

1. (a) The magnitude of the magnetic field due to the current in the wire, at a point a distance  $r$  from the wire, is given by

$$B = \frac{\mu_0 i}{2\pi r} .$$

With  $r = 20 \text{ ft} = 6.10 \text{ m}$ , we find

$$B = \frac{(4\pi \times 10^{-7} \text{ T}\cdot\text{m/A})(100 \text{ A})}{2\pi(6.10 \text{ m})} = 3.3 \times 10^{-6} \text{ T} = 3.3 \mu\text{T} .$$

- (b) This is about one-sixth the magnitude of the Earth's field. It will affect the compass reading.