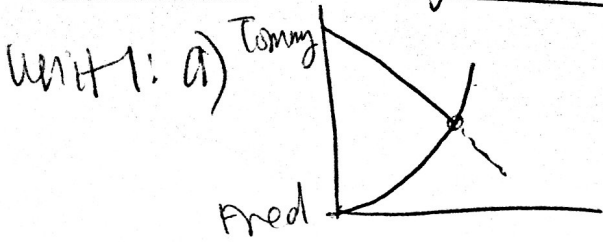


# SHORT ANSWER KEY FROM PAPER 5



b) Tommy:  $x_f = x_i + v_{ix} \Delta t + \frac{1}{2} a_x \Delta t^2$   
 $x_f = 60 \text{ ft} - 15 \text{ ft/s} \Delta t$   
 Fred:  $x_f = x_i + v_{ix} \Delta t + \frac{1}{2} a_x \Delta t^2$   
 $= 0 + 0 + \frac{1}{2} (6 \text{ ft/s}^2) (\Delta t^2)$

← set equal

$60 \text{ ft} - 15 \text{ ft/s} \Delta t = \frac{1}{2} (6 \text{ ft/s}^2) (\Delta t^2)$  solutions:  $-7.62 \text{ s}$ ,  $\boxed{2.62 \text{ s}}$

c)  $x_f = \frac{1}{2} (6 \text{ ft/s}^2) (2.62)^2 = \boxed{20.6 \text{ ft} = 6.9 \text{ yds}}$

Unit 2: a)  $v_{fy}^2 - v_{iy}^2 = 2a_y \Delta y$

$v_{iy} = 31.4 \text{ m/s} \sin 50 = 24.05 \text{ m/s}$

$0 - 24.05^2 = 2(-9.8 \text{ m/s}^2) \Delta y$

$v_{ix} = 31.4 \cos 50 = 20.19 \text{ m/s}$

$\Delta y = \boxed{29.5 \text{ m}}$

b)  $\Delta t = \frac{\Delta y}{v_{iy}} = \frac{29.5 \text{ m}}{24.05 \text{ m/s}} = \boxed{4.68 \text{ s}}$

c)  $v_{fy} = v_{iy} + a_y \Delta t = 24.05 \text{ m/s} - (9.8 \text{ m/s}^2)(4.68 \text{ s})$   
 $= -14.5 \text{ m/s}$

$v_x = 20.19 \text{ m/s}$

$v_{\text{tot}} = \sqrt{(-14.5)^2 + (20.19)^2} =$

$\boxed{24.9 \text{ m/s}}$

Unit 3:  $a_{3 \text{ kg}} = \frac{\sum F_{\text{ext}}}{m_{3 \text{ kg}}} = \frac{F_{6 \text{ kg}} - F_{3 \text{ kg}} - F_{12 \text{ kg}}}{2 \text{ kg}} = 0.392 \text{ m/s}^2$

b)  $\sum F_{3 \text{ kg}} = F_{TL} - F_G = m a_{3 \text{ kg}} \leftarrow +0.392 \text{ m/s}^2$

$\boxed{F_{TL} = 30.6 \text{ N}}$

$\sum F_{6 \text{ kg}} = F_{TR} - F_G = m a_{6 \text{ kg}}$

$a = 0.392 \text{ m/s}^2$

$\boxed{F_{TR} = 47.0 \text{ N}}$