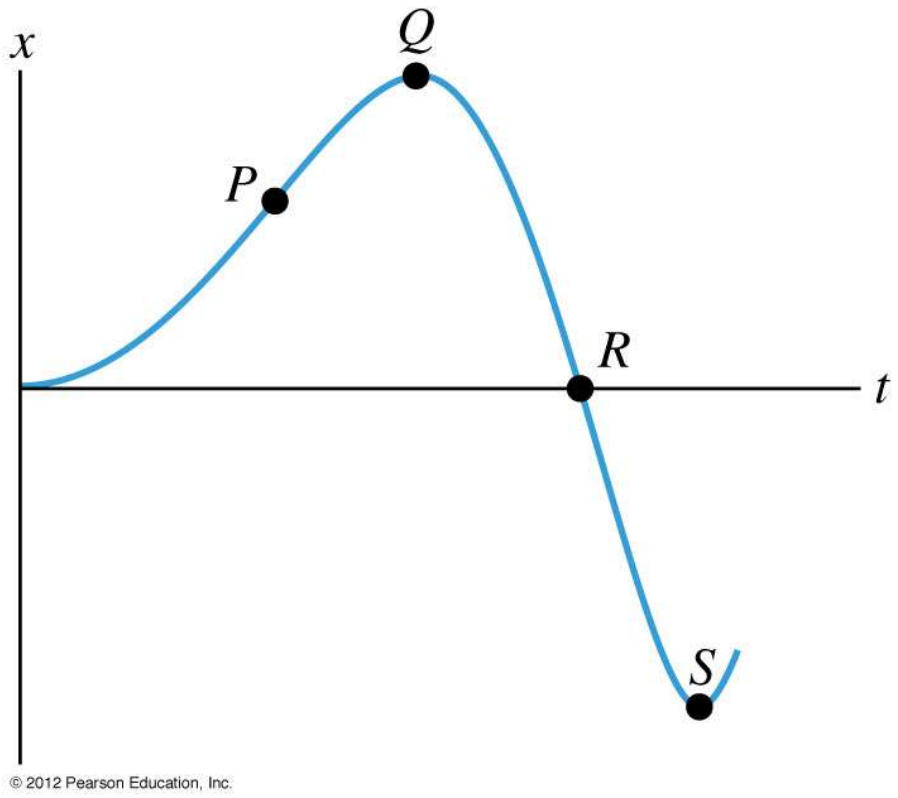
Q2.1

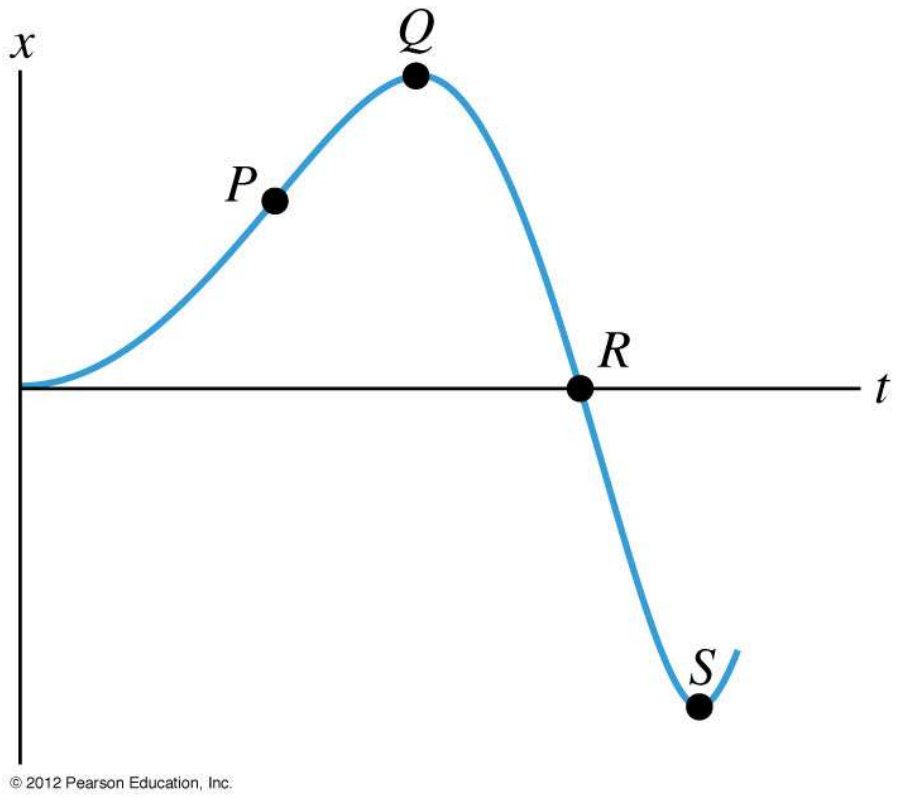


This is the *x*-*t* graph of the motion of a particle. Of the four points *P*, *Q*, *R*, and *S*, the velocity v_x is greatest (most positive) at

A. point *P*. B. point *Q*. C. point *R*. D. point *S*.

E. not enough information in the graph to decide

