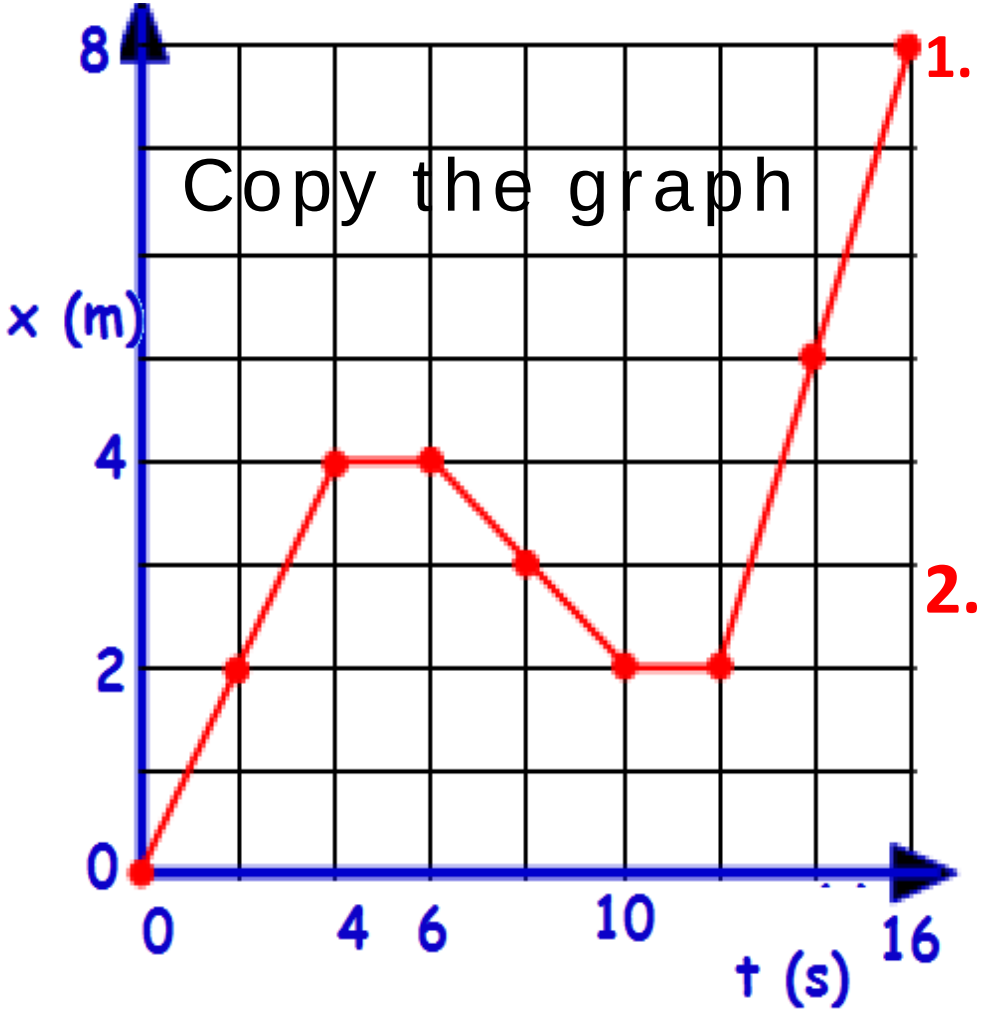
Bell Work, Feb 9 – 12, 2015

IB Physics: constant velocity, average velocity, average speed, area under the curve, calculating Δx (displacement), path length (or distance), calculating x position, and velocity

IB Physics Bell Work, Monday, Feb 9, 2015



1. Av Velocity = $\frac{\Delta x}{\Delta t} = \frac{x_f - x_i}{t_f - t_i}$

$$\bar{v} = \frac{\Delta x}{\Delta t} = \frac{8.0m - 0.0m}{16.0s - 0s} = 0.50\,\frac{m}{s}$$

