Read 3.5

Exam next Wednesday

OLD Exam on class web page

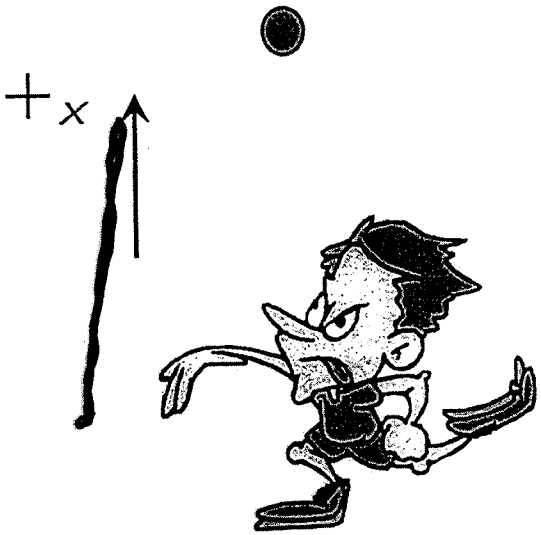
① bring $8\frac{1}{2} \times 11$" handwritten sheet

② calculator

GP2 solutions available

GP1 points on D2L

Problem: A boy standing on the ground throws a ball straight upward with a speed of 25.0 m/s. How long will it take to return to earth?



Given $v_0 = 25\,m/s$ want t

$a = -g = -9.8\,m/s^2$ what is d? $= 0\,m$

$$d = v_0 t + \frac{1}{2} a t^2$$

$$0 = v_0 t + \frac{1}{2} a t^2$$

$$-v_0 t = \frac{1}{2} a t^2$$

$$-v_0 = \frac{1}{2} a t \qquad t = \frac{-2v_0}{a} = \frac{-2(25\,m/s)}{-9.8\,m/s^2}$$

$$\boxed{t = 5.1\,s}$$

$$v = v_0 + at$$

$$v = 25\,m/s + (-9.8\,m/s^2)(5.1\,s) = \boxed{-25\,m/s}$$

Problem: Two balls are dropped from different buildings. The first building is twice as tall as the second building. How much longer does the first ball take to hit the ground compared with the second ball? Ignore air resistance.

$v_0 = 0$ both a same $= a$

relationship v_0, a, t, d solve for t

$d = v_0 t^0 + \frac{1}{2} a t^2$

$d = \frac{1}{2} a t^2$ $t = \sqrt{\frac{2d}{a}}$

d doubled $t = \sqrt{\frac{2(2d)}{a}}$

$t = \sqrt{2}\sqrt{\frac{2d}{a}}$

$\sqrt{2}$ longer

Interactive Question

D

Ball A is dropped from a window. At the same instant, ball B is thrown downward and ball C is thrown upward from the same window. Which statement concerning the balls is necessarily true if air resistance is neglected?

A) At one instant, the acceleration of ball C is zero.
B) All three balls strike the ground at the same time.
C) All three balls have the same velocity at any instant.
D) All three balls have the same acceleration at any instant.
E) All three balls reach the ground with the same velocity.

Interactive Question

B

Two balls are thrown straight up. The first is thrown with twice the initial speed of the second. Ignore air resistance. How much longer will it take for the first ball to reach its maximum height?

A) $\sqrt{2}$ times as long.
B) Twice as long.
C) Three times as long.
D) Four times as long.
E) Eight times as long.

Interactive Question

E

Two rocks are dropped into two different deep wells. The first one takes three times as long to hit bottom as the second one. Ignore air resistance. How much deeper is the first well than the second?

A) $\sqrt{3}$ times as deep.
B) Three times as deep.
C) Four and a half times as deep.
D) Six times as deep.
E) Nine times as deep.

Interactive Question

Ben and Jerry release their snowballs from the same height and at the same time. Ben's is dropped while Jerry's is thrown horizontally. Which one hits the ground first?

A)The dropped snowball

B)The thrown snowball

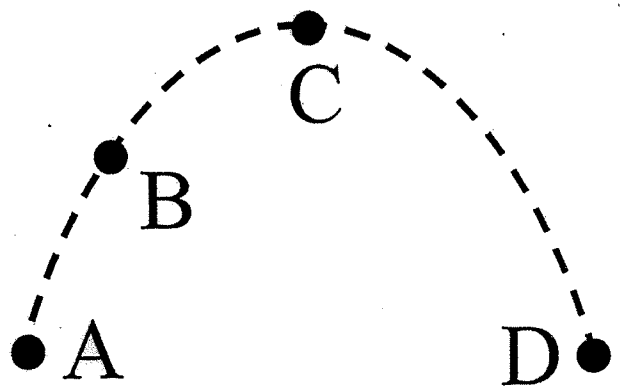
C) They hit at the same time

D) It depends on how hard Jerry threw

E) It depends on the initial height

Interactive Question

A tennis ball is thrown upward at an angle from point A and follows a parabolic path as shown. (The motion is shown from the time the ball leaves the person's hand until just before it hits the ground.)



