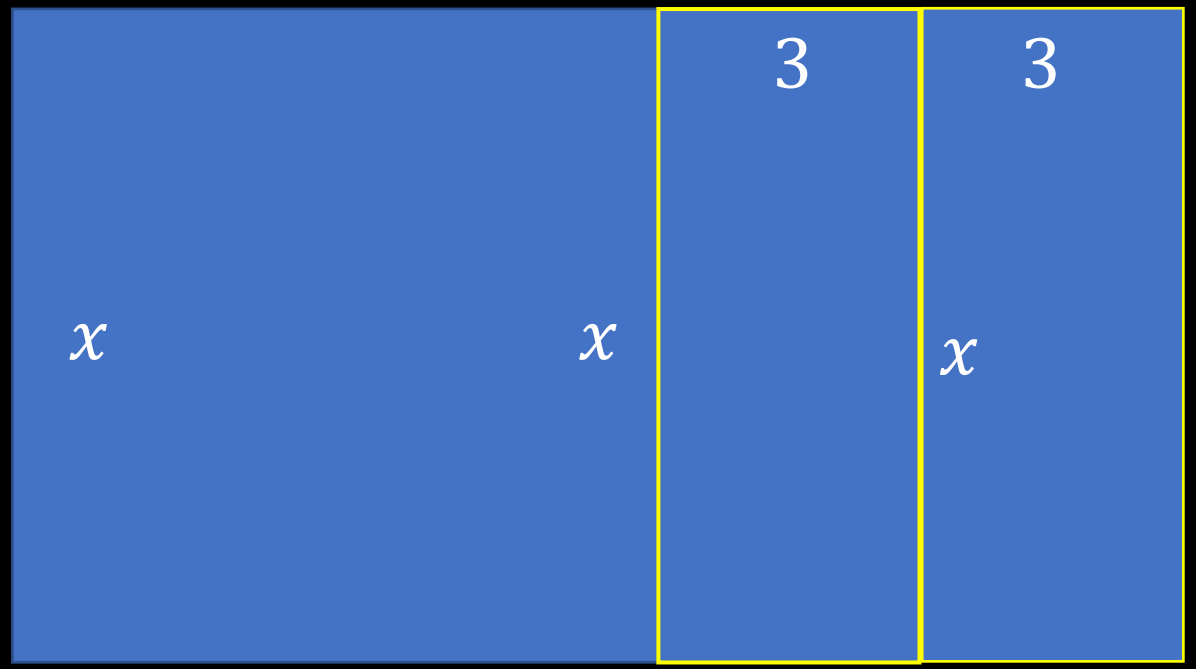
(K6.4) Students will know that complex solutions occur in conjugate pairs.

(D6.1) Students will be able to solve quadratic equations using the quadratic formula.

