

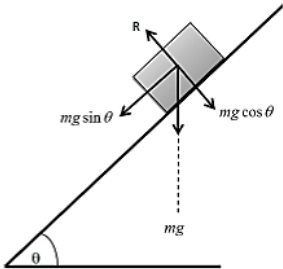
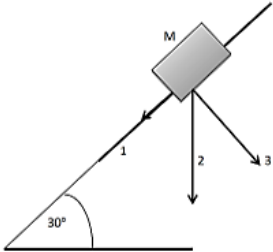
SUVA SANGAM COLLEGE

YEAR 12

PHYSICS

WORKSHEET 8

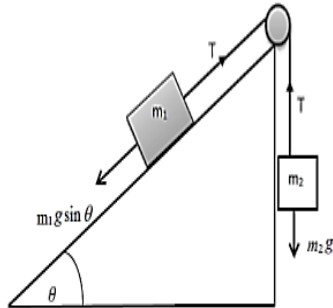
STRAND 1 MECHANICS

NO.	<p>CONCEPT IN BRIEF: FORCES</p> <p>FORCES IN TWO DIMENSION</p> <p>I. Acceleration down slopes</p>  <p>The acceleration “a” of the block down the slope is due to the component of weight force parallel to the surface. This is called sliding force and is given by:</p> $ma = mg \sin \theta$ <p>Thus, $a = g \sin \theta$</p> <p>Types of Forces</p> <pre>graph TD A[Types of Forces] --> B[Sliding] A --> C[Normal] A --> D[Gravity] B --> E[Fs] E --> F[Fs = mg sin theta] C --> G[Fn] G --> H[Fn = mg cos theta] D --> I[Fg] I --> J[Fg = mg]</pre>
1	<p>The diagram shows a mass M on an inclined plane with three arrows drawn to represent the weight and its components</p>  <p>(i) Which of the arrows shows the component of the weight that determines the friction between the mass M and the inclined surface?</p> <p>(ii) If M = 4kg and friction is negligible, calculate the acceleration of the mass.</p>

CONCEPT IN BRIEF: FORCES

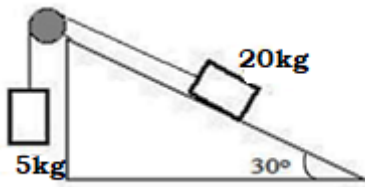
II. Slopes and pulleys

CASE 1: If $m_1 g \sin \theta > m_2 g$



For m_1	
• Tension (T)	$m_1 a = m_1 g \sin \theta - T$ $T = m_1 g \sin \theta - m_1 a$
For m_2	
• Tension (T)	$m_2 a = T - m_2 g$ $T = m_2 a + m_2 g$

2 A 20.0 kg mass is accelerated from rest along the 4.0 m long ramp pulling a 5.0kg mass suspended over a frictionless pulley. The ramp is inclined 30° ramp from the horizontal.



- (a) Determine the acceleration of the 20.0 kg mass along the ramp.
- (b) Determine the tension in the rope during the acceleration on the 5.0 kg mass.

CONCEPT IN BRIEF: FORCES

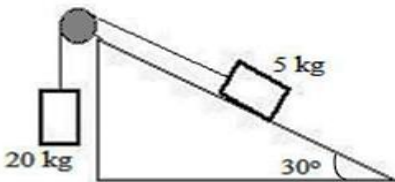
CASE 2: If $m_2 g > m_1 g \sin \theta$

- m_1 will slide up the slope while m_2 will move downwards. Each will have acceleration a .

$$a = \frac{m_2 g - m_1 g \sin \theta}{m_1 + m_2}$$

For m_1	
• Tension (T)	$m_1 a = T - m_1 g \sin \theta$ $T = m_1 g \sin \theta + m_1 a$
For m_2	
• Tension (T)	$m_2 a = m_2 g - T$ $T = m_2 g - m_2 a$

3 A 5.0 kg mass is accelerated from rest at the bottom of the 4.0 m long ramp by a falling 20.0kg mass suspended over a frictionless pulley. The ramp is inclined 30° ramp from the horizontal.



- (a) Determine the acceleration of the 5.0 kg mass along the ramp.
- (b) Determine the tension in the rope during the acceleration on the 5.0 kg mass along the ramp.