1. \[ F_s = kx \]
\[ = (240)(0.050) \]
\[ = 12 \text{ N} \]

2. \[ F_{NET} = ma \]
\[ kx = ma \]
\[ a = \frac{kx}{m} \]
\[ = \frac{(320)(0.40)}{4.0} \]
\[ = 32 \text{ m/s}^2 \text{ RIGHT} \]

3. \[ F_s = F_g \]
\[ m_g \]
\[ F_{NET} = ma \]
\[ F_s - F_f = ma \]
\[ kx - \mu F_s = ma \]
\[ kx - \mu mg = ma \]
\[ a = \frac{kx - \mu mg}{m} \]
\[ = \frac{(440)(0.12) - (0.55)(4.0)(9.8)}{4.0} \]
\[ = 7.8 \text{ m/s}^2 \text{ RIGHT} \]
4. \[ F_{N\text{ET}} = ma \]
\[ F_s - F_g = 0 \]
\[ F_s = F_g \]
\[ k\Delta x = mg \]
\[ \Delta x = \frac{mg}{k} \]
\[ = \frac{(0.050)(9.8)}{140} \]
\[ = 0.0035 \text{ m} \]
\[ = 3.5 \text{ mm} \]

5. \text{LET } l_{eq} \text{ BE THE EQUILIBRIUM POSITION.}
\text{LET } l \text{ BE THE LENGTH OF THE STRETCHED SPRING (WITH THE HANGING MASS)}
\text{THEN } \Delta x = l - l_{eq}, \text{ THE DISPLACEMENT FROM ITS EQUILIBRIUM POSITION.}
For ion:
\[ k(0.2 - \ell_{eq}) = 10 \]

For ion:
\[ k(0.3 - \ell_{eq}) = 20 \]

System of 2 equations with 2 unknowns
→ Solve using substitution:

Using 1
\[ k = \frac{10}{0.2 - \ell_{eq}} \]

3 into 2
\[ k(0.3 - \ell_{eq}) = 20 \]
\[ \frac{10}{0.2 - \ell_{eq}} (0.3 - \ell_{eq}) = 20 \]
\[ 10(0.3 - \ell_{eq}) = 20(0.2 - \ell_{eq}) \]
\[ 3 - 10\ell_{eq} = 4 - 20\ell_{eq} \]
\[ 10\ell_{eq} = 1 \]
\[ \ell_{eq} = 0.1 \text{ m} \]

Sub into 3
\[ k = \frac{10}{0.2 - \ell_{eq}} \]
\[ = \frac{10}{0.2 - 0.1} \]
\[ = 100 \frac{1}{\text{m}} \]
G. let $x_1$ be how much spring 1 is compressed. then $(0.16 - x_1)$ is the compressed length of spring 1. $0.20 - (0.16 - x_1)$ is the compressed length of spring 2. $0.12 - [0.20 - (0.16 - x_1)]$ is how much spring 2 is compressed. $x_2$.

\[ x_2 = 0.12 - [0.04 + x_1] \]
\[ = 0.08 - x_1 \]

At the point where the springs meet:

\[ F_{s_2} \quad \square \quad F_{s_1} \quad \alpha = 0 \]

\[ F_{\text{net}} = ma \]
\[ F_{s_2} - F_{s_1} = 0 \]
\[ F_{s_1} = F_{s_2} \]

\[ k_1 x_1 = k_2 x_2 \]
\[ 120 x_1 = 240 (0.08 - x_1) \]
\[ 120 x_1 = 19.2 - 240 x_1 \]
\[ x_1 = 0.053 \text{ m} \]
\[ = 5.3 \text{ cm} \]

Springs will be compressed in such a way that the forces are balanced.
Spring 1 is compressed by 5.3 cm.

\[ x_2 = 0.08 - x_1 \\
= 0.08 - 0.053 \\
= 0.027 \text{ m} \\
= 2.7 \text{ cm} \]

Spring 2 is compressed by 2.7 cm.