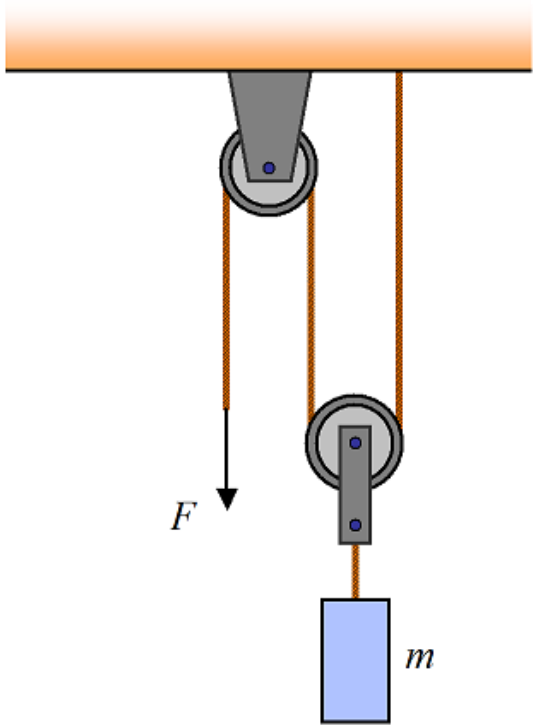
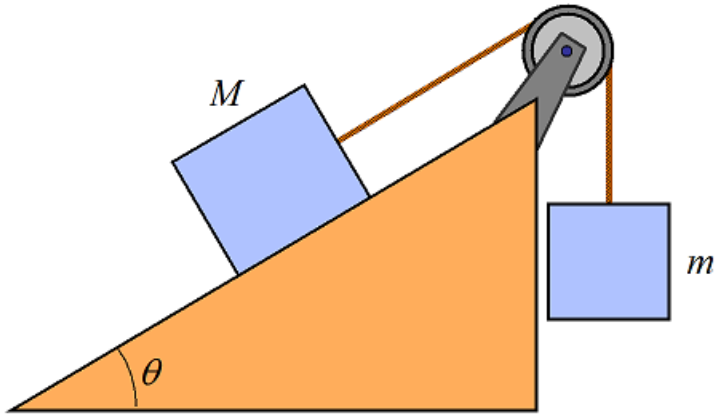
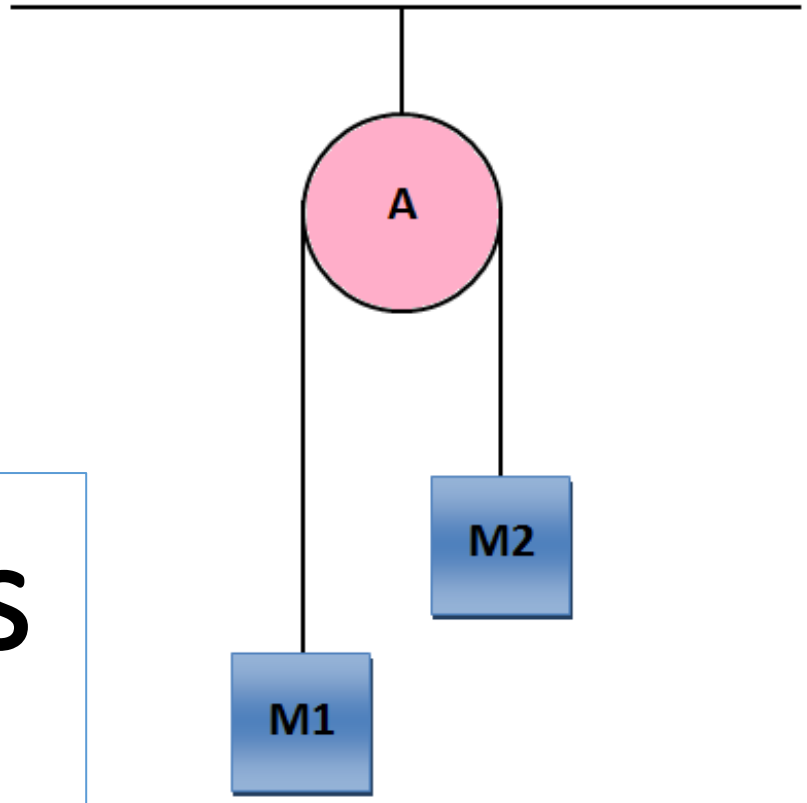
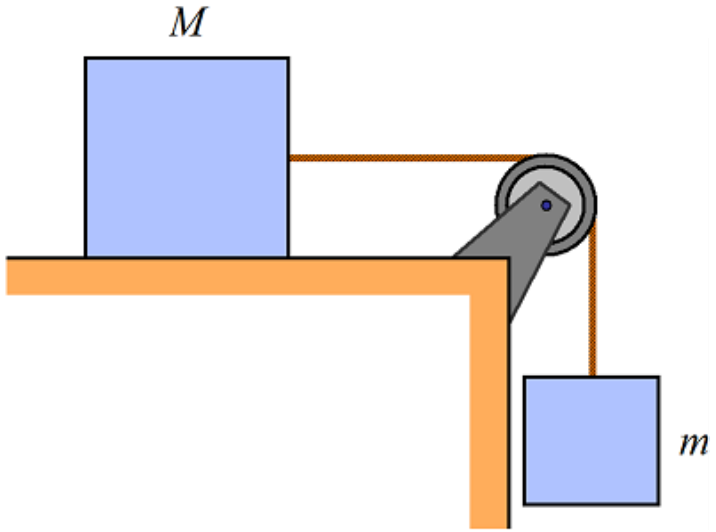


