# Investigating Position-Time Graphs

Clearly indicate whether the following statements are true or false:

1. __T__ Object A moves faster than object B.

2. __T__ Object B moves in uniform motion.

3. __F__ Object A has the same initial position as object B.

4. __F__ Object B covers the same distance in 6 seconds as object A covers in 2 seconds.

5. __F__ The point of intersection of the two graphs represents the only moment in time when both objects move with the same velocity.

6. __T__ Object A eventually comes to rest while object B continues moving eastwards.

7. __F__ Object A moves with the speed of 12m/s. $(A = 3 m/s)$

8. __F__ Object B moves with the speed of 0.5m/s. $(B = \frac{2}{3} m/s)$

9. __T__ Both object move at the same direction for the entire time shown on the graph.

10. __T__ The position of object B 6 seconds after it started moving is the same as the position of object A after 2 seconds of its motions.
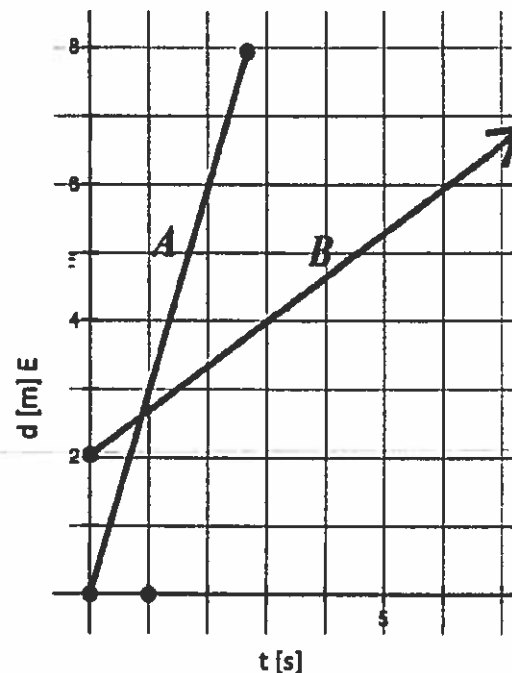
A) Label all the axes appropriately: time is given in seconds, displacement in meters and westward direction considered positive.

B) Describe the motion of each object with as much detail as you can.

- When possible, indicate whether the object moves with uniform or non-uniform motion, initial position and initial time, velocity, direction, distance covered, final position, displacement,...
- Is the object ever at rest? If yes, when exactly? How do you know? If not, how can you tell?
- What is the object's average velocity over the time interval (0,5)s ? **Graph 1 only.**
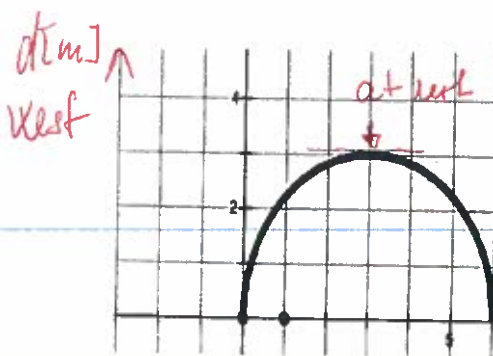- What is the object's instantaneous velocity at 3 s? **Graph 1 only.**

**1.**

d[m]
West

t[s]
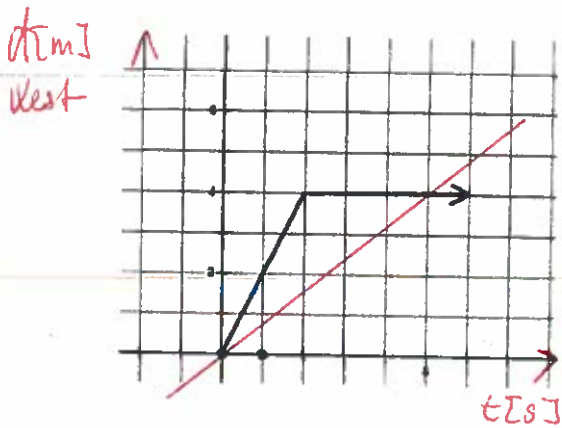
- non-uniform
- $\vec{d_i} = 0m$ West
- $t_i = 0s$
- $\vec{v_1} = 2\frac{m}{s}[W]$, $\vec{v_2} = 0m[W]$
- westwards
- $d = 4m$
- $\vec{d_f} = 4m[W]$
- $\vec{\Delta d} = 4m[W]$

- @ rest from $t = 2s$ onwards
  ⟹ horizontal line
- $\vec{v} = \frac{4}{5} = 0.8\frac{m}{s}[W]$ for $t = (0,5)$
- $\vec{v}_{inst} = 0\frac{m}{s}[W]$ when $t = 3s$

**2.**

d[m]
West

t[s]
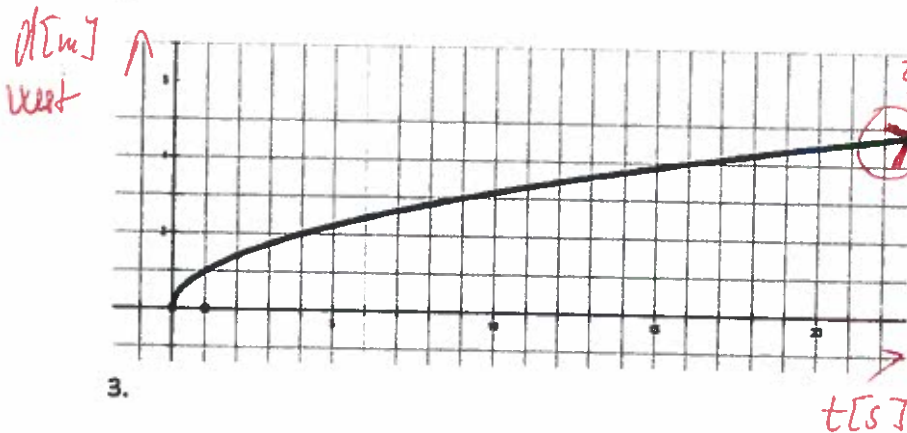
2. 
- non-uniform
- $\vec{d_i} = 0m$ West
- $t_i = 0s$
- $v_i$ = higher than $v_f$
  - object slows down
- westwards
- $d = 5m$
- $\vec{d_f} = 5m[W]$
- $\vec{\Delta d} = 5m[W]$
- never at rest

**3.**

d[m]
West

at rest

t[s]

- non-uniform
- $\vec{d_i} = 0m$ West
- $t_i = 0s$
- object speeds up, slows down to a stop at 3s slowly
  moves, speeds up
  ⟹ westwards, after 3s East wards

zero displacement!