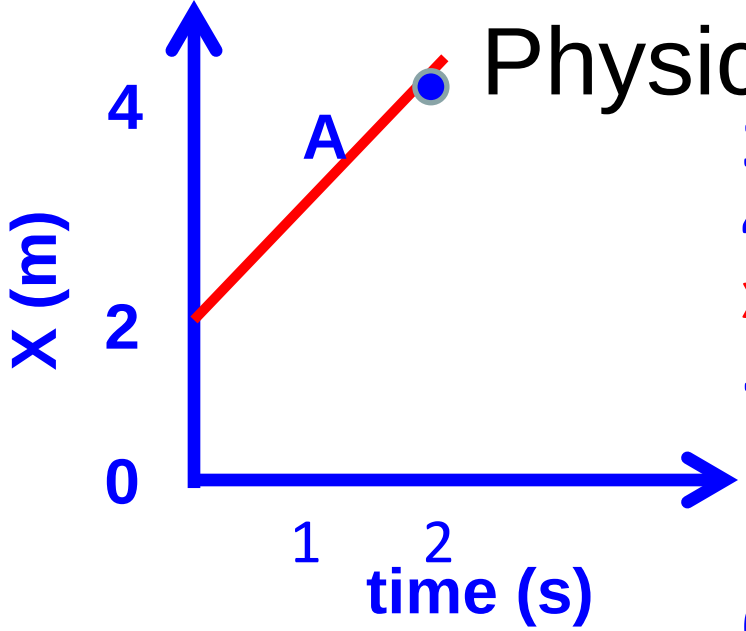
2. Av speed = $\frac{path\ length}{\Delta t}$ =

$$\frac{4.0m + 0 + 2.0m + 0 + 6.0m}{16.0s - 0s} = \frac{12.0m}{16.0s} = 0.750\,\frac{m}{s}$$

1. **Determine the skater's average velocity from t = 0s to t = 16s.**
2. **Determine the skater's average speed from t = 0s to t = 16s.**

w/s 3, 3 (d) (e)

Physics Bell Work, Monday, Feb 9



3. What is the slope of A? 1 m/s
4. Write a equation to find the x position

x= (1 m/s) • t + 2m

5. What quantity is 1 m/s?

average velocity, $\overline{v} = \frac{\Delta\, x\text{–}position}{\Delta\, time}$

6. What is the importance of b = 2m

It is the starting position or initial position, called X_0

7.Write a general equation to find the x position using only symbols.

$X = v \bullet t + x_0$

x = x-position, v =velocity, t = time, x_0 initial position

8. What is another way to find x- position?

$\Delta\, x = x_f - x_i$

Physics IB Bell Work, Tuesday, Feb 10

1. What is displacement?

Displacement is the change in position: $\Delta x = x_f - x_i$ **or**

$\Delta x = v\,\Delta t$ $x = v \bullet t + v_0$ **is used to find the displacement on an x-t graph**

