

Velocity and Acceleration Calculations

① $\text{speed} = \frac{\text{distance}}{\text{time}} = \frac{9000 \text{ mi}}{12.12 \text{ s}} = \boxed{742.6 \frac{\text{mi}}{\text{s}}}$

$742.6 \frac{\text{mi}}{\text{s}} \left(\frac{60 \text{ s}}{1 \text{ min}} \right) \left(\frac{60 \text{ min}}{\text{h}} \right) = \boxed{2.67 \times 10^6 \text{ mph}}$

② $\text{speed} = \frac{528 \text{ m}}{4 \text{ s}} = \boxed{132 \text{ m/s}}$

③ Given $v_0 = 96 \text{ m/s}$ and $t = 17 \text{ s}$ (object moving at constant v)
Unknown Δx

Equation $\Delta x = v \Delta t$

Substitute $\Delta x = (96 \text{ m/s})(17 \text{ s})$

Solve $\boxed{\Delta x = 1632 \text{ m}}$

④ Given $v = 700 \text{ m/s}$ $\Delta x = 500,000$ (object at constant v)
Unknown t

Equation $\Delta x = v \Delta t$

$$t = \frac{\Delta x}{v}$$

Substitute $t = \frac{500,000 \text{ m}}{700 \text{ m/s}}$

Solve $\boxed{t = 714.3 \text{ s}}$

⑤ $\Delta x = v \Delta t$
 $\Delta t = \frac{\Delta x}{v} = \frac{35 \text{ km}}{80 \text{ km/hr}} = \boxed{0.44 \text{ hr}}$

⑥ $\Delta x = v \Delta t$
 $\Delta t = \frac{\Delta x}{v} = \frac{450 \text{ km} \left(\frac{1000 \text{ m}}{1 \text{ km}} \right)}{120 \text{ m/s}} = \boxed{3750 \text{ s}}$

$$\textcircled{7} \quad \Delta x = v \Delta t$$
$$v = \frac{\Delta x}{\Delta t} = \frac{1000 \text{ m}}{20 \text{ min}} \left(\frac{1 \text{ min}}{60 \text{ s}} \right) = \boxed{0.83 \text{ m/s}}$$

$$\textcircled{8} \quad \Delta x = v \Delta t = (6 \text{ m/s}) (3 \text{ min}) \left(\frac{60 \text{ s}}{1 \text{ min}} \right) = \boxed{1080 \text{ m}}$$

$$\textcircled{9} \quad \Delta v = a \Delta t$$
$$a = \frac{\Delta v}{\Delta t} = \frac{300 \text{ m/s} - 0 \text{ m/s}}{0.5 \text{ s}} = \boxed{600 \text{ m/s}^2}$$

$$\textcircled{10} \quad a = \frac{\Delta v}{\Delta t} = \frac{1.8 \text{ km/s} - 1 \text{ km/s}}{0.03 \text{ s}} = \boxed{26.7 \text{ km/s}^2}$$

$$\textcircled{12} \quad a = \frac{\Delta v}{\Delta t} = \frac{1700 \text{ m/s} - 0 \text{ m/s}}{25 \text{ s}} = \boxed{68 \text{ m/s}^2}$$