

2.2 Speed and velocity

1. $2 + 1 + 2 + 2$
 $= 7m$

2. South-east

3. 100m dash in 12s

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

$$\bar{v} = \frac{100}{12} = 8.3m/s$$

4. $d = 300m$ let $\pi = 3.14$

$$\text{Circumference} = \pi d$$

$$= 3.14 \times 300$$

$$= 942m$$

$$10 \times 60 = 600s$$

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

$$\bar{v} = \frac{942}{600} = 1.57m/s$$

5. $7.86 \times 10^7 km \rightarrow d$ $3.00 \times 10^8 m/s \Rightarrow v$

$$7.86 \times 10^7 \times 1000 = 7.86 \times 10^{10} m$$

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

$$t = \frac{d}{\bar{v}} \quad t = \frac{7.86 \times 10^{10}}{3.00 \times 10^8}$$

$$t = 262s$$

$$~~262s~~$$

$$= 2.62 \times 10^2 s$$

6. 750mi $\rightarrow d$ 55mi/h $\rightarrow v$

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

$$t = \frac{750}{55}$$

$$= 13.64 \text{ hrs}$$

7. a) $52 \text{ mi/h} \Rightarrow v$ $1\frac{1}{2} \text{ hrs} \Rightarrow t$

$$d = vt$$

$$= 52 \times 1\frac{1}{2}$$

$$= 78 \text{ mi}$$

b) $100 - 78 = 22 \text{ mi left}$

$$22 \text{ mi} \Rightarrow d \quad \frac{1}{2} \text{ h} \Rightarrow t$$

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

$$v = \frac{22}{\frac{1}{2}}$$

$$= 44 \text{ mi/h}$$

c) Average speed = $\frac{\text{total } d}{\text{total } t}$

$$= \frac{78 + 100}{1\frac{1}{2} + \frac{1}{2}} = \frac{178}{2}$$

$$= 89 \text{ mi/h}$$

8. let distance be 'd'

a) $t = 2.50 \text{ min}$

$$2.50 \times 60 = 150 \text{ s}$$

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

$$v = \frac{d}{150}$$

$$v = d \times 150^{-1} \text{ m/s}$$

b)

8. A track straightaway = 100m

a) $t = 2.50 \text{ min}$

$$= 2.50 \times 60 = 150 \text{ s}$$

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

$$= \frac{100}{150} = 0.67 \text{ m/s}$$

b) $t = 3.20 \text{ min}$

$$= 3.20 \times 60 = 192 \text{ s}$$

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

$$= \frac{100}{192} = 0.52 \text{ m/s}$$

c) $v = \frac{\text{total time distance}}{\text{total time}}$

$$= \frac{200}{342} = 0.58 \text{ m/s}$$

9. $300 \text{ km} \rightarrow d$ $2 \text{ h} \rightarrow t$

$$v = \frac{d}{t} = \frac{300}{2} = 150 \text{ km/h, east}$$

b) The instantaneous velocity is 150 km/h, east .

10. a) $d = 0.750 \text{ km}$ $t = 20 \text{ s}$

$$v = \frac{d}{t} = \frac{0.750 \times 1000}{20} = 37.5 \text{ m/s}$$

b) $v = \frac{\text{total } d}{\text{total } t}$

$$v = \frac{0.5 \times 1000}{20 + 25} = \frac{500}{45} = 33.33 \text{ m/s}$$

2.3 Acceleration

11. $\bar{a} = \frac{\Delta v}{\Delta t} = \frac{v_1 - v_0}{t}$

$$= \frac{12 - 0}{6} = \underline{\underline{2.0 \text{ m/s}^2}}$$

12.