

Unit 4 Exam A

7b)

The most straightforward solution is to find the force of tension F_T by first finding the vertical component F_{Ty} :

$$F_{Ty} = mg = 0.15 \cdot 9.8 = 1.47 \text{ N}$$

$$F_T = \frac{F_{Ty}}{\sin\theta} = 1.47 \frac{0.5}{0.3} = 2.45 \text{ N}$$

A more roundabout solution can be found by first finding the horizontal component F_{Tx} using the centripetal force equation, and substituting the formula $v^2 = rg \tan(\theta)$ (which was provided at the top of the page):

$$F_{Tx} = F_c = \frac{mv^2}{r}$$

$$v^2 = rg \tan(\theta) = 0.4(9.8) \frac{0.4}{0.3} = 5.23$$

$$F_{Tx} = \frac{mv^2}{r} = \frac{0.15 \cdot 5.23}{0.4} = 1.96$$

$$F_T = \frac{F_{Tx}}{\cos\theta} = 1.96 \frac{0.5}{0.4} = 2.45 \text{ N}$$

Eli went this route, and his solution was correct except that he didn't do the last step of multiplying his answer by $\frac{5}{4}$ to get the full magnitude of F_T .

7c)

Eli's solution here is correct, though he reused some of the work he did in part (b) where he calculated v^2 to be 5.23, so this may have made it less clear to the grader where his answer came from.

$$v^2 = rg \tan(\theta) = 0.4(9.8) \frac{0.4}{0.3} = 5.23$$

$$v = \sqrt{5.23} = 2.29 \text{ m/s}$$