2. An object travels at a velocity of 2 m/s for 2 seconds. what is its displacement?

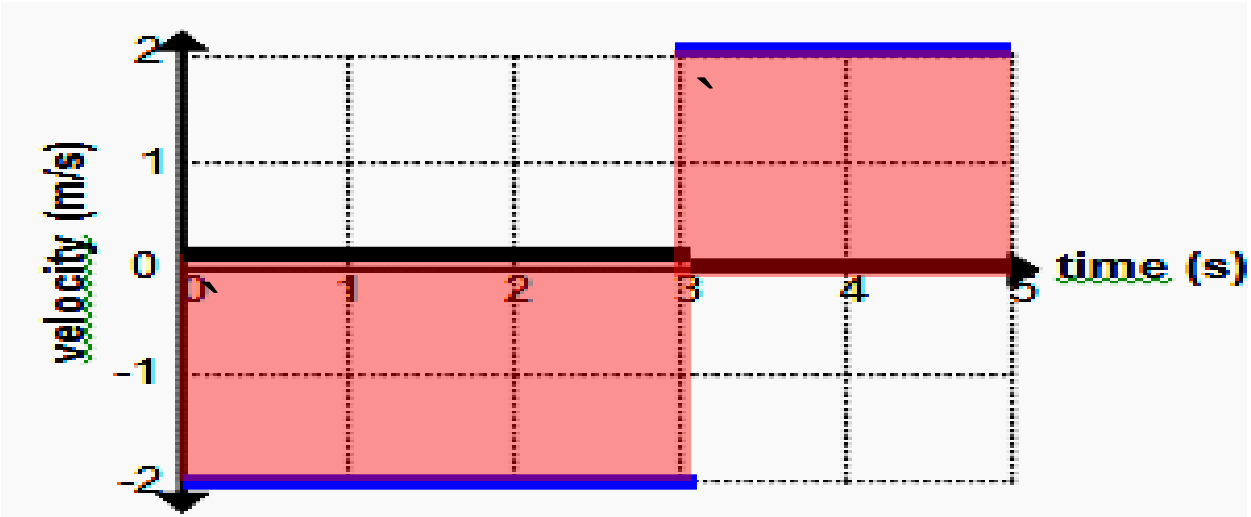
$\Delta x = v\,\Delta t$ **v = 2 m/s, t = 2 s**

$$\left(2\,\frac{m}{s}\right)2s = \frac{2m \cdot 2\cancel{s}}{1\cancel{s}} = 4\ m$$

3. Explain how you can find displacement from a velocity- time (v-t) graph?

Count the squares between 0 velocity & the velocity line.

