

349(4): Check a Units.

We have:

$$J = \text{current density} = \text{Cm}^{-2} \text{s}^{-1}$$

$$E = \text{electric field strength} = J \text{C}^{-1} \text{m}^{-1} = \text{volt m}^{-1}$$

So

$$\text{conductivity} = \frac{J}{E} = \frac{\text{Cm}^{-2} \text{s}^{-1}}{J \text{C}^{-1} \text{m}^{-1}},$$

$$\sigma = \text{C}^2 \text{J}^{-1} \text{m}^{-1} \text{s}^{-1} \quad \checkmark \checkmark$$

Therefore:

$$F_0 = \text{force density} = \frac{f}{\sigma} J$$

$$= \frac{\text{Cm}^{-3} (\text{Cm}^{-2} \text{s}^{-1})}{\text{C}^2 \text{J}^{-1} \text{m}^{-1} \text{s}^{-1}} = \text{Jm}^{-4}$$

We have:

$$J = \text{kgm m}^{-2} \text{s}^{-2}$$

$$\text{Force} = F = \text{kgm m s}^{-2}$$

So

$$J = F \text{m}$$

and

$$F_0 = F \text{m}^{-3} \quad \checkmark \checkmark$$

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