Question 25

A light inextensible string passes over a smooth pulley, with particles of masses m_1 and m_2 kg, attached to each end of the string as shown in the diagram.
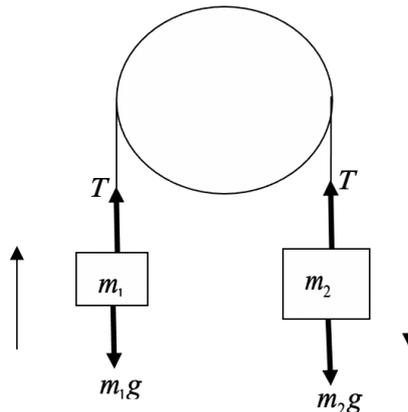
Which of the following is **false?**

A.   If $m_2 = 2m_1$ the mass m_2 moves downwards with an acceleration $\frac{g}{2}$ ms^{-2}.

B.   If $m_1 = m_2 = m$ the tension in the string is equal to mg newtons.

C.   If $m_1 = m_2$ both masses remain at rest.

D.   If $m_2 > m_1$ the mass m_2 moves downwards with an acceleration $\frac{(m_2 - m_1)g}{m_1 + m_2}$ ms^{-2}.

E.   If $m_1 \neq m_2$ the tension in the string is equal to $\frac{2m_1m_2}{m_1 + m_2}$ kg-wt.

ANSWER A

If $m_2 > m_1$ the mass m_2 moves downwards, resolving downwards, $(1) \qquad m_2g - T = m_2a$ The mass m_1 moves upwards, resolving upwards, $(2) \qquad T - m_1g = m_1a$ Solving for a and T gives	$a = \frac{(m_2 - m_1)g}{m_1 + m_2}$ and $T = \frac{2m_1m_2g}{m_1 + m_2}$ So that **D.** and **E.** are both true. **B.** and **C.** are also true. **If** $m_2 = 2m_1$ **then** $a = \frac{(2m_1 - m_1)g}{m_1 + 2m_1} = \frac{g}{3}$ **A.** is false.