

Velocity and Acceleration Problems

1) $V_0 = 32 \text{ m/s}$
 $V_f = 96 \text{ m/s}$
 $t = 8.0 \text{ s}$
 $a = \frac{V_f - V_0}{t} = \frac{96 - 32}{8} = 8 \text{ m/s}^2$

2) $V_0 = 0 \text{ m/s (at rest)}$
 $V_f = 444 \text{ m/s}$
 $t = 1.8 \text{ s}$
 $a = \frac{V_f - V_0}{t} = \frac{444}{1.8} = 246.7 \text{ m/s}^2$

3) $V_0 = 22 \text{ m/s}$
 $a = 1.6 \text{ m/s}^2$
 $t = 6.8 \text{ s}$
 $V_f = \frac{V_f - V_0}{t} \Rightarrow V_0 + at = V_f$
 $22 + 1.6 \cdot 6.8 = V_f$
 $V_f = 32.9 \text{ m/s}$

4) $V_0 = 145 \text{ m/s}$
 $a = 23.1 \text{ m/s}^2$
 $t = 20 \text{ s}$
 $V_f = \frac{V_f - V_0}{t} \Rightarrow V_0 + at = V_f$
 $145 + 23.1 \cdot 20 = V_f$
 $V_f = 607 \text{ m/s}$

6) $t = 15 \text{ s}$ have to find a before Δx
 $V_0 = 145 \text{ m/s}$
 $V_f = 75 \text{ m/s}$
 $a = -4.33 \text{ m/s}^2$
 $\Delta x = \frac{V_0 t + \frac{1}{2} a t^2}{2}$
 $\Delta x = \frac{145 \cdot 15 + \frac{1}{2} (-4.33) 15^2}{2}$
 $\Delta x = 1687.9 \text{ m}$

5) comparing to speed of sound $\frac{607}{331} = 1.8$ times the speed of sound

7) $a = -9.8 \text{ m/s}^2$ (gravity)
 $V_0 = 0 \text{ m/s}$
 $t = 8.0 \text{ s}$
 $\Delta x = \frac{1}{2} (-9.8) 8^2 = -313.6 \text{ m}$
 means downward

7a) $a = -9.8 \text{ m/s}^2$
 $V_0 = 0 \text{ m/s}$
 $t = 8.0 \text{ s}$
 $a = \frac{V_f - V_0}{t} \Rightarrow V_f = V_0 + at$
 $V_f = 0 + (-9.8) \cdot 8$
 $V_f = -78.4 \text{ m/s}$