

16. (a) Analyzing vertical forces where string 1 and string 2 meet, we find

$$T_1 = \frac{40 \text{ N}}{\cos 35^\circ} = 49 \text{ N} .$$

- (b) Looking at the horizontal forces at that point leads to

$$T_2 = T_1 \sin 35^\circ = (49 \text{ N}) \sin 35^\circ = 28 \text{ N} .$$

- (c) We denote the components of  $T_3$  as  $T_x$  (rightward) and  $T_y$  (upward). Analyzing horizontal forces where string 2 and string 3 meet, we find  $T_x = T_2 = 28 \text{ N}$ . From the vertical forces there, we conclude  $T_y = 50 \text{ N}$ . Therefore,

$$T_3 = \sqrt{T_x^2 + T_y^2} = 57 \text{ N} .$$

- (d) The angle of string 3 (measured from vertical) is

$$\theta = \tan^{-1} \left( \frac{T_x}{T_y} \right) = \tan^{-1} \left( \frac{28}{50} \right) = 29^\circ .$$