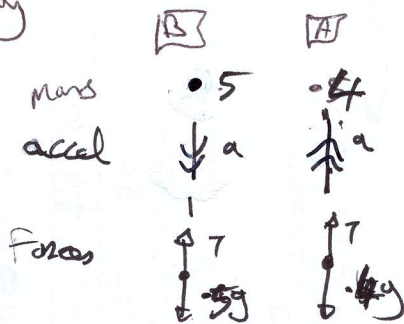


1995: Q4: critically

(i)



$$\begin{aligned} \text{NII: } & -0.4g + T = 0.4a & [5] \\ & 0.5g - T = 0.5a & [5] \\ \hline & 0.1g = 0.9a & [5] \\ & \boxed{\frac{g}{9} = a} & [5] \end{aligned}$$

(ii) velocity of A before it picks up mass C

$$v = u + at \Rightarrow v = 0 + \frac{g}{9}(1) = \frac{g}{9} \quad [5]$$

(iii) Velocity of A after 'picks up' (collides) with C (call this w)
 [Total of momentum] before = Total momentum of system after

$$\begin{aligned} 0.4\left(\frac{g}{9}\right) + 0.5\left(\frac{g}{9}\right) &= 0.6w + 0.5w & [5] \\ 0.9\left(\frac{g}{9}\right) &= 1.1w \\ \boxed{\frac{g}{11} = w} & & [5] \end{aligned}$$

Write must consider momentum of B as well as A before and after the pickup as A, B moving with common accel as one system and will move at new velocity, w, immediately after pickup.

(iv) To find the distance the 0.6 kg travels from C before coming to rest: First calculate new f.

mass:	• 6	• 5	
accel:	↑ f	↓ f	Assume
forces:	$\uparrow T'$ $\downarrow 0.6g$	$\uparrow T'$ $\downarrow 0.5g$	

$$\begin{aligned} \text{NII: } & T' - 0.6g = 0.6f \text{ and } 0.5g - T' = 0.5f & [5] \\ \text{Add} & -0.1g = 0.1f \\ & \boxed{-\frac{g}{11} = f} \text{ down} & [5] \end{aligned}$$

$$\begin{aligned} \text{Find } & \left. \begin{aligned} u = w = \frac{g}{11} \uparrow \\ v = 0 \\ a = -\frac{g}{11} \text{ down} \\ s = ? \end{aligned} \right\} & \begin{aligned} v^2 &= u^2 + 2fs \\ 0 &= \left(\frac{g}{11}\right)^2 + 2\left(-\frac{g}{11}\right)s \\ \frac{g^2}{121} &= \left(\frac{2g}{11}\right)s \\ \frac{g}{22} &= s \\ 0.45m &= s \\ \text{from C.} & & [5] \end{aligned} \end{aligned}$$