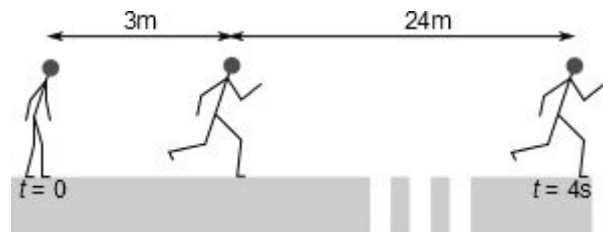


Equations of motion – Tutorial

1. An object is thrown vertically upwards with a velocity of 3.0 m/s and, at the same time, a second object is thrown vertically downwards at a speed of 2.0 m/s. Calculate the distance apart of the objects after 0.5 s. (2.5 m)

2. An American baseball player starts from rest and runs to first base 27 m away. He accelerates uniformly over the first 3.0 m to maximum speed, which he maintains until he crosses first base. The total run is completed in 4.0 s.

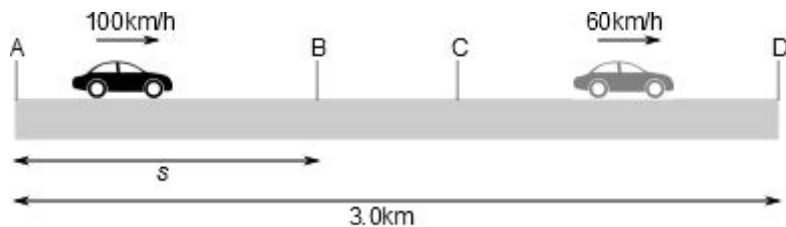


Calculate:

- (a) the maximum speed, (7.5 m/s)
- (b) the acceleration during the first 3.0 m, (9.4 m/s²)
- (c) the time during which this acceleration occurs. (0.8 s)

3. A car is driven 3.0 km between points A and D.

Between A and B it travels at a steady 100 km/h for t seconds.



Between B and C it decelerates uniformly for 4.0s.

Between C and D it travels at a steady 60km/h for t seconds.

Calculate:

- (a) the time t , (65.5 s)
 - (b) the distance, s , between A and B. (1.8 km)
4. Ball 1 is launched with an initial vertical velocity, v_1 , of 50 m/s. Three seconds later, ball 2 is launched with an initial vertical velocity of v_2 . Neglect air resistance.
- (a) Calculate v_2 if the balls are to collide at a height of 90m. (42 m/s)
 - (b) At the instant of collision, is ball 1 ascending or descending? (descending)

