P #43

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a) $r = .800\,m$

$$v_t = \frac{2 \cdot \pi \cdot r \cdot \#rev}{t} = \frac{2 \cdot \pi \cdot (.800\,m) \cdot .5\,rev}{1\,sec}$$

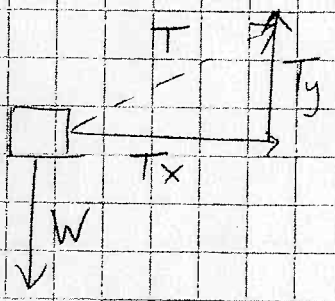
$$\boxed{v_t = 2.51\,m/s}$$

b) $r = .800\,m$
$v_t = 2.51\,m/s$

$$a_c = \frac{v^2}{r} = \frac{(2.15\,m/s)^2}{(.800\,m)}$$

$$\boxed{a_c = 7.90\,m/s^2}$$

c)



$$T_y = W = m \cdot g$$
$$= (5.00\,kg)(9.8\,m/s^2)$$
$$T_y = 49\,N$$

$$T^2 = T_x^2 + T_y^2$$
$$(100\,N)^2 = T_x^2 + (49\,N)^2$$

$$T_x = 87.1\,N = F_c$$

F_c cannot be more than T_x, so $F_c = 87.1\,N$
$r = .800\,m$
$m = 5.00\,kg$

$$F_c = \frac{m \cdot v^2}{r}$$

$$(87.1\,N) = \frac{(5\,kg) \cdot v_t^2}{(.800\,m)}$$

$$\boxed{v_t = 3.73\,m/s}$$