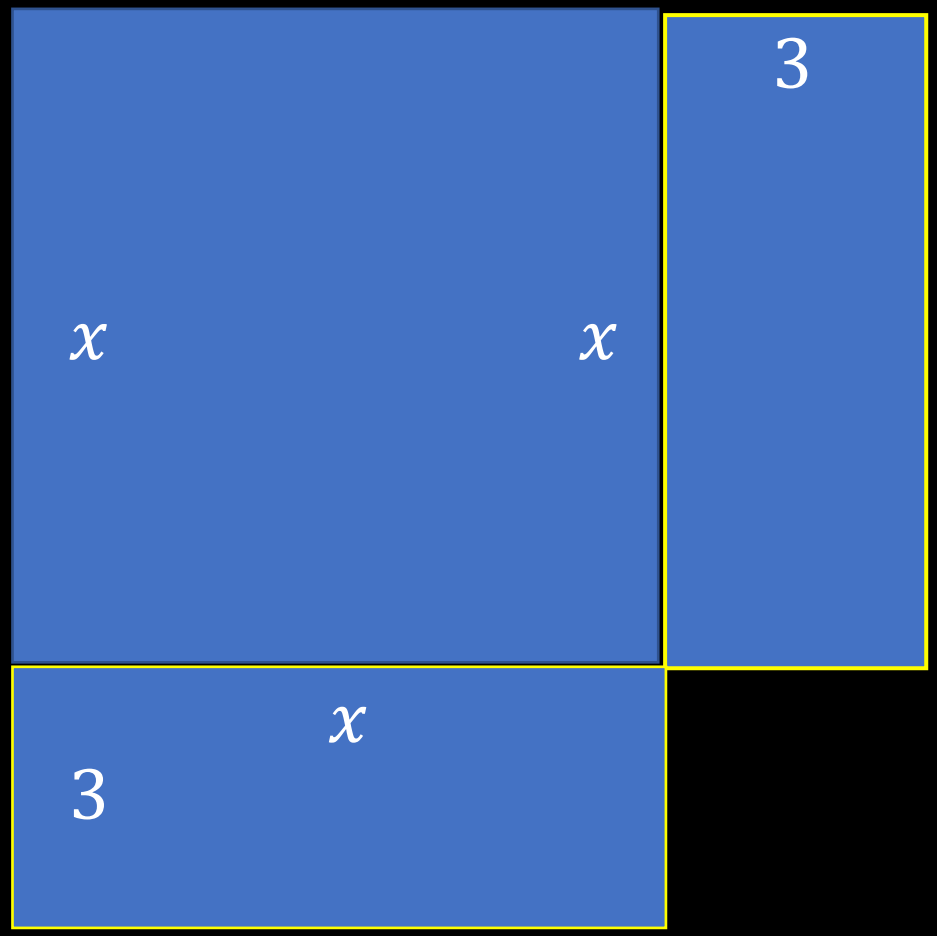

BBC

$$x(x+6)=55$$

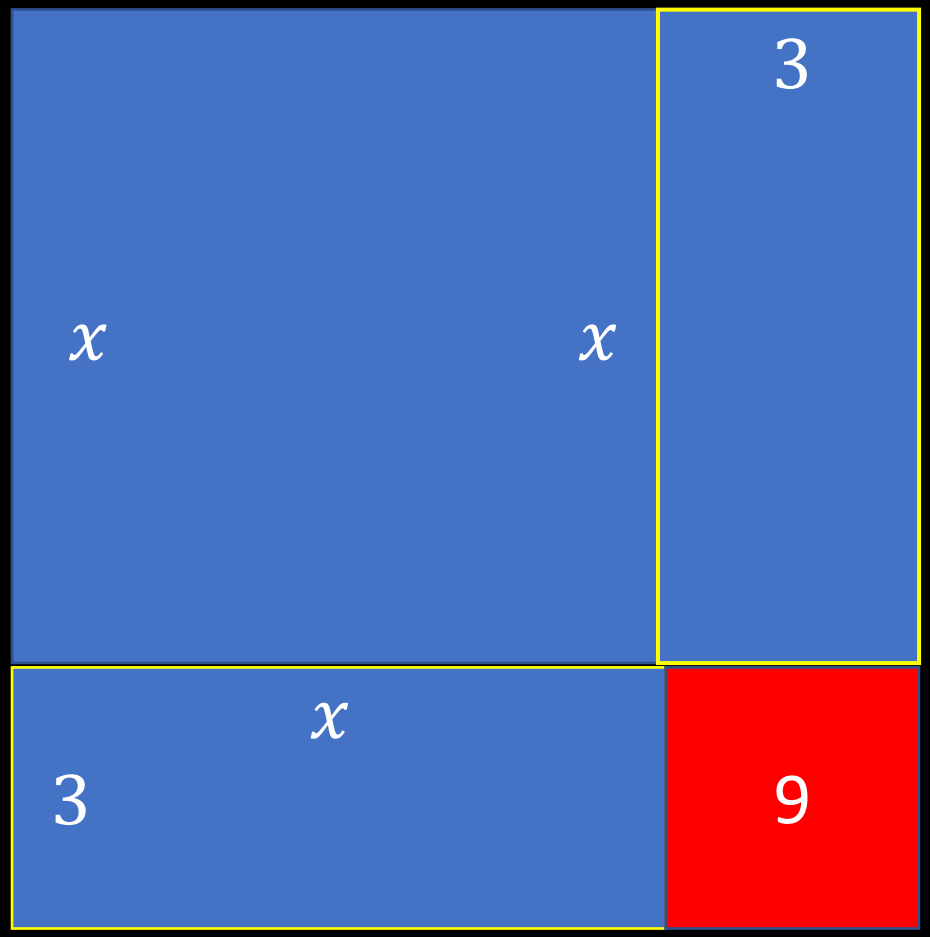




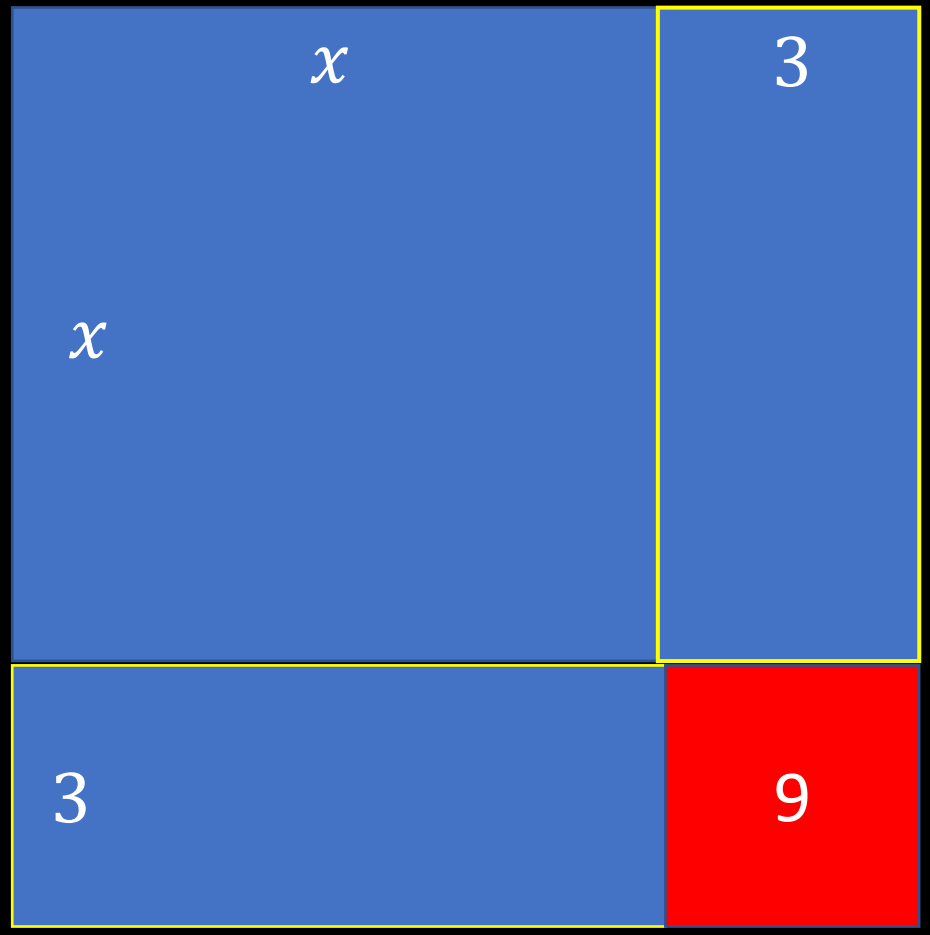
$$x^2 + 3x + 3x = 55$$



$$x^2 + 3x + 3x = 55$$



$$x^2 + 3x + 3x + 9 = 55 + 9$$



$$(x+3)^2 = 64$$

The Solution!

$(x + 3)^2 = 64$

$x + 3 = 8$

$x = 5$

The Babylonians did not use negative numbers!

We know better!

$(x + 3)^2 = 64$

$x + 3 = 8$

$x + 3 = -8$

$x = 5$

$x = -11$

The Quadratic Formula

An equation in the standard form, $ax^2 + bx + c = 0$, has solutions

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

The expression $b^2 - 4ac$ is called the discriminant of the quadratic equation.

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

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

$$x^2 + x + 2 = 0$$

Page 2 of the Notes Handout!

