BOARD NOTES
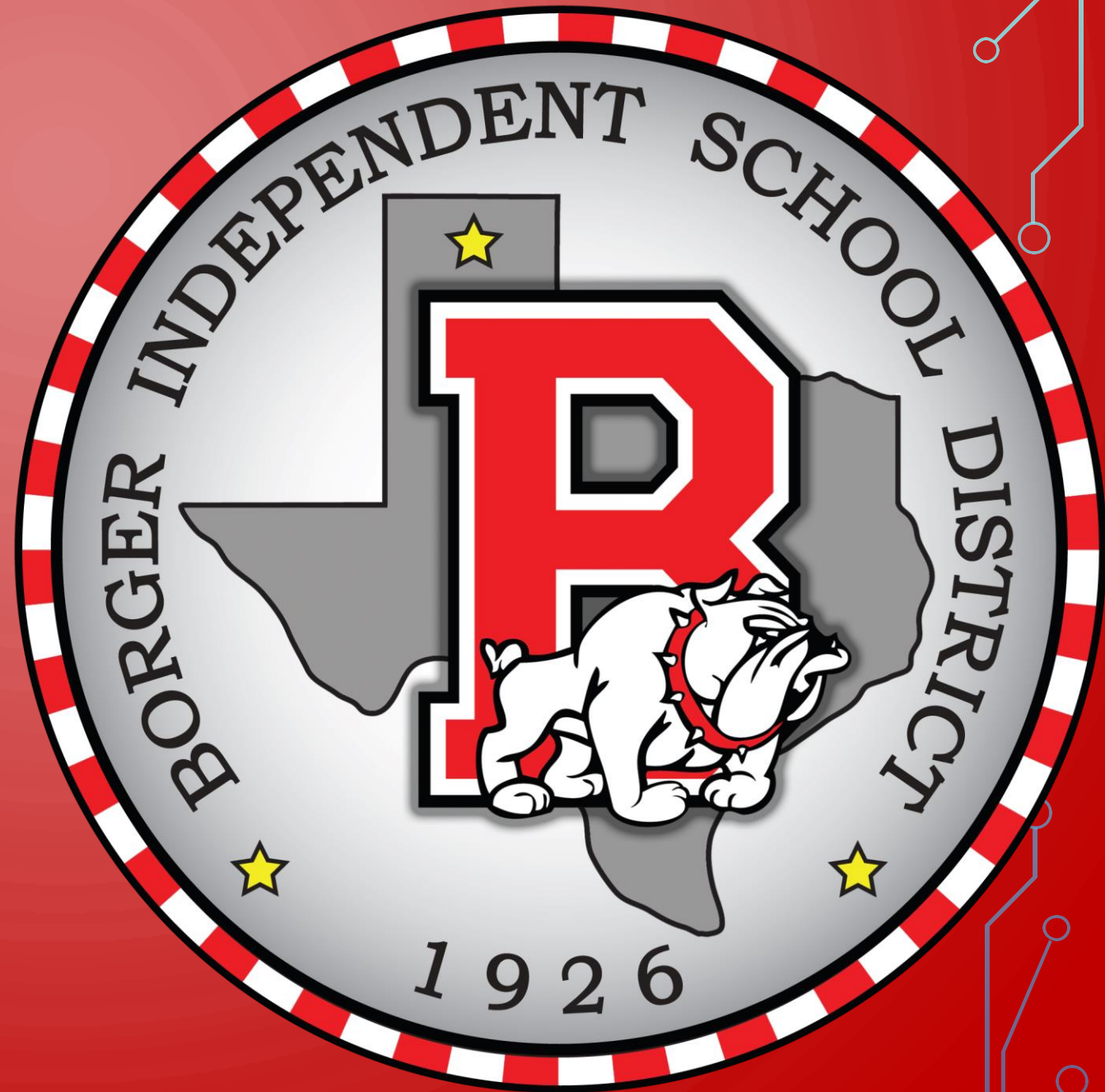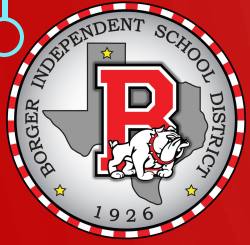
3 MARCH 2020

2A.7 (A) add, subtract, and multiply complex numbers;

We will be able to add, subtract, and multiply complex numbers.

