

# UNIFORM MOTION SOLUTIONS

1. GIVEN :

$$v = 2.5 \frac{m}{s}$$

$$t = 5.0 s$$

$$d = ?$$

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

$$d = vt$$

$$= (2.5)(5.0)$$

$$= 12.5 m \rightarrow 13 m$$

2. given:

$$v = 8.10 \frac{m}{s}$$

$$d = 100. m$$

$$t = ?$$

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

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

$$= \frac{100.}{8.10}$$

$$= 12.3 s$$

3. a)   $d = 1500 + 450$   
 $= 1950 m$

GIVEN:

$$d = 1950 m$$

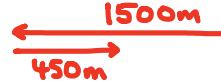
$$t = 1200 s$$

$$v = ?$$

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

$$= \frac{1950}{1200}$$

$$= 1.63 \frac{m}{s}$$

b)   $\vec{d} = 1500 - 450$   
 $= 1050 m$  WEST

GIVEN:

$$\vec{d} = 1050 m$$
 EAST

$$t = 1200$$

$$\vec{v} = ?$$

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

$$= \frac{1050}{1200}$$

$$= 0.88 \frac{m}{s}$$
 WEST

4. a) GIVEN:

$$v_1 = 8.0 \frac{m}{s}$$
$$t_1 = 30.0 \text{ min} = 1.80 \times 10^3 \text{ s}$$
$$d_1 = ?$$

$$30.0 \text{ min} \times \frac{60 \text{ s}}{\text{min}}$$

$$v_1 = \frac{d_1}{t_1}$$
$$d_1 = v_1 t_1$$
$$= (8.0)(1.80 \times 10^3)$$
$$= 14400 \text{ m}$$

GIVEN:

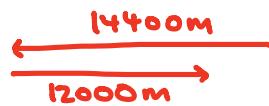
$$v_2 = 10.0 \frac{m}{s}$$
$$t_2 = 20.0 \text{ min} = 1.20 \times 10^3 \text{ s}$$
$$d_2 = ?$$

$$20.0 \text{ min} \times \frac{60 \text{ s}}{\text{min}}$$

$$v_2 = \frac{d_2}{t_2}$$
$$d_2 = v_2 t_2$$
$$= (10.0)(1.20 \times 10^3)$$
$$= 12000 \text{ m}$$

$$d_T = d_1 + d_2$$
$$= 14400 + 12000$$
$$= 26400 \text{ m} \longrightarrow 26000 \text{ m}$$

b)  $\vec{d}_1 = 14400 \text{ m}$  WEST  
 $\vec{d}_2 = 12000 \text{ m}$  EAST



$$d_T = d_1 - d_2$$
$$= 14400 - 12000$$
$$= 2400 \text{ m} \quad \text{WEST}$$

5. GIVEN:

$$d = 42.0 \text{ km} = 4.20 \times 10^4 \text{ m}$$
$$t = 2 \text{ h } 57 \text{ min} = 177 \text{ min} = 10620 \text{ s}$$
$$v = ?$$

$$177 \text{ min} \times \frac{60 \text{ s}}{\text{min}}$$

$$v = \frac{d}{t}$$
$$= \frac{4.20 \times 10^4}{10620}$$
$$= 3.95 \frac{\text{m}}{\text{s}}$$

6. a) GIVEN:  $\underbrace{40.0}_{\text{km/h}} \times \frac{\text{km}}{\text{h}} \times \frac{1000 \text{ m}}{\text{km}} \times \frac{\text{h}}{60 \text{ min}} \times \frac{\text{min}}{60 \text{ s}}$

$v_1 = 40.0 \frac{\text{km}}{\text{h}} = 11.11 \frac{\text{m}}{\text{s}}$

$t_1 = 30. \text{ min} = 1800 \text{ s}$

$d_1 = ?$

\*SHORTCUT:  $\frac{\text{km}}{\text{h}} \xleftrightarrow[\times 3.6]{\div 3.6} \frac{\text{m}}{\text{s}}$

$v_1 = \frac{d_1}{t_1}$

$d_1 = v_1 t_1$

$= (11.11)(1800)$

$= 20000 \text{ m}$

GIVEN:  $\underbrace{60.0}_{\text{km/h}} \times \frac{\text{km}}{\text{h}} \times \frac{1000 \text{ m}}{\text{km}} \times \frac{\text{h}}{60 \text{ min}} \times \frac{\text{min}}{60 \text{ s}}$

$v_2 = 60.0 \frac{\text{km}}{\text{h}} = 16.66 \frac{\text{m}}{\text{s}}$

$t_2 = 15 \text{ min} = 9.0 \times 10^2 \text{ s}$

$d_2 = ?$

$v_2 = \frac{d_2}{t_2}$

$d_2 = v_2 t_2$

$= (16.66)(9.0 \times 10^2)$

$= 15000 \text{ m}$

$$\begin{aligned} d_T &= d_1 + d_2 \\ &= 20000 + 15000 \\ &= 35000 \text{ m} \quad \text{or} \quad 35 \text{ km} \end{aligned}$$

7. a) GIVEN:

