Phys 101 – Sec # 3 **Quiz # 4 (Ch. 5 & 6)**

Key

Name: **ID #**

1- Pulled by the 8.0-N block shown in the figure, the 20-N block slides to the right at **a constant speed**. Find μ_k between the block and the table. Assume the pulley to be massless and frictionless.

- constant speed $\Rightarrow$ $a = 0$

apply Newton's 2nd law

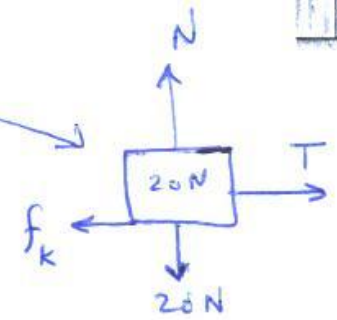
$\Sigma F_{net_x} = m a_x$

$T - f_k = 0$

$T - \mu_k N = 0$

$8 - \mu_k (20) = 0$

$\Rightarrow \quad \mu_k = \frac{8}{20} = \boxed{0.4}$



$N - 20N = 0$

$\Rightarrow \boxed{N = 20\ N}$

$\Sigma F_y = ma_y$

$T - 8 = 0$

$\boxed{T = 8\ N}$

2- A string can tolerate a tension of 5 N only. A stone of mass 3 kg is attached to one end of this string, while the other end is fixed. **Is it possible** to rotate the stone in a horizontal circle of radius 3 m with constant speed of 3 m/s using this string? (Show all steps).

Let us calculate the required force to make the stone rotating as described:-

$$F = m\frac{v^2}{r} = \cancel{3}\ \frac{3^2}{\cancel{3}} = \boxed{9\ N}$$

But this force is greater than what the string can tolerate.

$\Rightarrow$ the string will break.

$\Rightarrow$ we can not acheive the described circular motion using this string.