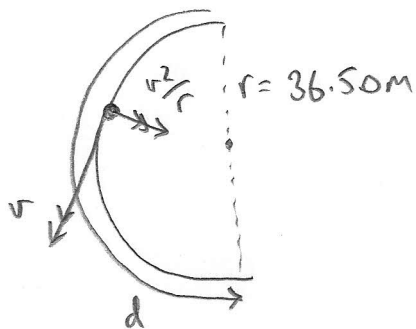


Circular motion example

(iv)



$$d = \pi r \quad \text{is length of bend}$$

$$v = \frac{d}{12.15s}$$

$$v = \frac{\pi \times 36.50}{12.15s} = \boxed{9.44 \text{ m/s}}$$

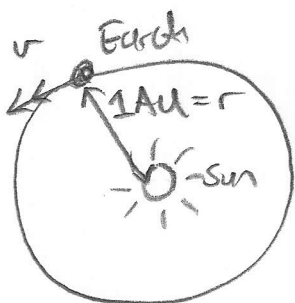
$$\frac{v^2}{r} = \frac{\left(\frac{\pi \times 36.50}{12.15}\right)^2}{36.50} \quad (\text{m/s}^2)$$

$$= \boxed{2.44 \text{ m/s}^2}$$

Usain Bolt's 100m acceleration was $\frac{12 \text{ m/s}}{4.5s} = \boxed{2.76 \text{ m/s}^2}$

so comparable forces required by the athletes.

(vi)



$$v = \frac{2\pi r}{T}$$

$$v = \frac{2\pi \times 1.496 \times 10^{11} \text{ m}}{365.25 \times 24 \times 3600 \text{ s}}$$

$$= \boxed{29.8 \text{ km/s}}$$