

**100m record** – Usain Bolt, 2009: 9.58 seconds

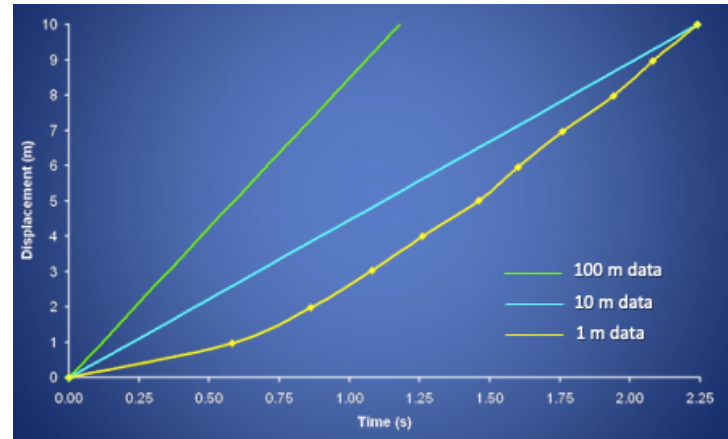
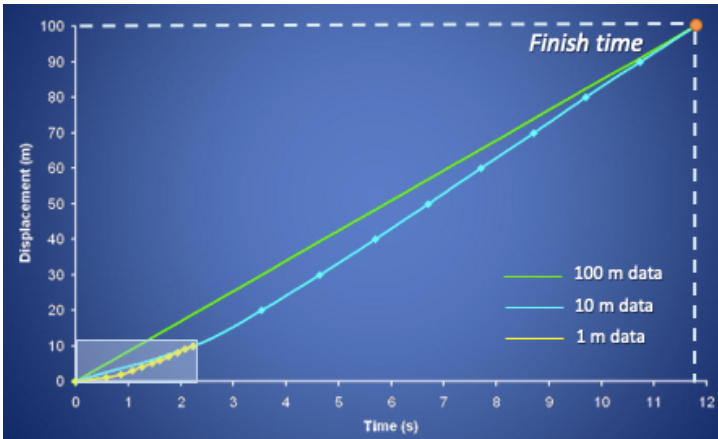
Velocity = displacement/time

$$=100/9.58$$

$$=10.44\text{ms}^{-1}$$

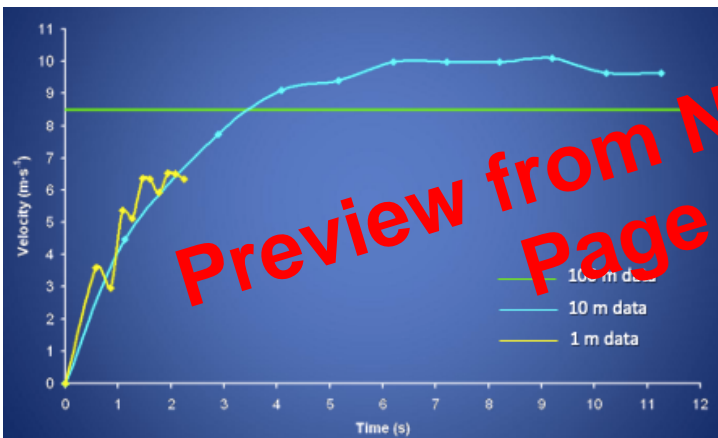
Average velocities are not sufficient to analyse performance, advanced performance may depend on the tiniest of changes. Some form of displacement, velocity and acceleration time-profile is required

### Displacement-time graph



Race time only allows calculation of average velocity over the entire 100m distance. 10m split times allow calculation of average velocity for each 10m interval. 1m split times allow calculation of average velocity for each 1m interval

### Average velocity-time graph



These calculations give an average velocity between the time points giving a theoretical value. The accuracy depends on the measuring frequency, so the higher frequency, the more accurate. The point in time for this theoretical value needs to be considered i.e. when it occurs

### Calculating velocity

As the time period between the successive position measures decreases, so the calculated average velocity becomes more representative of the actual velocity at any instant between those points

