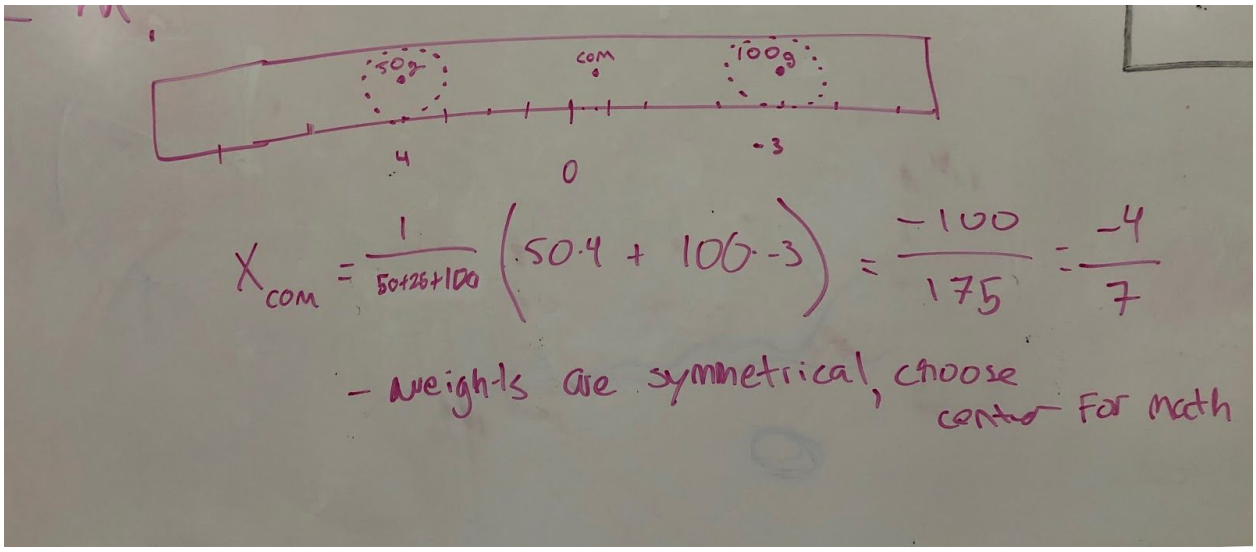
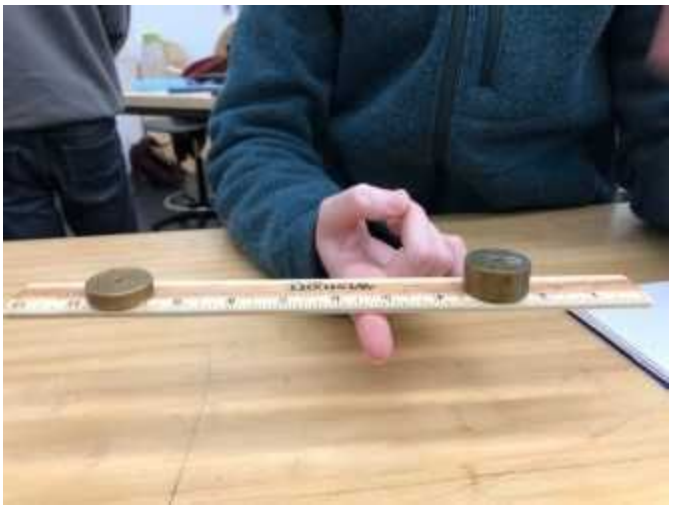
Table 4 1/31/19
QEA

Exercise 6

a. To be consistent, and because the weights are symmetrical, we should take the center of each weight to be its position.
b. For asymmetric masses, the center of mass will shift toward the more massive weight.





c. Yes, you should take into account the position of the ruler so that it doesn't affect your calculations. Making the origin the center of mass of the ruler cancels out any effect the ruler would have on the result. For a uniform ruler, the center of mass / center of mass for the ruler is at its geometric center.

Exercise 8

Plate: 148 g

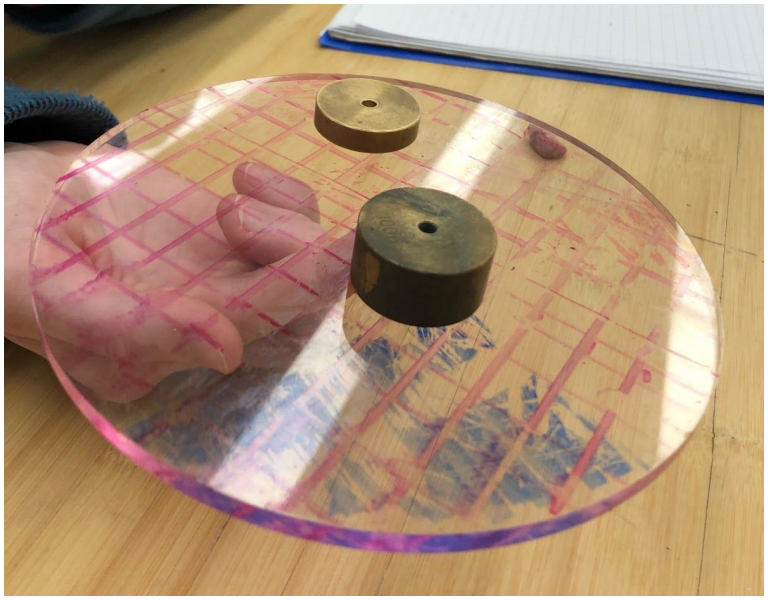
a. Center of mass is in the center of the plate because the plate is circular, symmetrical, and has an even density and thickness
    i. Experimentally confirmed correct

b. $0 = 20x_1 + 50x_2\ ;\ x_1 = \frac{-5x_2}{2}$
$0 = 20y_1 + 50y_2\ ;\ y_1 = \frac{-5y_2}{2}$
Experiment points: (1 1), (-2.5 -2.5)

c. Arbitrary points: (3 -3), (-2, 4)
$x_{COM} = \frac{1}{20+100+148}(20 * 3 + 100 * -2) = -0.52$
$y_{COM} = \frac{1}{20+100+148}(20 * -3 + 100 * 4) = 1.29$

d. $x_{COM} = \frac{1}{20+100+148}(20 * 10 + 100 * 5 + 148 * 7) = 6.45$
$y_{COM} = \frac{1}{20+100+148}(20 * 4 + 100 * 11 + 148 * 7) = 8.29$

The center of mass does not change. Changing the plane origin only changes the relative points.



Exercise 10

Side length of grid square: ½ inch
Area of grid square: $\Delta A = ¼$ inch^2
Weight of each grid square: $\Delta M = 0.455$ grams

Exercise 11

Total Area: 40 squares = 10 inch^2
Total Mass estimated: 18.2g
Total Mass measured: 18g

Exercise 12