

$$1. \frac{1+1+8 \cdot 2}{\sqrt{65 \cdot 5}} = \frac{17}{5\sqrt{13}} \Rightarrow \theta = \cos^{-1}\left(\frac{17}{5\sqrt{13}}\right)$$

$$2. \cancel{\overrightarrow{PQ}} \cdot \overrightarrow{QP} \cdot \overrightarrow{QR} = 0 \Rightarrow (a, 0, -2) \cdot (a, -2, 2) \\ = 0 \rightarrow a^2 + 0 + (-4) = 0 \rightarrow a = \pm 2$$

$$3. (AB + AD) \cdot (AB - AD) = 0 \rightarrow AB = AD$$

