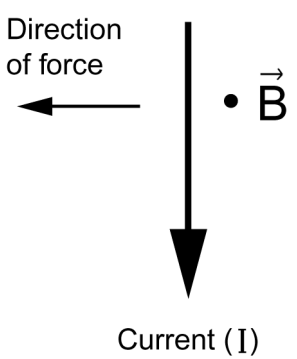
Skill and Practice Sheet Answer Key

17A The Inverse Square Law

1. 0.25 W/m^2
2. one-ninth
3. 24,204 km (four times the original distance)
4. 55.6 N
5. It is 9 times more intense 2 meters away.
6. It is 16 times more intense at 1 meter than at 4 meters away.

17B Magnetic Fields and Forces

1. 4×10^{-6} tesla, 0.04 gauss
2. 0.04 meter or 4 centimeters
3. The answer is shown in the graphic at right.



4. The force from each wire is toward the other wire. The wires are attracting each other.
5. The force would change by a factor of ½. Since the current in the wires remains the same, the magnetic field at the wires will be reduced by half as the distance increases from r to $2r$ according to the formula:

$$\vec{B} = 2 \times 10^{-7} \frac{I}{r}$$

6. 0.083 tesla
7. The coil has 799 turns.

17C Calculating Gravitational Field Strength

1. 8.9 N/kg
2. 24.9 N/kg
3. 10.4 N/kg
4. 10.9 N/kg
5. 8.5×10^{25} kg
6. 6.0×10^{24} kg
7. 271 N/kg

17D Calculating Electric Fields and Forces

1. 2.0 N
2. 0.008 N
3. 1.2 N
4. 63 N/C
5. 5.0 N/C
6. 25 N/C
7. The answer is:

1 joule = 1 newton-meter

We can rewrite this equation as $\text{newton} = \frac{\text{joule}}{\text{meter}}$

$1 \text{ volt} = \frac{1 \text{ joule}}{\text{coulomb}}$

We can rewrite this equation as $\text{coulomb} = \frac{\text{joule}}{\text{volt}}$

Therefore, $\frac{\text{newton}}{\text{coulomb}}$ can be rewritten as $\frac{\frac{\text{joule}}{\text{meter}}}{\frac{\text{joule}}{\text{volt}}}$

Since dividing by a fraction is the same as multiplying by its reciprocal, we can write:

$$\frac{\text{joule}}{\text{meter}} \times \frac{\text{volt}}{\text{joule}} = \frac{\text{volt}}{\text{meter}}$$