- -6 m, 4 m, so
- (-6m + 4 m) =-2 m

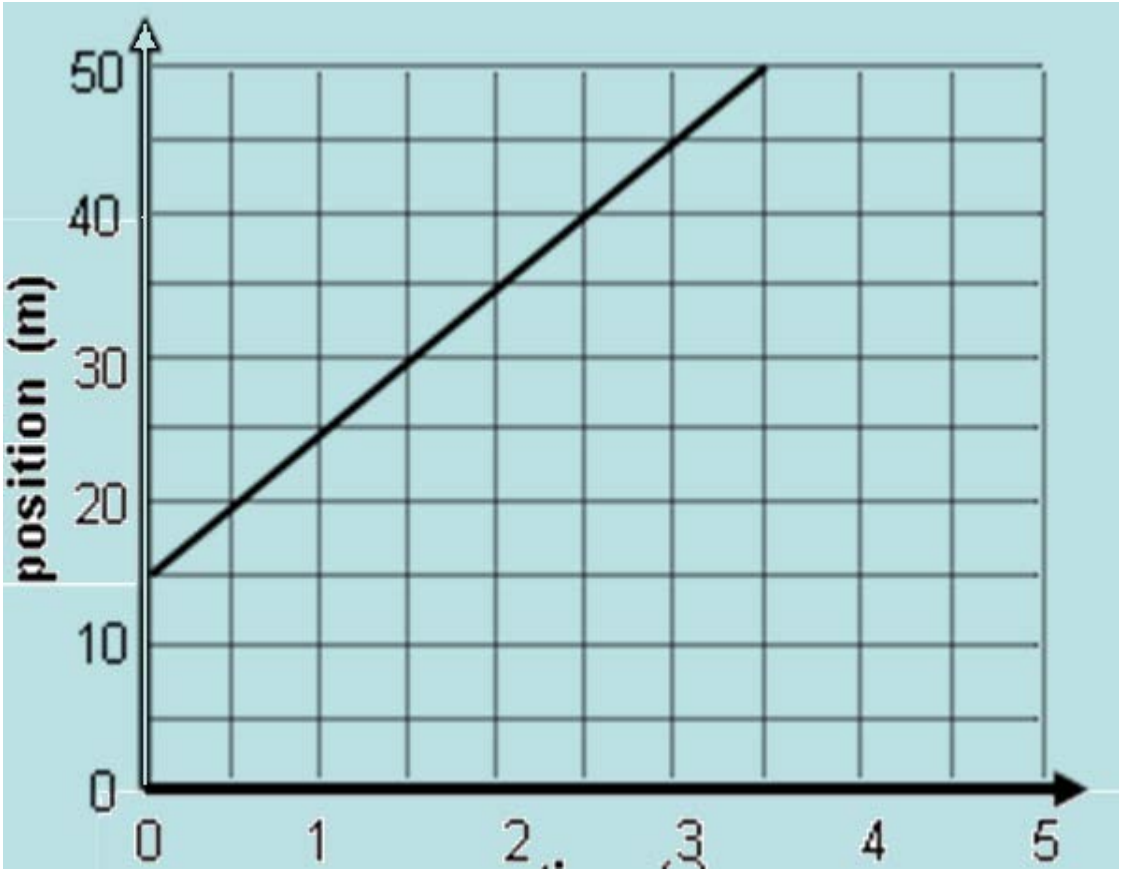


IB Physics Bell Work, Wed, Feb 11

1. **Draw the graph.** **Describe the motion of the object modeled in the graph.**

Starting at 15 meters, the object travels in a positive direction, arriving at 50 meters after 3.5 seconds.

2. **Draw a motion map of the graph.**



3. **Write the mathematical expression that describes the object's motion.**
4. **Determine the object's average velocity.**
5. **Determine the displacement at 3 seconds using a v- t graph**
6. **Determine the objects position at 3 seconds.**

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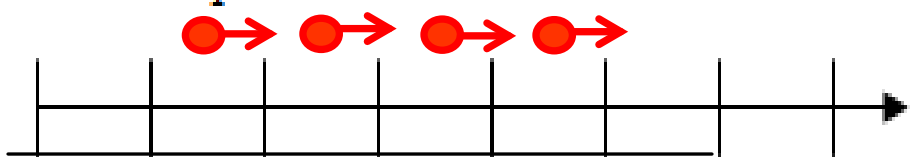
IB Physics Bell Work, Wed, Feb 11

2. Motion map:



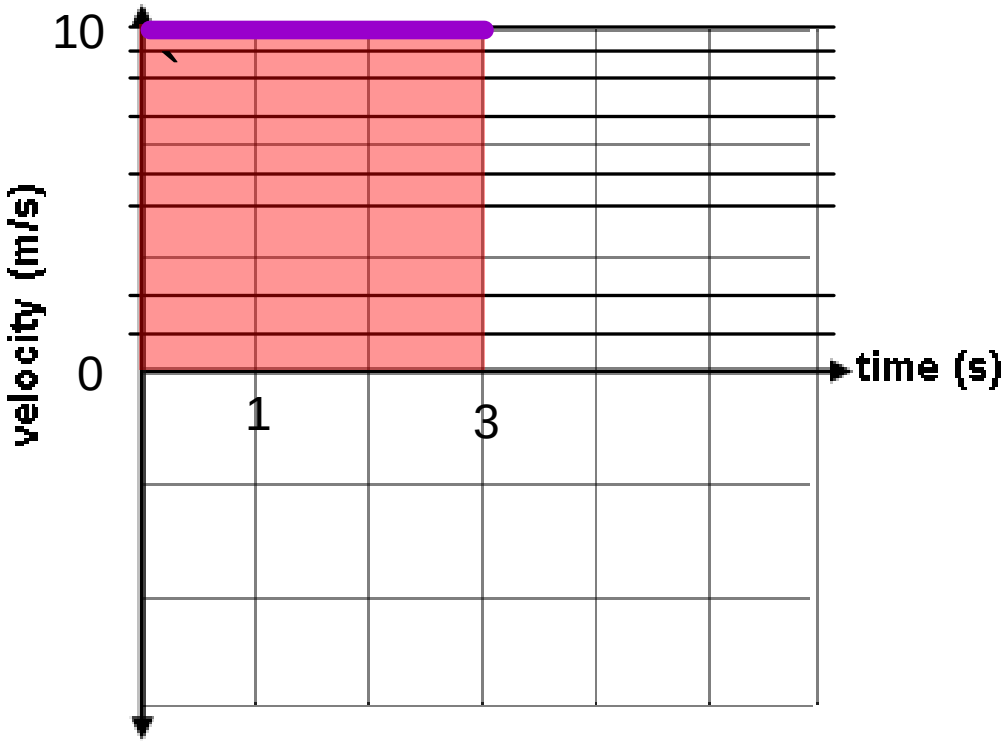
3. mathematical expression:

y = m • x +b

$$x_f = \text{slope} \times \text{time} + \text{intercept}$$

$$x_f = \left(10\tfrac{m}{s}\right) t + 15m$$

5.



