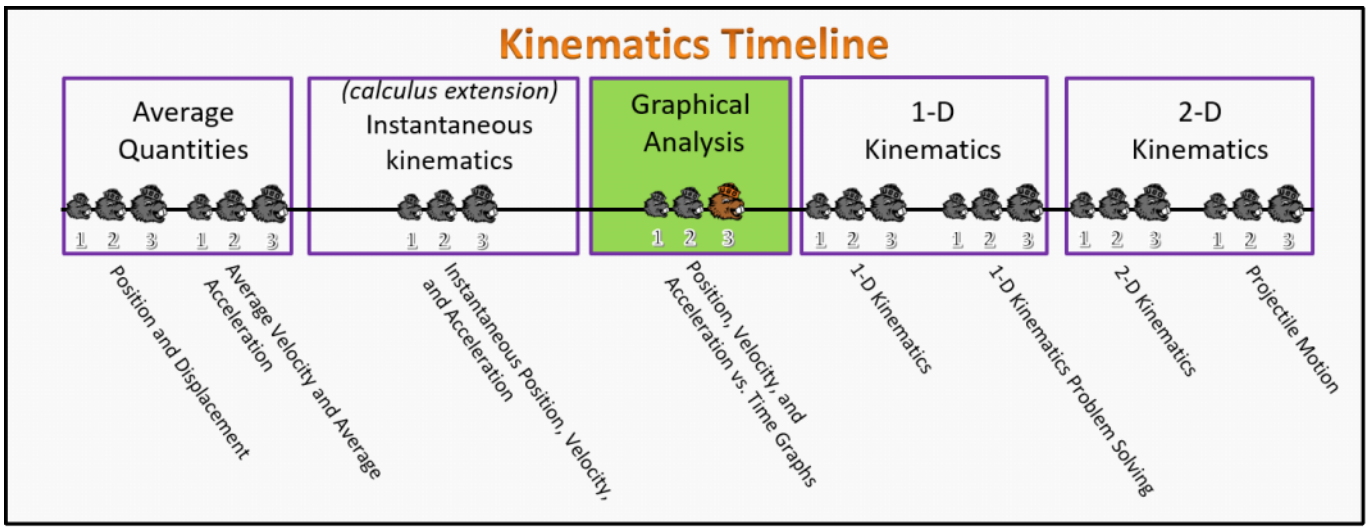
(GA.L1.3-sols) Practice Stage Solutions

Thursday, March 29, 2018 8:34 PM

Graphical Analysis
Foundation Stage (GA.L1.3)

Post-Lecture 1
Position, Velocity, and Acceleration vs Time Graphs



Questions

GA.L1.3-01

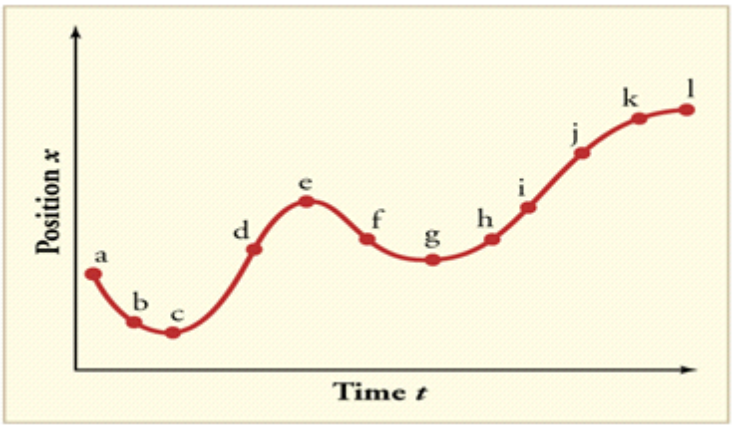
Description: Determining times at which instantaneous velocity is greatest from position graph

Learning Objectives: [x]

Problem Statement: Use the graph of position-vs-time to answer the following questions.

(a) Identify the time or times (t_a, t_b, t_c, etc.) at which the instantaneous velocity is greatest.

t_d



(b) Identify the time or times (t_a, t_b, t_c, etc.) at which the instantaneous velocity is zero?

t_c t_e t_g t_i

(c) Identify the time or times (t_a, t_b, t_c, etc.) at which the instantaneous velocity is negative.

t_a t_i t_k

t_a t_b t_f

GA.L1.3-02

Description: Find instantaneous and average acceleration from a velocity vs. time graph

Learning Objectives: [x]

Problem Statement: A graph of v(t) is shown for a track sprinter in a 100-m race.

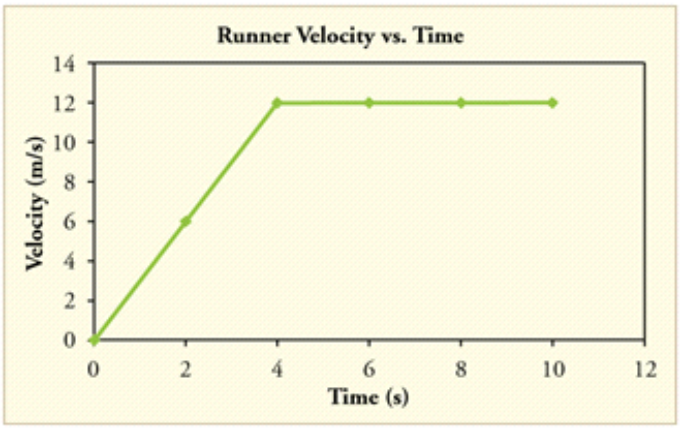
(a) What is the acceleration of the sprinter at **t** = 2 s?