$d = 10 \times 8.0 \text{ km} = 80. \text{ km} = 8.0 \times 10^4 \text{ m}$

$t = 20.0 \text{ min} = 1.20 \times 10^3 \text{ s}$

$v = ?$

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

$= \frac{8.0 \times 10^4}{1.20 \times 10^3}$

$= 67 \frac{\text{m}}{\text{s}}$

b) GIVEN:

$d = 0$  STARTS AND FINISHES AT THE SAME POSITION

$$t = 20.0 \text{ min} = 1.20 \times 10^3 \text{ s}$$
$$\vec{V} = ?$$

$$\vec{V} = \frac{\vec{d}}{t}$$
$$= 0$$

8. a) given:

$$t_1 = 3.0 \text{ h} = 180 \text{ min} = 10800 \text{ s}$$
$$v_1 = 80.0 \frac{\text{km}}{\text{h}} \stackrel{\div 3.6}{=} 22.22 \frac{\text{m}}{\text{s}}$$
$$d_1 = ?$$
$$v_1 = \frac{d_1}{t_1}$$
$$d_1 = v_1 t_1$$
$$= (22.22)(10800)$$
$$= 240000 \text{ m}$$

GIVEN:

$$t_2 = 2.0 \text{ h} = 120 \text{ min} = 7200 \text{ s}$$
$$v_2 = 100.0 \frac{\text{km}}{\text{h}} \stackrel{\div 3.6}{=} 27.77 \frac{\text{m}}{\text{s}}$$
$$d_2 = ?$$
$$v_2 = \frac{d_2}{t_2}$$
$$d_2 = v_2 t_2$$
$$= (27.77)(7200)$$
$$= 200000 \text{ m}$$

$$d_T = d_1 + d_2$$
$$= 240000 + 200000$$
$$= 440000 \text{ m} \quad \text{OR} \quad 440 \text{ km}$$

b) given:

$$d_T = 440000 \text{ m}$$

$$t_T = 10800 \text{ s} + 7200 \text{ s} = 18000 \text{ s}$$

$$v_T = ?$$

$$v_T = \frac{d_T}{t_T}$$
$$= \frac{440000}{18000}$$
$$= 24 \frac{\text{m}}{\text{s}}$$

- OR -

given:

$$d_T = 440 \text{ km}$$

$$t_T = 3.0 \text{ h} + 2.0 \text{ h} = 5.0 \text{ h}$$

$$v_T = ?$$

$$v_T = \frac{d_T}{t_T}$$

$$= \frac{440}{5.0}$$

$$= 88 \frac{\text{km}}{\text{h}}$$

THIS WHOLE QUESTION COULD HAVE BEEN  
DONE IN USING km FOR DISTANCE,  
h FOR TIME AND  $\frac{\text{km}}{\text{h}}$  FOR SPEED.

9. GIVEN:

$$d_1 = 8.0 \text{ km} = 8.0 \times 10^3 \text{ m}$$

$$v_1 = 10.0 \frac{\text{m}}{\text{s}}$$

$$t_1 = ?$$

$$v_1 = \frac{d_1}{t_1}$$

$$t_1 = \frac{d_1}{v_1}$$

$$= \frac{8.0 \times 10^3}{10.0}$$

$$= 8.0 \times 10^2 \text{ s}$$

GIVEN:

$$d_2 = 40.0 \text{ km} = 4.00 \times 10^4 \text{ m}$$

$$v_2 = 25 \frac{\text{m}}{\text{s}}$$

$$t_2 = ?$$

$$v_2 = \frac{d_2}{t_2}$$

$$t_2 = \frac{d_2}{v_2}$$

$$= \frac{4.00 \times 10^4}{25}$$

$$= 1600 \text{ s}$$

GIVEN:

$$d_T = 8.0 \times 10^3 \text{ m} + 4.00 \times 10^4 \text{ m} = 4.80 \times 10^4 \text{ m}$$

$$t_T = 8.0 \times 10^2 \text{ s} + 1600 \text{ s} = 2400 \text{ s}$$

$$v_T = ?$$

$$v_T = \frac{d_T}{t_T}$$

$$= \frac{4.80 \times 10^4}{2400}$$

$$= 20 \frac{\text{m}}{\text{s}}$$

## 10. CALCULATE THE SPEED OF THE JOKER RUNNER

GIVEN:

$$d = 100. \text{m}$$

$$t = 10.1 \text{s}$$

$$v = ?$$

$$\begin{aligned} v &= \frac{d}{t} \\ &= \frac{100.}{10.1} \\ &= 9.90 \frac{\text{m}}{\text{s}} \end{aligned}$$

IT TAKES THE GRIFFIN RUNNER 9.8 s TO RUN 100. m. CALCULATE HOW FAR THE JOKER RUNNER CAN RUN IN THIS AMOUNT OF TIME

GIVEN:

$$v = 9.90 \frac{\text{m}}{\text{s}}$$

$$t = 9.8 \text{s}$$

$$d = ?$$

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

$$d = vt$$

$$= (9.90)(9.8)$$

$$= 97.03 \text{ m}$$

THE JOKER RUNNER'S LEAD MUST NOT EXCEED

$$100. \text{m} - 97.03 \text{m} = 2.97 \text{m}$$

→ 3 m