



Honors Physics

L0524R : Rubric for Newtonian Solution
rev. 2005 1130

Step 1	Draw FDBs: <u>separate</u> diagrams showing all forces acting on each object by itself. We assume $m_1 > m_2$.	
Step 2	Find expressions for the net forces.	$F_{NET,1} = F_T - F_{g1}$ $F_{NET,2} = F_T - F_{g2}$
Step 3	Find expressions for the accelerations	$a_1 = -a_0$ $a_2 = +a_0$
Step 4	Write Newton II	$F_{NET,1} = m_1 a_1$ $F_{NET,2} = m_2 a_2$
Step 5	Substitute	$(F_T - F_{g1}) = m_1 (-a_0)$ $(F_T - F_{g2}) = m_2 (+a_0)$
Step 6	Solve.	$F_T = F_{g1} - m_1 a_0$ $\Rightarrow (F_{g1} - m_1 a_0) - m_2 g = m_1 a_0$
		$\Rightarrow F_{g1} - m_1 a_0 + m_1 a_0 - F_{g2} = m_2 a_0 + m_1 a_0$ $\Rightarrow F_{g1} - F_{g2} = m_1 a_0 + m_2 a_0 = (m_1 + m_2) a_0$ $\Rightarrow a_0 = \frac{F_{g1} - F_{g2}}{m_1 + m_2} = \frac{m_1 g - m_2 g}{m_1 + m_2} = \left(\frac{m_1 - m_2}{m_1 + m_2} \right) g$

step #1	A	FBDs are separate (not connected by a line or string)	1
	B	tensions point the correct way (up for both)	1
	C	weights have different subscripts	1
step #2	D	relative sign in first net force	1
	E	relative sign in second net force	1
step #3	F	correct sign for acceleration of light mass	1
	G	correct sign for acceleration of heavy mass	1
step #5	H	same acceleration and tension for both masses	1
step #6	J	correct solution	1
	K	handed in on time	1