

$$\begin{aligned} \text{a) } R_{eq} &= r + R \\ &= 1.5 \Omega + 20 \Omega \\ &= 21.5 \Omega \end{aligned}$$

$$\begin{aligned} V_{eq} &= I_{eq} \cdot R_{eq} \\ 9V &= I_{eq} \cdot (21.5 \Omega) \end{aligned}$$

$$I_{eq} = .42 \text{ A}$$

$$\begin{aligned} \text{b) } I_{xy} &= I_{eq} = .42 \text{ A} \\ R_{xy} &= R = 20 \Omega \end{aligned}$$

$$\begin{aligned} V_{xy} &= I_{xy} \cdot R_{xy} \\ &= (.42 \text{ A}) (20 \Omega) \end{aligned}$$

$$V_{xy} = 8.37 \text{ V}$$

$$\begin{aligned} \text{c) } R_{eq} &= r + R \\ &= 1.5 + 30 \Omega \\ &= 31.5 \Omega \end{aligned}$$

$$\begin{aligned} V_{eq} &= I_{eq} \cdot R_{eq} \\ 9V &= I_{eq} \cdot (31.5 \Omega) \end{aligned}$$

$$I_{eq} = .29 \text{ A}$$

$$\begin{aligned} \text{d) } I_{xy} &= I_{eq} = .29 \text{ A} \\ R_{xy} &= R = 30 \Omega \end{aligned}$$

$$\begin{aligned} V_{xy} &= I_{xy} \cdot R_{xy} \\ &= (.29 \text{ A}) (30 \Omega) \end{aligned}$$

$$V_{xy} = 8.57 \text{ V}$$