

Distance, Speed and Acceleration Practice Problems

KEY

1. A football field is about 100 m long. It takes a Mr. Gray 20.0 seconds to run its length

a. What was his speed in m/s?

$$v = ? \quad v = \frac{d}{t} = \frac{100\text{m}}{20.0\text{s}} = \boxed{5.00\text{m/s}}$$

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

$$t = 20.0\text{s}$$

b. What was his speed in km/h?

$$v = ?$$

$$d = 0.100\text{km}$$

$$t = 0.0055\dots\text{h}$$

$$v = \frac{d}{t} = \frac{0.100\text{km}}{0.0055\dots\text{h}} = \boxed{18.0\text{km/h}}$$

$$\frac{5.00\text{m}}{\text{s}} \times \frac{3600\text{s}}{1\text{h}} \times \frac{1\text{km}}{1000\text{m}} = 18.0\frac{\text{km}}{\text{h}}$$

2. The pitcher's mound in baseball is 85.0 m from the plate. It takes 4.00 seconds for a pitch to reach the plate.

a. How fast is the pitch in m/s?

$$v = ?$$

$$d = 85.0\text{m}$$

$$t = 4.00\text{s}$$

$$v = \frac{d}{t} = \frac{85.0\text{m}}{4.00\text{s}} = 21.25\text{m/s} = \boxed{21.3\text{m/s}}$$

b. How fast is the pitch in km/h?

$$v = ?$$

$$d = 0.0850\text{km}$$

$$t = 0.0011\dots\text{h}$$

$$v = \frac{d}{t} = \frac{0.0850\text{km}}{0.0011\dots\text{h}} = \boxed{76.5\text{km/h}}$$

$$\frac{21.25\text{m}}{\text{s}} \times \frac{3600\text{s}}{1\text{h}} \times \frac{1\text{km}}{1000\text{m}} = 76.5\frac{\text{km}}{\text{h}}$$

3. If you drive at 100 km/hr for 45.0 min, how far will you go?

$$v = 100\text{km/h}$$

$$d = ?$$

$$t = 45.0\text{min} = 0.75\text{h}$$

$$v = \frac{d}{t} \quad 100\frac{\text{km}}{\text{h}} = \frac{d}{0.75\text{h}}$$

$$\boxed{d = 75.0\text{km}}$$

$$45.0\text{min} \times \frac{1\text{h}}{60\text{min}} = \boxed{0.75\text{h}}$$

4. If you run at a t 12.0 m/s for 15.0 minutes, how far will you go?

$$v = 12.0\text{m/s}$$

$$d = ?$$

$$t = 15.0\text{min} = 900\text{s}$$

$$v = \frac{d}{t} \quad 12.0\text{m/s} = \frac{d}{900\text{s}}$$

$$d = 10.800\text{m} = \boxed{1.08 \times 10^4\text{m} \text{ or } 10.8\text{km}}$$

5. Every summer I drive to Michigan. It is 3900 km to get there. If I average 100 km/hr, how much time will I spend driving?

$$v = 100\text{km/h}$$

$$d = 3900\text{km}$$

$$t = ?$$

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

$$100\text{km/h} = \frac{3900\text{km}}{t}$$

$$t = 39\text{h} = \boxed{39.0\text{h}}$$

6. A bullet travels at 850 m/s. How long will it take a bullet to go 1.50 km?

$$v = 850\text{m/s}$$

$$d = 1.50\text{km} = 1500\text{m}$$

$$t = ?$$

$$v = \frac{d}{t} \quad 850\text{m/s} = \frac{1500\text{m}}{t}$$

$$t = 1.7647\dots\text{s} = \boxed{1.76\text{s}}$$

7. The fastest train in the world moves at 500 km/hr. How long will it take to travel 4000 m?

$$v = 500 \text{ km/h}$$

$$d = 4000 \text{ m} = 4.000 \text{ km}$$

$$t = ?$$

$$v = \frac{d}{t} \quad 500 \text{ km/h} = \frac{4.000 \text{ km}}{t}$$

$$t = 0.00800 \text{ h}$$

8. How long will it take light moving at 300,000 km/s to reach us from the sun? The sun is 15,000,000 km from earth.

$$v = 300,000 \text{ km/s}$$

$$d = 15,000,000 \text{ km}$$

$$t = ??$$

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

$$300000 \frac{\text{km}}{\text{s}} = \frac{15000000 \text{ km}}{t}$$

$$t =$$

9. It is 21,000 kilometers around the earth and the earth rotates in 24 hrs. How fast is it rotating?

$$v = ?$$

$$d = 21000 \text{ km}$$

$$t = 24 \text{ hrs}$$

$$v = \frac{d}{t} = \frac{21000 \text{ km}}{24 \text{ h}} = 875 \frac{\text{km}}{\text{h}} = \boxed{8.8 \times 10^2 \text{ km/h}}$$

10. A car goes from rest to 100 km/hr in 10.0 seconds. What is its acceleration?

$$a = ?$$

$$v_i = 0$$

$$v_f = 100 \text{ km/h}$$

$$\Delta t = 10.0 \text{ s}$$

$$a = \frac{v_f - v_i}{\Delta t} = \frac{100 - 0 \text{ km/h}}{10.0 \text{ s}} = \boxed{10.0 \text{ km/h/s}}$$

11. A bus slams on its breaks and goes from 30.0 km/hr to 15.0 km/hr in 4.50 seconds. What is its acceleration?

$$a = ?$$

$$v_f = 15.0 \text{ km/h}$$

$$v_i = 30.0 \text{ km/h}$$

$$\Delta t = 4.50 \text{ s}$$

$$a = \frac{v_f - v_i}{\Delta t} = \frac{15.0 - 30.0 \text{ km/h}}{4.50 \text{ s}} = -3.333... \text{ km/h/s} = \boxed{3.33 \text{ km/h/s}}$$

12. If a man is running at 25.0 km/h and accelerates at a rate of 1.00 m/s/min for 3.50 s, what will be his final speed?

$$a = 1.00 \text{ m/s/min}$$

$$v_i = 25.0 \text{ km/h}$$

$$v_f = ??$$

$$\Delta t = 3.50 \text{ s}$$

$$a = \frac{v_f - v_i}{\Delta t}$$

$$\frac{1.00 \text{ m/s}}{\text{min}} = \frac{v_f - 6.94 \text{ m/s}}{3.50 \text{ s}}$$

$$v_f = 10.44... \text{ m/s} = \boxed{10.4 \text{ m/s}}$$

$$\frac{25.0 \text{ km}}{\text{h}} \times \frac{1 \text{ h}}{3600 \text{ s}} \times \frac{1000 \text{ m}}{1 \text{ km}} = 6.94... \frac{\text{m}}{\text{s}}$$