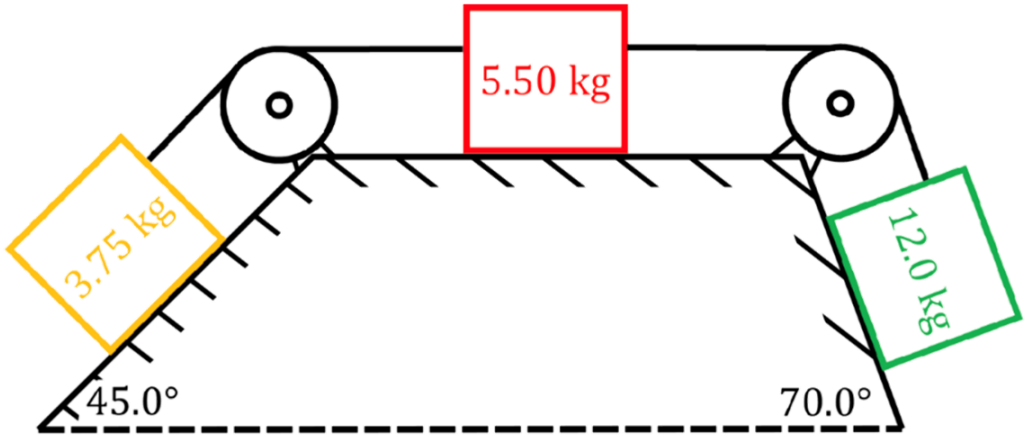


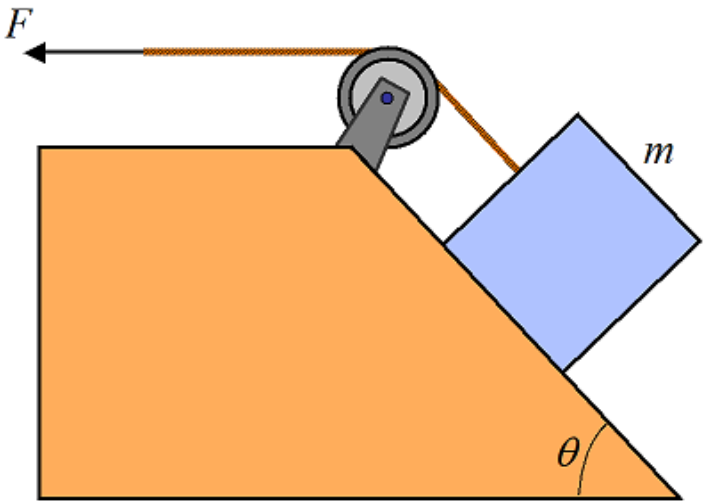
Pully Questions

Content in progress



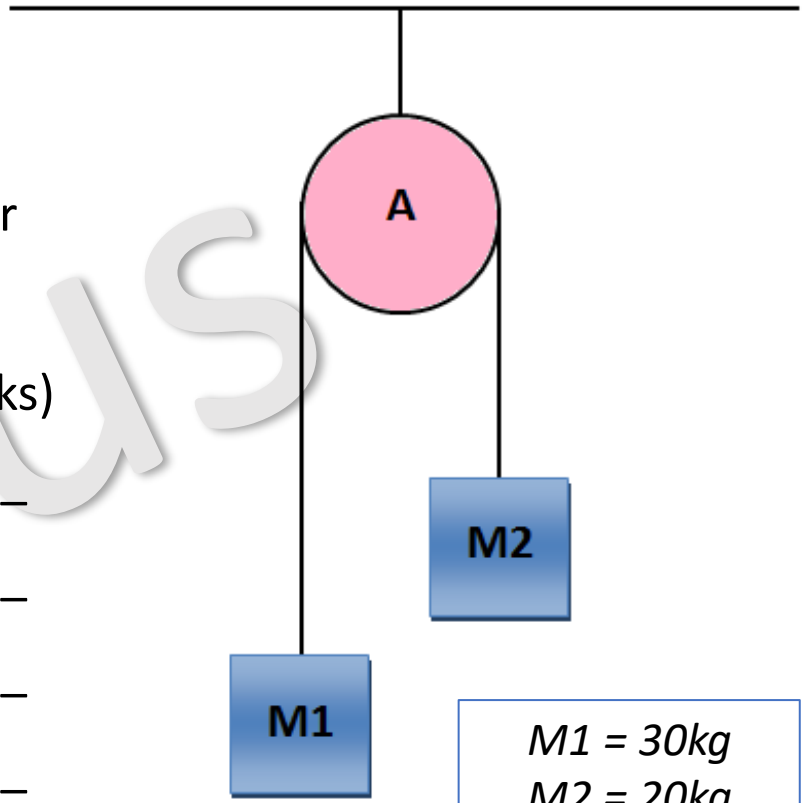






Pulley Question – Vertical masses

Two masses, m_1 (30kg) and m_2 (20kg) are connected by a rope over a frictionless pulley of negligible mass. The masses are released from rest. Air resistance is negligible.



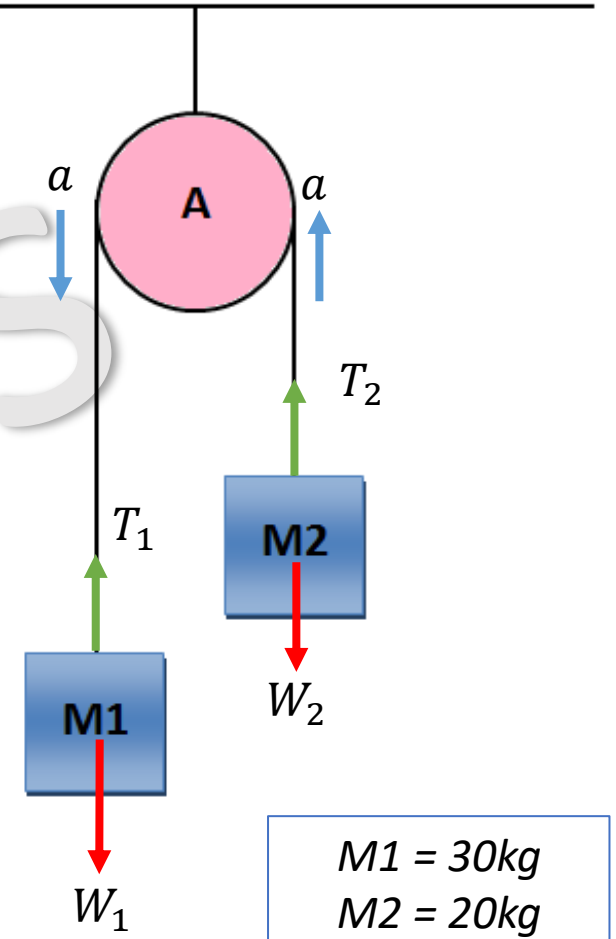
M1 = 30kg
M2 = 20kg
g = 9.8m/s
Ignore friction

a) Calculate the acceleration of the masses once they are released. (2 marks)

b) Calculate the tension in the rope. (2 marks)

SOLUTION: Pulley Question – Vertical masses

Two masses, m_1 (30kg) and m_2 (20kg) are connected by a rope over a frictionless pulley of negligible mass. The masses are released from rest. Air resistance is negligible.



M1 = 30kg
