



PHYSICS TEACHER'S GUIDE: SOLUTIONS TO PROBLEMS (Page Two of Two)

3. $W_T = 50 \times 80 \text{ tons} + 20 \times 30 \text{ tons} + 3 \times 200 \text{ tons} = 5200 \text{ tons}$
 $d = 70 \times W_T \times V^2 / F_b$
 $d = 70 \times 5200 \text{ tons} \times (60 \text{ mph})^2 / 70 \text{ cars} \times 10,200 \text{ lbs} = 1836 \text{ ft}$
Distance before brakes apply = $18 \text{ sec} \times 88 \text{ ft/sec} = 1584 \text{ ft}$
Total distance = $1836 \text{ ft} + 1584 \text{ ft} = 3420 \text{ ft}$

4. $(v_f - v_i)^2 = 2 a \times d \quad (182.5 - 0 \text{ ft/sec})^2 = 2 a \times 5500 \text{ ft}$
 $a = -3.0 \text{ ft/sec}^2$

5. $m_1 v_1 + m_2 v_2 = m_{1A} v_{1A} + m_{2A} v_{2A}$
 $30 \text{ tons} \times 2 \text{ ft/sec} + 55 \text{ tons} \times 0 = 30 \text{ tons} \times v_{1A} + 55 \text{ tons} \times 1.2 \text{ ft/sec}$
 $60 \text{ tons ft/sec} - 66 \text{ tons ft/sec} = 30 \text{ tons} \times v_{1A}$
 $- 6 \text{ tons ft/sec} = 30 \text{ tons} \times v_{1A}$
 $- 0.2 \text{ ft/sec} = v_{1A}$