Quiz 2

You may or may not make use of the following:

$$\epsilon_0 = 8.85 \times 10^{-12} \ Nm^2C^{-2} \quad k = \frac{1}{4\pi\epsilon_0} = 9 \times 10^9 \ C^2N^{-1}m^{-2}$$

$$|\vec{E}_{\text{dipole,on-axis}}| \approx \frac{1}{4\pi\epsilon_0} \frac{2p}{r^3} \qquad |\vec{E}_{\text{dipole,perp}}| \approx \frac{1}{4\pi\epsilon_0} \frac{p}{r^3}$$

1. Which of the following are true? Check ALL that apply.

   ☐ If the net electric field at a particular location inside a piece of metal is zero, the metal is not in equilibrium

   ☐ The net electric field inside a block of metal is zero <u>under all circumstances</u> *only in equilibrium!*

   ☑ The net electric field at any location inside a block of copper is zero if the copper block is in equilibrium

   ☐ The electric field from an external charge cannot penetrate to the center of a block of iron *it can, but is cancelled in eq.*

   ☐ In equilibrium, there is a net flow of mobile charges inside a conductor

q_1

Charge — — — — — — — — r — — — — — — — — Neutral atom
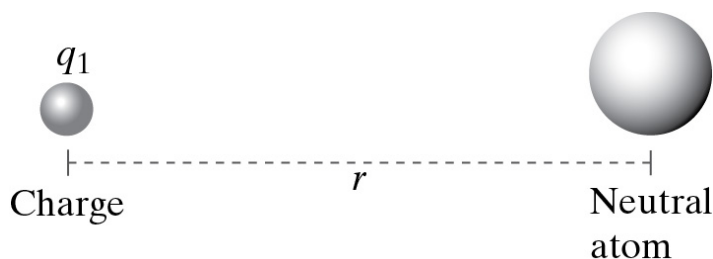
2. Consider the diagram above, where q_1 is a charged particle and the atom is neutral.

   (a) If q_1 is negative in the above diagram, which of the configurations below (1-10) best describes the charge distribution in the neutral atom in this situation? If other, please specify.

1	(2)	3	4	5
$-$ $+$	$+$ $-$	$+$ $-$	$-$ $+$	◯
6	7	8	9	10
				other
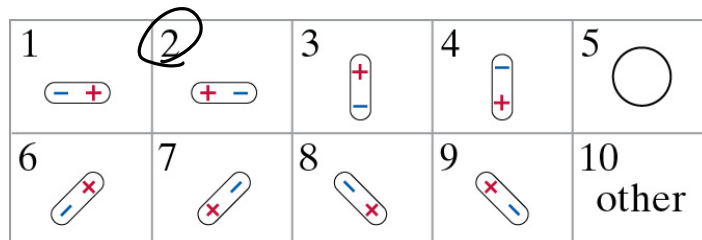
   (b) Which arrow below best describes the direction of the electric field at the location of q_1 due to the polarized neutral atom?

   a h b
   (g) c
   f d
   e
   j zero magnitude
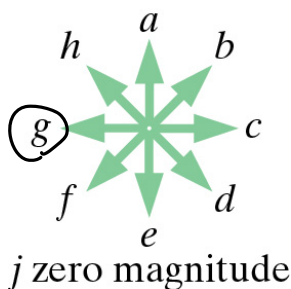
   (c) Which of the arrows best describes the direction of the force on the charged particle, due to the polarized atom?

   c