# Single Mechanics – Multiple Particle Kinematics

1. Two stones are thrown from the same point at the same time, one vertically upwards with speed 30 m/s, and the other vertically downwards at 30 m/s. Find how far apart the stones are after 3 seconds. $134.1 + 45.9 = 180$

2. A car $A$, travelling at a constant velocity of 25 m/s, overtakes a stationary car $B$. Two seconds later car $B$ sets off in pursuit, accelerating at a uniform 6 m/s$^2$. How far does $B$ travel before catching up with A? 300 m

3. A ball $A$ is thrown vertically upwards at 25 m/s from a point $P$. Three seconds later a second ball $B$ is also thrown vertically upwards from the point $P$ at 25 m/s. Taking the acceleration due to gravity as 10 m/s$^2$ calculate

   (a) how long $A$ has been in motion when the balls meet, 4 seconds

   (b) the height above $P$ at which $A$ and $B$ meet. 20 m

4. A motorbike and car set off at the same time from traffic lights. The car accelerates at 1.5m/s/s to a max speed of 30m/s and the bike accelerates at 2.5 m/s/s to a max speed of 20 m/s.

   What is the greatest distance that the motorbike is in front of the car? $53\frac{1}{3}$m