SUVA SANGAM COLLEGE

## YEAR 13

PHYSICS

WORKSHEET 3

Strand 1 P13.1	Mechanics
Sub-Strand P 13.1.3	Kinematics of Linear Dynamics
Content Learning Outcome P13.1.3.1	Application of Newton's second law to appreciate the concept of linear dynamics
Reference from Text	Pg 13 to 17

Questions

| No.	**CONCEPT IN BRIEF**: Force of friction $f_k = \mu_k \times F_N$. For mass on a flat surface $F_N = mg$. Take $g = 9.8\, m/s^2$.
1.	A carpenter is pulling a box of 80 kg with a force of 540 N on a horizontal surface. The coefficient of kinetic friction between the surface and box is 0.42. Calculate the: (a) normal force acting on the box. (b) frictional force exerted by the surface on the box. (c) acceleration of the box.
	CONCEPT IN BRIEF: Force of friction $f_k = \mu_k \times F_N$. For mass on an inclined surface $F_N = mg \cos\theta$, $F_s = mg \sin\theta$ Take $g = 9.8\, m/s^2$.
2.	A two mass system is connected over a light frictionless pulley. The coefficient of kinetic friction is 0.12.
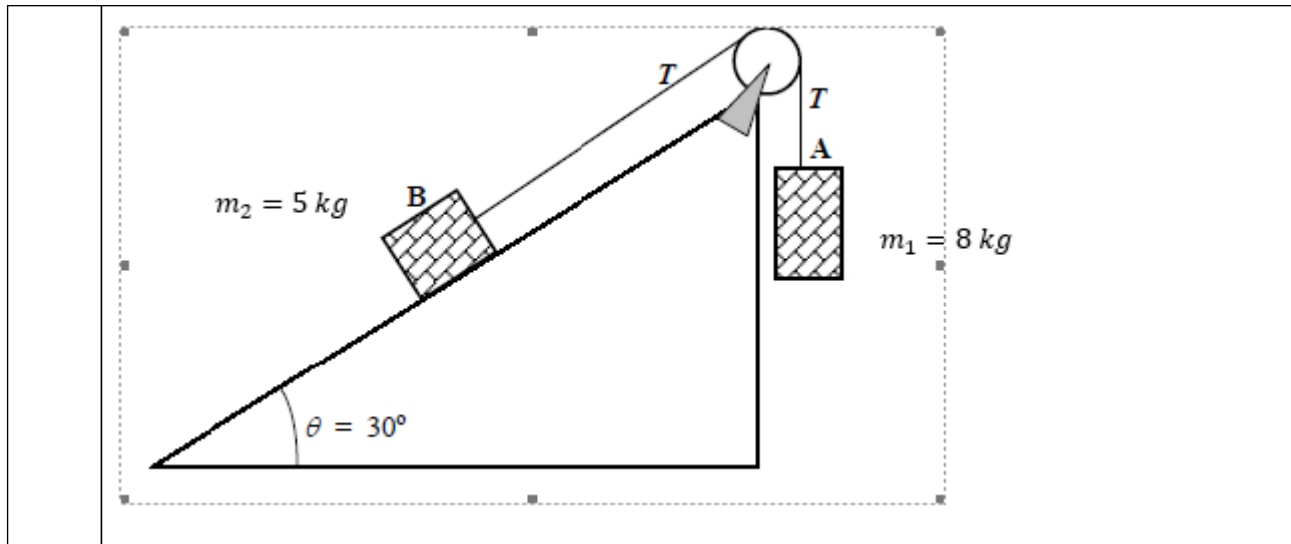
Calculate the:
(a) frictional force on mass B.
(b) net force.
(c) acceleration of the system.
(d) tension in the string.

CONCEPT IN BRIEF:

Free-body diagram for mass m_1

$m_1 g \downarrow \uparrow N$ $\mu N = \mu m_1 g$ T

m_1

friction

Free-body diagram for mass m_2

T

m_2

a

$m_2 g$

Down is chosen as positive.

| 3. | Two masses 7 kg and 5 kg are suspended over a frictionless pulley as shown below. The coefficient of kinetic friction,μ_k, between 5 and the bench is 0.23. |

5 kg

Smooth pulley

T

A

$\mu_k = 0.23$

B

7 kg
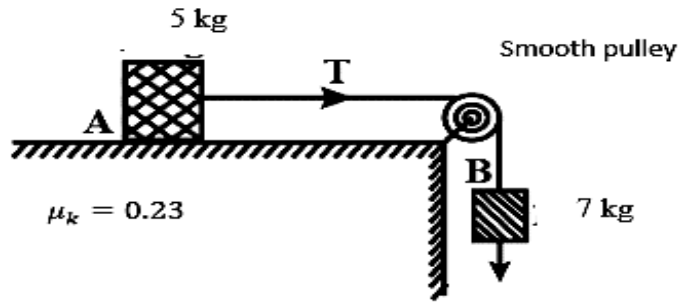
Calculate the:
(a) frictional force.
(b) net force.
(c) acceleration of the system.
(d) tension in the string.