Intro to Motion Practice

$d = vt$

$v = \frac{d}{t}$

$t \quad \frac{d}{v}$

1. $t = 3\text{min } 59.4\text{s}$ $\quad \bar{v} = ?\ ^{mi}/_{hr} = ?\ ^{m}/_{s}$

$d = 1\text{ mi}$

$t \Rightarrow \frac{3\text{min}}{1\text{min}} \left| \frac{60\text{s}}{} \right. = 180\text{s} + 59.4\text{s} = \underline{239.4\text{s}}$

239s with sig figs

$1\text{mi} = 1609\text{m} \quad d = \underline{1609\text{m}}$

$t \Rightarrow \frac{239.4\text{s}}{3600\text{s}} \left| \frac{1\text{hr}}{} \right. = \underline{0.0665\text{hr}}$

$$\bar{v}\ (^{mi}/_{hr}) = \frac{d}{t} = \frac{1\text{ mi}}{0.0665\text{hr}} = \boxed{15.0\ ^{mi}/_{hr}}$$

$$\bar{v}\ (^{m}/_{s}) = \frac{d}{t} = \frac{1609\text{m}}{239\text{ s}} = \boxed{6.72\ ^{m}/_{s}}$$

---

2. $d = 200\text{m} \quad \bar{v} = 62.92\ ^{mi}/_{hr} \quad \bar{v}\ (^{m}/_{s}) = ? \quad t = ?$

$$\bar{v}\ (^{m}/_{s}) = \frac{62.92\text{mi}}{\text{hr}} \left| \frac{1609\text{m}}{1\text{ mi}} \right| \frac{1\text{hr}}{3600\text{s}} = \boxed{28.12\ ^{m}/_{s}}$$

$$t = \frac{d}{v} = \frac{200\text{m}}{28.12\ ^{m}/_{s}} \qquad \boxed{t = 7.112\text{s}}$$

---

3. $\bar{v}_1 = 60\ ^{km}/_{hr}$ $\quad t_1 = ?$ $\quad \bar{v}_2 = 20\ ^{km}/_{hr}$ $\quad t_2 = ?$

330 km | 330 km

$$\bar{v} = \frac{\text{total distance}}{\text{total time}} \qquad d_{total} = 660\text{km} \qquad t_{total} = t_1 + t_2$$

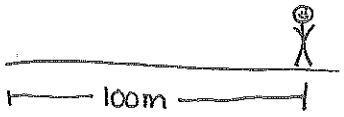
$$t_1 = \frac{d_1}{v_1} = \frac{330\text{ km}}{60\ ^{km}/_{hr}} = \underline{5.5\text{ hr}}$$

$$t_2 = \frac{d_2}{v_2} = \frac{330\text{ km}}{20\ ^{km}/_{hr}} = \underline{16.5\text{hr}}$$

$t_1 + t_2 = 22\text{ hr}$

$$\bar{v} = \frac{660\text{ km}}{22\text{ hr}} \qquad \boxed{\bar{v} = 30.\ ^{km}/_{hr}}$$

4. $\bar{v} = 34.3\ km/hr$



$t = ?$

$d = 100m$

$\bar{v} = 34.3\ km/hr$

$$\bar{v} = \frac{34.3\ km}{hr} \left| \frac{1000\ m}{1\ km} \right| \frac{1\ hr}{3600\ s} = 9.53\ m/s$$

$$t = \frac{d}{v} = \frac{100\ m}{9.53\ m/s}$$

$t = 10.5\ s$ with sig figs

$t = 10.49s$ ← Actual record