4. Object's average velocity

The slope of the graph gives the average velocity

$$velocity = slope = \frac{\Delta x}{\Delta t} = \frac{50m - 15m}{3.5\,\text{sec} - 0\,\text{sec}} = \frac{35m}{3.5\,\text{sec}} = 10\tfrac{m}{s}$$

6. Objects position (x_f) at 3 s.

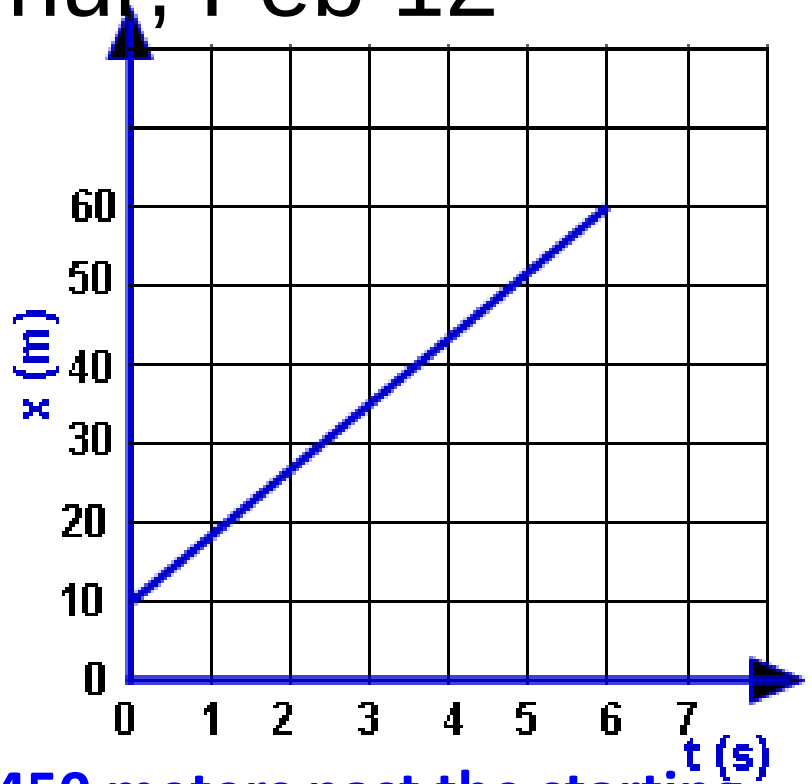
Displacement (area under the velocity line) + initial posistion= (10 x 3) + 15 = 45 meters, or

$x = v \bullet t + x_0$

$x = (10m/s) \bullet 3\ s + 15\ m = 45\ m$

IB Physics Bell Work, Thur, Feb 12

1. Write a mathematical expression to describe the motion of the object for this graph:



$$v = \frac{\Delta x}{\Delta t} = slope = \frac{60.0m - 10.0m}{6.0s - 0s} = 8.3\,\frac{m}{s}$$

$$x_f = (8.3\,\tfrac{m}{s})t + 10.0m$$

2. A racecar reaches a speed of 95 m/s after **it is 450 meters past the starting line. If** the car travels at a **constant speed of 95 m/s for the next 12.5 s, how far will the car be from the starting line?**

$x_f = v(t) + x_0$

$x_0 =$ **450 m,** $v =$ **95 m/s,** $t =$ **12.5 s**

$$x_f = 95\,\frac{m}{s}\,(12.5s) + 450m$$

$X_f =$ 1188m + 450m
= 1640 m