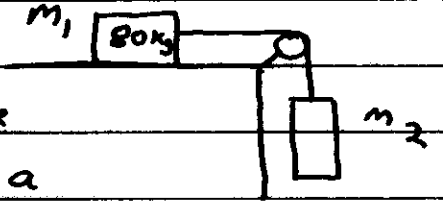
20080306-1627 Answer



Determine the mass m_2 needed to accelerate an 80.00 kg object at a rate of acceleration of 11.00 m/s^2 on a flat frictionless horizontal surface on Earth.

Solution:

1ST Find F to acc 80kg at 11 m/s^2 using $F = ma$

$$F = (80\,kg)(11\,m/s^2) = 880\,N$$

2nd The needed force must come from $m_2 g$

3rd All the mass must be accelerated at the ~~same~~ same rate. Find total mass

$$m_{TOTAL} = 80\,kg + m_2$$

4Th $F_{TOTAL} = (mass_{TOTAL})(acc)$

$$m_2 g = (80kg + m_2)(11\,m/s^2)$$

$$(9.8\,m/s^2)m_2 = 880N + (11\,m/s^2)m_2$$

$$(9.8\,m/s^2)m_2 - (11\,m/s^2)m_2 = 880N$$

$$(-1.2\,m/s^2)m_2 = 880N$$

$$m_2 = (800N)/-1.2\,m/s^2$$

$$\boxed{m_2 = -733\,1/3\,kg}$$

What is wrong here? Why did we get a negative mass? Think! This could only happen on a planet where the acc. due to gravity is greater than 11 m/s^2. On Earth the acc. due to gravity is too small.