

Form A: 2. B 3. C 4. E 5. C 6. D

Form B: 2. C 3. D 4. B 5. C 6. E

Form C: 2. D 3. C 4. C 5. E 6. B

Form D: 2. C 3. D 4. E 5. B 6. C

Form E: 2. B 3. C 4. E 5. C 6. D

7. (A) constant velocity $\rightarrow \vec{a} = 0$ $\Sigma \vec{F} = 0$ \vec{F}_g is down, so \vec{F}_e is up.
 $Q < 0$, \vec{F}_e is up, so \vec{E} must be down.

(B) Translate (6 pts.), Equate (6 pts.), Solve (7 pts.), Significant Digits (1 pt.)

$$\Sigma \vec{F} = \vec{F}_g + \vec{F}_e = 0 \quad (-F_g) + (+F_e) = 0 \quad F_e = F_g \quad QE = mg$$

$$E = \frac{mg}{Q} = \frac{(1.25 \times 10^{-7})(9.80)}{(6.25 \times 10^{-5})} = \underline{1.96 \times 10^{-2} \text{ N/C}} \quad \underline{\text{(or V/m)}}$$

8. Translate (8 pts.), Equate (8 pts.), Solve (8 pts.), Significant Digits (1 pt.)

$$P = 1100 \text{ W} \quad V = 110 \text{ V} \quad R(\text{total}) = \frac{R_1}{12}$$

$$P = IV \quad V = IR \quad I = \frac{V}{R} \quad P = \frac{V^2}{R} \quad R(\text{total}) = \frac{V^2}{P}$$

$$\frac{R_1}{12} = \frac{V^2}{P} \quad R_1 = \frac{12V^2}{P} = \frac{(12)(110)^2}{(1100)} = \underline{132 \Omega}$$

9. Same as 8.

$$f_0 = 2.25 \times 10^3 \text{ Hz} \quad X_c = 12.0 \Omega \quad X_L = 50.0 \Omega \quad C = ?, L = ?$$

$$f_0 = \frac{1}{2\pi\sqrt{LC}} \quad X_c = \frac{1}{2\pi f C} \quad X_L = 2\pi f L$$

$$X_c X_L = \frac{L}{C} \quad L = C X_c X_L \quad f_0 = \frac{1}{2\pi\sqrt{C X_c X_L C}}$$

$$C = \frac{1}{2\pi f_0 \sqrt{X_c X_L}} = \underline{2.89 \times 10^{-6} \text{ F}} \quad L = C X_c X_L = \underline{1.73 \times 10^{-3} \text{ H}}$$