Single Body Analysis #2

Var	Given value	Units	Description
g	10	$\frac{m}{s^2}$	Acceleration due to gravity
m_1	3	kg	Mass 1
m_2	5	kg	Mass 2
m_3	1	kg	Masss 3
a		$\frac{m}{s^2}$	Acceleration
T_1		N	Tension 1
T_2		N	Tension 2

$$m_1 g - T_1 = m_1 a$$

$$T_1 - T_2 = m_2 a$$

$$T_2 = m_3 a$$

$$m_1 g = m_1 a + m_2 a + m_3 a$$

$$m_1 g = (m_1 + m_2 + m_3) a$$

$$\frac{m_1 g}{m_1 + m_2 + m_3} = a$$

Single Body Analysis #2 (continued)

$$a = \frac{m_1 g}{m_1 + m_2 + m_3}$$

$$= \frac{(3\,\text{kg})\left(10\,\frac{\text{m}}{\text{s}^2}\right)}{(3\,\text{kg}) + (5\,\text{kg}) + (1\,\text{kg})}$$

$$= \boxed{3.333333333\,\frac{\text{m}}{\text{s}^2}}$$ ✓

$$T_2 = m_3 a$$

$$= (1\,\text{kg})\left(3.333333333\,\frac{\text{m}}{\text{s}^2}\right)$$

$$= \boxed{3.333333333\,\text{N}}$$ ✓

Single Body Analysis #2 (continued)

$$T_1 - T_2 = m_2 a$$

$$T_1 = m_2 a + T_2$$

$$= (5\,\text{kg})\left(3.333333333\,\frac{\text{m}}{\text{s}^2}\right) + (3.333333333\,\text{N})$$

$$= \boxed{20.00000000\,\text{N}}$$ ✓

$$m_1 g - T_1 = m_1 a$$

$$m_1 g = m_1 a + T_1$$

$$m_1 g - m_1 a = T_1$$

$$T_1 = m_1 g - m_1 a$$

$$T_1 = 3\,kg * 10\,\frac{m}{s^2} - 3\,kg * 3.33\,\frac{m}{s^2}$$

$$\boxed{T_1 = 20\,N}$$