M2 = 20kg
g = 9.8m/s²
Ignore friction

a) Calculate the acceleration of the masses once they are released. (2 marks)

$$\sum F = ma$$

$$W_1 - W_2 - T_1 + T_2 = (m_1 + m_2)a$$

Note: $T_1 = T_2$ as tension is uniform in rope.

$$m_1 g - m_2 g = (m_1 + m_2)a$$

$$g(m_1 - m_2) = (m_1 + m_2)a$$

$$\therefore a = g\left(\frac{m_1 - m_2}{m_1 + m_2}\right)$$

Note: The above simplified expression may be useful for similar questions.

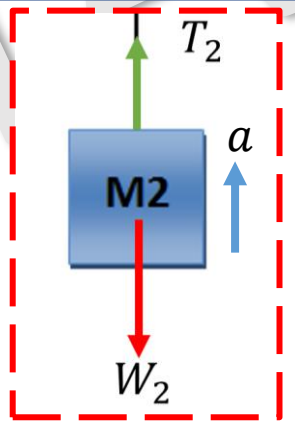
$$a = 9.8\left(\frac{30-20}{30+20}\right) = 1.96$$

$$\boxed{\therefore a = 2.0\ m/s^2}$$ (in the direction of W_1)

b) Calculate the tension in the rope. (2 marks)

Isolate the system at M_1

"Pretend to cut the rope"



$$\sum F = ma$$

$$W_2 - T_2 = m_2(-a)$$

$$(20)(9.8) - T_2 = (20)(-1.96)$$

$$T_2 = 235.2$$

$$\boxed{\therefore T_2 = 240\text{N}}$$