6.01-6.05 In class assignment
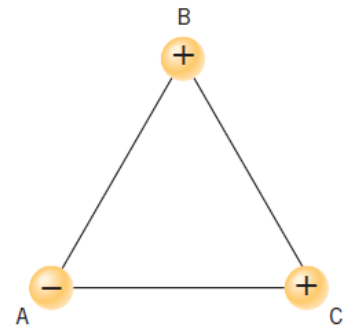
*You may work alone, in groups, on the white board, etc. Please **show all** your work below.*

1) Three point charges have equal magnitudes, two being positive and one negative. These charges are fixed to the corners of an equilateral triangle, as the drawing shows. The magnitude of each of the charges is 5.0 µC, and the lengths of the sides of the triangle are 3.0 cm.
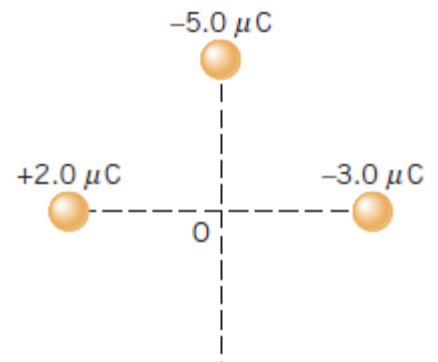
a) Calculate the net force that the negative charge experiences. (3 marks)

b) Calculate this negative charge's acceleration if it has a mass of 1.40 g. (1 mark)

2) Calculate the following due to 3 charges placed 6.1 cm from the origin O:

a) The net electric field. (3 marks)

b) The force that a -14 µC charge would experience if placed at O. (2 marks)

c) The electric potential at O. (2 marks)

3) Two charges A (+ 5.0 µC) and B (-1.0 µC) are stationary and placed 1.0 cm apart.

a) Calculate the work needed to move charge B from 1.0cm away to 5.0 cm away from charge A. (2 marks)

b) If charge B is then released at 5.0 cm from rest, how much speed would charge B have right when it passes the 1.0 cm mark from charge A? The mass of charge B is 2.00 g. (2 marks)

4) Draw the equipotential lines around these two unequal but same polarity charge. The electric field lines have been drawn in for you to guide you. (2 marks)
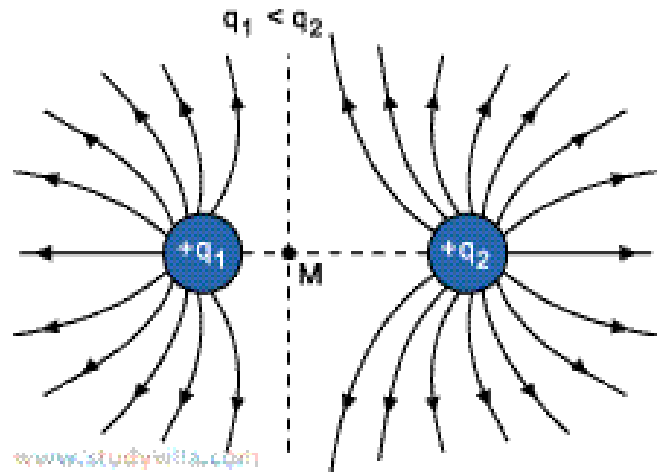
Bonus) A small spherical insulator of mass 8.00 x 10^{-2} kg and charge + 0.600 µC is hung by a thin wire of negligible mass. A charge of - 0.900 µC is held 0.150 m away from the sphere and directly to the right of it, so the wire makes an angle θ with the vertical. Find (a) the angle θ and (b) the tension in the wire. (3 marks)