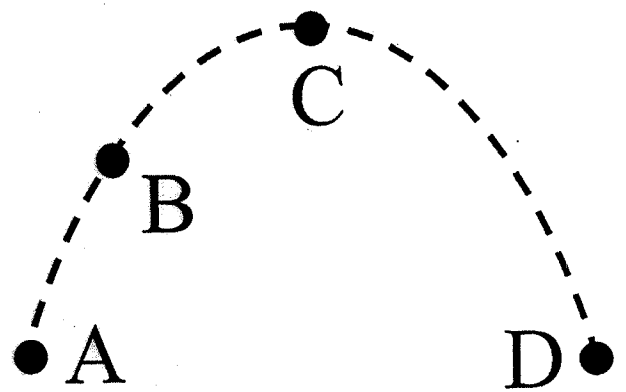
At what point is the vertical velocity equal to zero?

A) A
B) B
C) C
D) D
E) None of the above

Interactive Question

E

A tennis ball is thrown upward at an angle from point A and follows a parabolic path as shown. (The motion is shown from the time the ball leaves the person's hand until just before it hits the ground.)



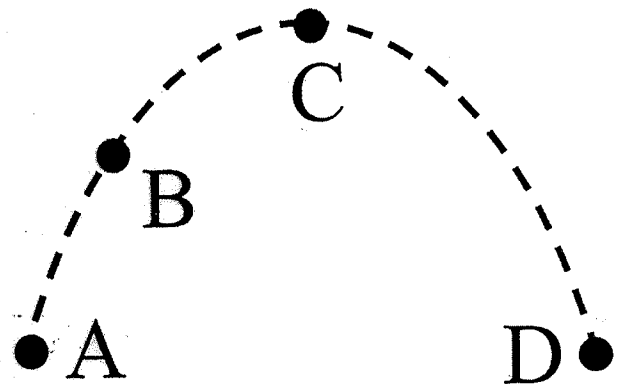
At what point is the velocity equal to zero?

A) A
B) B
C) C
D) D
E) None of the above

Interactive Question

E

A tennis ball is thrown upward at an angle from point A and follows a parabolic path as shown. (The motion is shown from the time the ball leaves the person's hand until just before it hits the ground.)



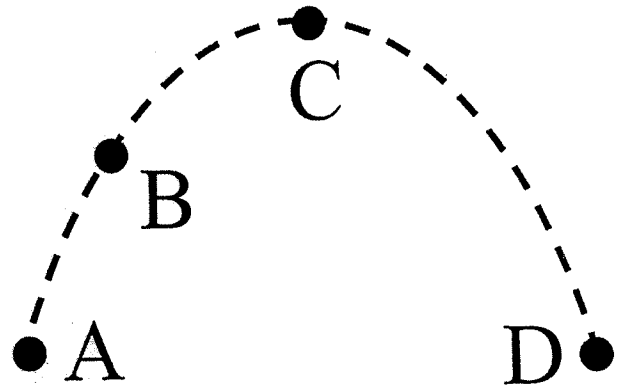
At what point is the vertical acceleration equal to zero?

A) A
B) B
C) C
D) D
E) None of the above

Interactive Question

D

A tennis ball is thrown upward at an angle from point A and follows a parabolic path as shown. (The motion is shown from the time the ball leaves the person's hand until just before it hits the ground.)



At what point is the horizontal velocity equal to the horizontal velocity at A?

A) B
B) C
C) D
D) All of the above
E) None of the above

Interactive Question

E

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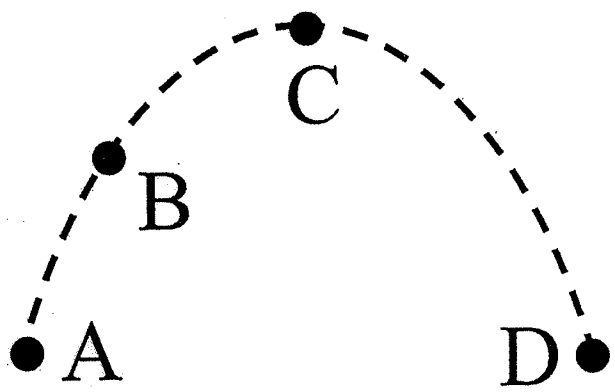
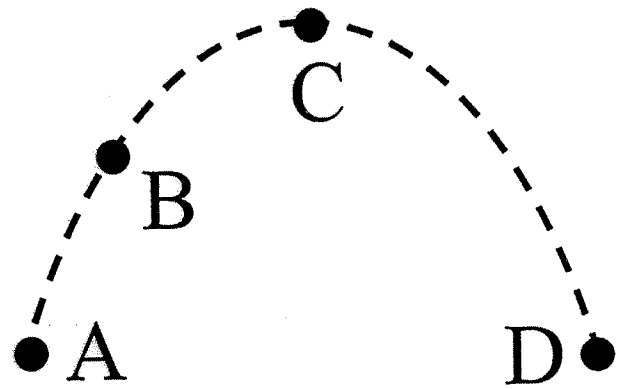


At what point is the horizontal acceleration equal to zero?

A) A
B) B
C) C
D) D
E) All of the above

Interactive Question



A tennis ball is thrown upward at an angle from point A and follows a parabolic path as shown. (The motion is shown from the time the ball leaves the person's hand until just before it hits the ground.)

At what point is the ball moving the slowest?

A) A
B) B
C) C
D) D
E) The speed is the same everywhere