(1) 0.0 m/s^2
(2) 1.2 m/s^2
(3) 1.5 m/s^2
(4) 3.0 m/s^2
(5) 6.0 m/s^2
(6) 12 m/s^2

$\bar{a}_x = \frac{\Delta v_x}{\Delta t}$

$= \frac{12 - 0}{4 - 0} \frac{m}{s^2}$

$a_x = 3\ m/s^2$

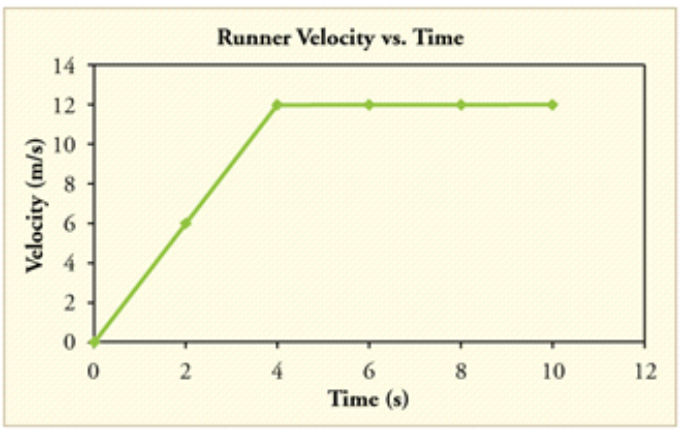


(b) What is the acceleration of the sprinter at **t** = 6 s?

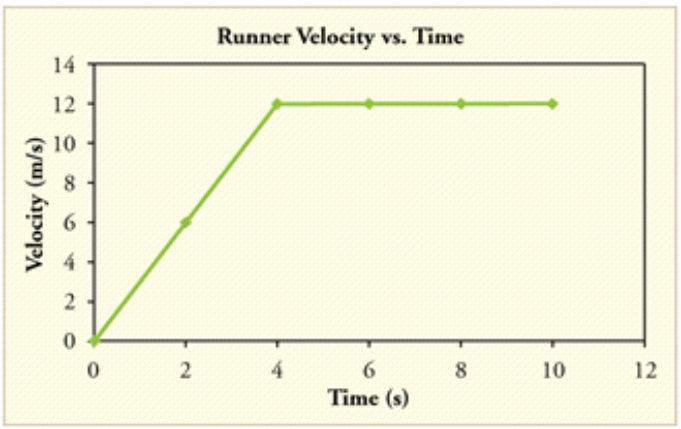
(1) 0.0 m/s^2
(2) 1.2 m/s^2
(3) 1.5 m/s^2
(4) 3.0 m/s^2
(5) 6.0 m/s^2
(6) 12 m/s^2

SLOPE = 0 m/s^2

So $a_x = 0\ m/s^2$



(c) What is the average acceleration of the sprinter during the entire race?



(1) 0.0 m/s²
(2) 1.2 m/s²
(3) 1.5 m/s²
(4) 3.0 m/s²
(5) 6.0 m/s²
(6) 12 m/s²

$$\bar{a}_x = \frac{\Delta v_x}{\Delta t} = \frac{12-0}{10-0}\ m/s^2$$

$$\bar{a}_x = 1.2\ m/s^2$$

GA.L1.3-03

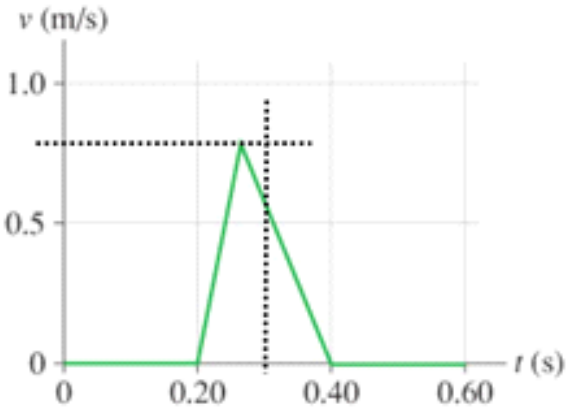
Description: Estimate distance from position plot.

Learning Objectives: [x]

Problem Statement: A somewhat idealized graph of the speed of the blood in the ascending aorta during one beat of the heart appears in the figure.

(a) Approximately how far, in cm, does the blood move during one beat?

(1) 0.4 cm
(2) 0.8 cm
(3) 4.5 cm
(4) 7.5 cm
(5) 14 cm



$$\text{AREA} = \tfrac{1}{2}(.4-.2)(.75)$$

$$\Delta x = 0.075\ m$$

$$\Delta x = 7.5\ cm$$

(b) Assuming your brain is 30 cm from your heart, estimate how many beats it will take for that blood to reach your brain.

(1) 1
(2) 4
(3) 7
(4) 10

$$30\ cm \times \frac{1\ \text{BEAT}}{7.5\ cm} = 4\ \text{BEATS}$$

(4) 10
(5) 12