WHAT WE NEED:

- TI-84

- Definition of imaginary

I WILL BE ABLE TO COMPLETE MY HOMEWORK GIVEN THE

- Equation

Complex Numbers and Imaginary Numbers

The **imaginary unit** i is defined as

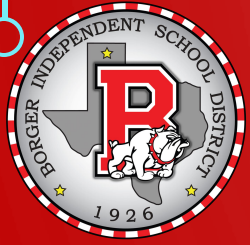$$i = \sqrt{-1}, \text{ where } i^2 = -1.$$

The set of all numbers in the form

$$a + bi,$$

with real numbers a and b, and i, the imaginary unit, is called the set of **complex numbers.**
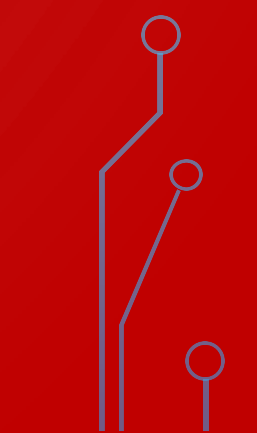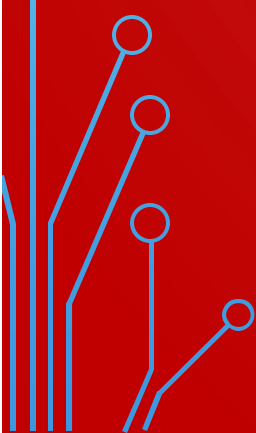
The **standard form** of a complex number is

$$a + bi.$$

Operations on Complex Numbers

The form of a complex number $a + bi$ is like the binomial $a + bx$. To add, subtract, and multiply complex numbers, we use the same methods that we use for binomials.

$$\sqrt{-64} - \sqrt{-25}$$

$$= \sqrt{(-1)64} - \sqrt{(-1)25}$$

$$= i\sqrt{64} - i\sqrt{25}$$

$$= 8i - 5i$$

$$= \boxed{3i}$$

$$\sqrt{-1} = i$$

$$i^2 = -1$$

$$a + bi$$

$$(2-3i)(5+i)$$

$$= (2)(5) + (2)(i) + (-3i)(5) + (-3i)(i)$$

$$= 10 + 2i - 15i - 3i^2$$

$$= 10 - 13i - 3 \cdot (-1)$$

$$= \boxed{13 - 13i}$$

$$(a+b)^2 = a^2 + 2ab + b^2$$

$$(2 + i\sqrt{3})^2$$

$$= (2 + i\sqrt{3})(2 + i\sqrt{3})$$

$$= 4 + 4i\sqrt{3} + 3i^2$$

$$= \boxed{1 + 4i\sqrt{3}}$$

$$\sqrt{3} \cdot \sqrt{3} \cdot i \cdot i$$

$$2(-3 + 2i) + 3(-5 - 2i)$$

$$= -6 + 4i - 15 - 6i$$

$$= \boxed{-21 - 2i}$$

$$-6(2 - i\sqrt{5}) - 3(4 - 3i\sqrt{2})$$

$$= -12 + 6i\sqrt{5} - 12 + 9i\sqrt{2}$$

$$= -24 + (6\sqrt{5} + 9\sqrt{2})i$$

$$(6i)^2 = 6^2 i^2 = -36$$

$$(-5i)(3i) = -15i^2 = 15$$

$$\sqrt{-25} \cdot \sqrt{-4} = i\sqrt{25} \cdot i\sqrt{4}$$

$$= \sqrt{(-25)(-4)} = 5i \cdot 2i$$

$$= \cancel{\sqrt{100}} = -10$$

$$\cancel{10}$$

$$\overset{a}{(1} + \overset{b}{3i})(1 - 3i) = a^2 + b^2 = 1^2 + 3^2 = 10$$
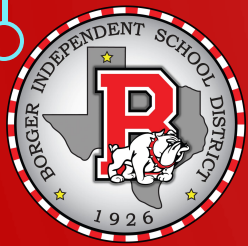
$$(1)(1) + (1)(-3i) + (3i)(1) + (3i)(-3i)$$

$$1 - 9i^2$$

$$1 - 9(-1)$$

$$10$$

$$(a + bi)(a - bi)$$

$$(8+ai)(8-ai) = 64$$

$$(-10i)(10i) = 100$$

$$(-3-2i\sqrt{3})(-3+2i\sqrt{3}) = 9+12 = 21$$

$$a = -3$$
$$b = 2\sqrt{3}$$
$$(-3)^2 + (2\sqrt{3})^2$$
$$9 + (2^2)(\sqrt{3})^2$$