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

Make up new numbers

The imaginary number i, is a number with the property that $i^2 = -1$.

$$\sqrt{-9} = \sqrt{(9)(-1)} = \sqrt{9}\sqrt{-1} = 3i$$

Complex Numbers

A complex number is a pair of real numbers, a and b, written $a + bi$.

a is called the real part, b the imaginary part.

$$2 + 3i,\ i,\ 7,\ 0,\ \sqrt{2} + i\sqrt{3}$$

$$x^2 + x + 2 = 0$$

Complex Conjugates

The pair of complex numbers $a + bi$ and $a - bi$ are called complex conjugates.

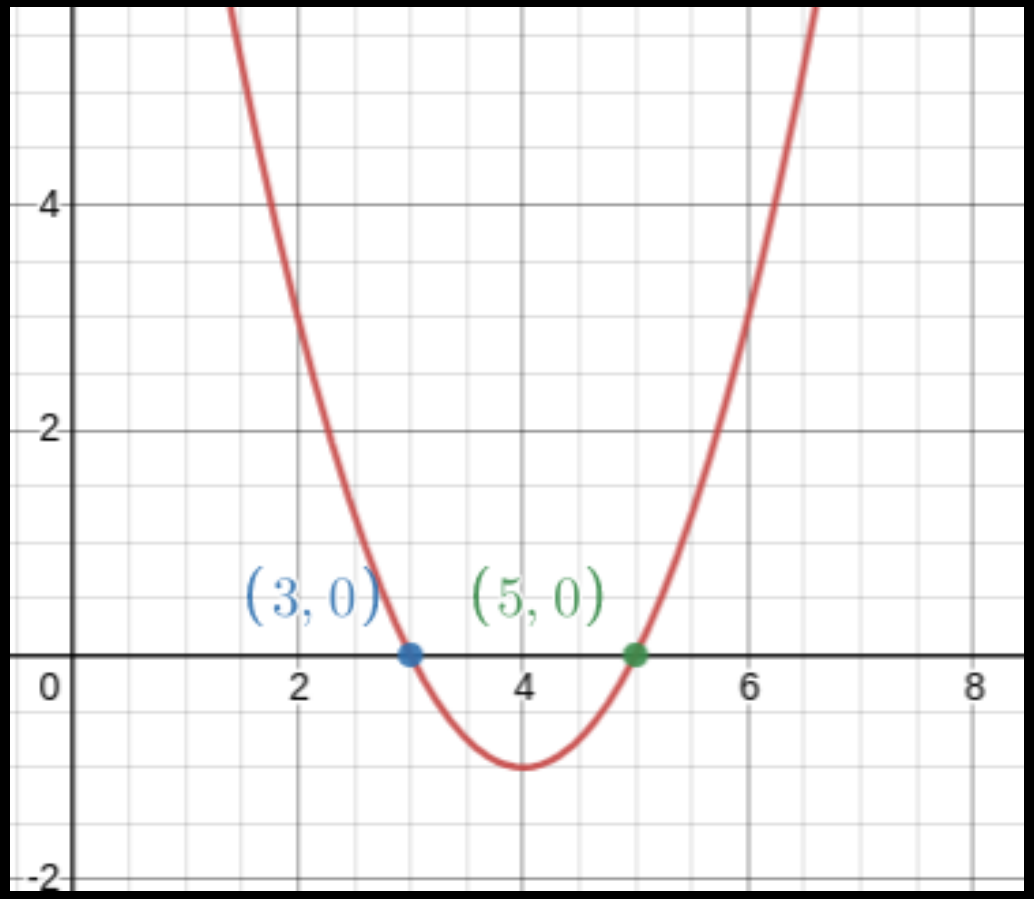
$2 + 3i$ and $2 - 3i$ are complex conjugates.

$2 + 3i$ and $1 - 3i$ are NOT complex conjugates.

Number and Type of Solutions

Discriminant	Number of distinct solutions	Type of solutions
$b^2 - 4ac < 0$	2	Complex Conjugates
$b^2 - 4ac = 0$	1	Real
$b^2 - 4ac > 0$	2	Real

Graph Method



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

Factor using guess and check

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

Factor using split-the-middle

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

Factor using special factorizations

$$x^2 - 8x + 16 = 0$$

Unit review on Wednesday, November 17

- Bring all your notes and handouts to class

Unit Test on Monday, November 22.