

Name: _____

For full credit, make your work clear. Show the formulas you use, all the essential steps, and results with correct units and correct number of significant figures.

1. (4) A 120-V hair dryer has two settings: 850 W and 1250 W. Which setting corresponds to a higher resistance? Justify your answer by determining the resistance for each setting.

a. Lower setting

b. Higher setting

$$P = \frac{V^2}{R}$$

$$R_1 = \frac{V^2}{P_1} = \frac{(120 \text{ V})^2}{850 \text{ W}} = 16.9 \Omega$$

$$R_2 = \frac{V^2}{P_2} = \frac{(120 \text{ V})^2}{1250 \text{ W}} = 11.5 \Omega$$

$$R_1 > R_2$$

2. (6) Calculate the rms and peak currents for each power setting.

$$I_{rms} = \frac{V_{rms}}{R}$$

$$V_{rms} = 120 \text{ V}$$

$$I_{rms,1} = \frac{V_{rms}}{R_1} = \frac{120 \text{ V}}{16.9 \Omega} = 7.1 \text{ A}$$

$$I_{rms,2} = \frac{V_{rms}}{R_2} = \frac{120 \text{ V}}{11.5 \Omega} = 10.4 \text{ A}$$

$$I_{0,1} = \sqrt{2} \times I_{rms,1} = 10.0 \text{ A}$$

$$I_{0,2} = \sqrt{2} \times I_{rms,2} = 14.7 \text{ A}$$