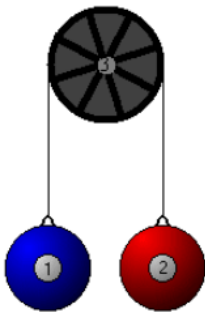


Multiple Masses and Finding Net Force

Chapter 10.2 of MHR:

Read Pg 478 - 489

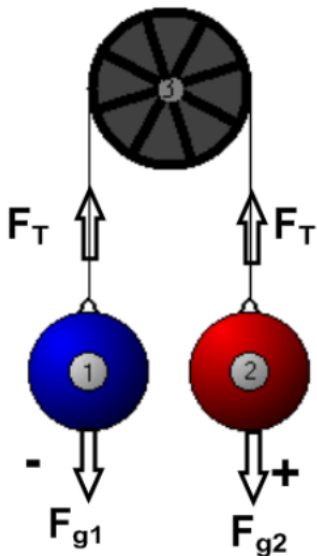
Problems Pg 485 #s 19 - 22, Pg 488 #s 24 - 28



This is an example of a system where there are multiple masses, the Atwood machine.

We will apply the concept of forces to determine the resulting acceleration.

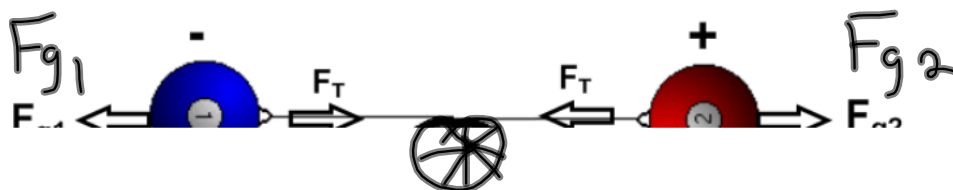
Define the Direction of Forces



Our problems will not include friction and the pulley will be massless.

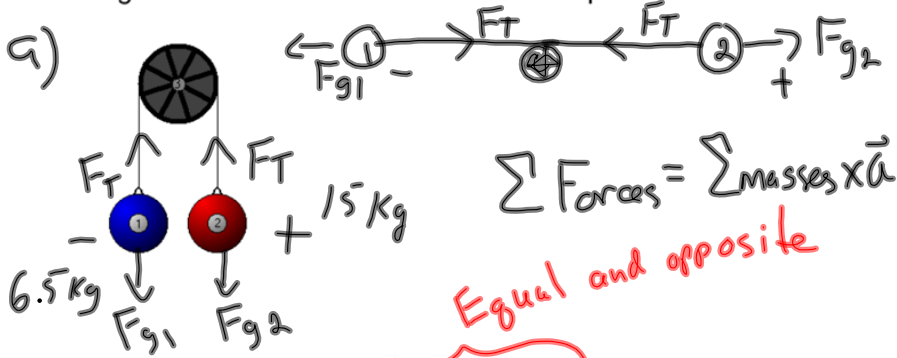
You may find it easier to picture, or draw, the system horizontally.

$$\sum \text{Forces} = \sum \text{masses} \times \vec{a}$$



Atwood Machine Examples

What is the acceleration of an Atwood machine with masses of 6.5 kg and 15 kg on opposite sides of the pulley? What is the magnitude of the force of tension in the rope?



Equal and opposite

$$F_{g1} + F_{g2} + \cancel{F_T} + \cancel{F_T} = (m_1 + m_2)a$$

$$F_{g1} + \bar{F}_{g2} = (m_1 + m_2)a$$

$$-m_1g + m_2g = (m_1 + m_2)a$$

$$-(6.5)(9.81) + (15)(9.81) = (6.5 + 15)a$$

$$-63.75 + 147.15 = 21.5a$$

$$83.4 = 21.5a$$

$$\boxed{3.9 \text{ m/s}^2 = a}$$

b) Choose one mass to analyze
 Say $m_2 \leftarrow$ Newton's 2nd Law
 with m_2

$$\Sigma \text{ Forces on } m_2 = m_2 \times \vec{a}$$

$$F_{g2} + \bar{F}_T = m_2 a$$

$$147.15 + \bar{F}_T = (15)(3.9)$$

$$F_T = 58.5 - 147.15$$

$$\boxed{= -89 \text{ N}}$$