A2.1

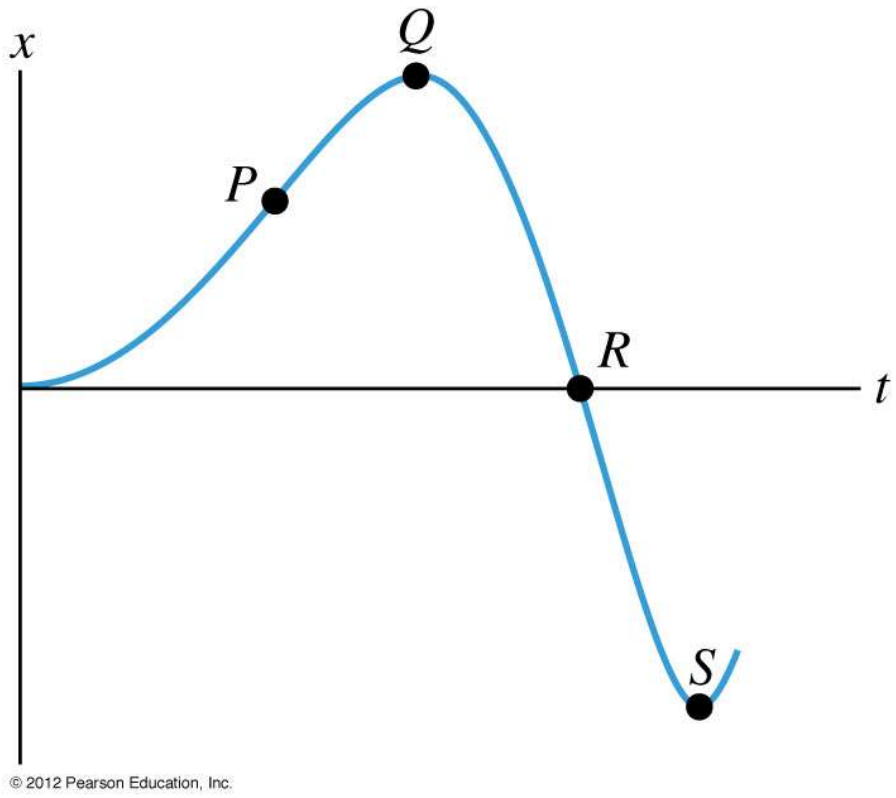


This is the *x*-*t* graph of the motion of a particle. Of the four points *P*, *Q*, *R*, and *S*, the velocity v_x is greatest (most positive) at

A. point *P*. B. point *Q*. C. point *R*. D. point *S*.

E. not enough information in the graph to decide

Q2.2

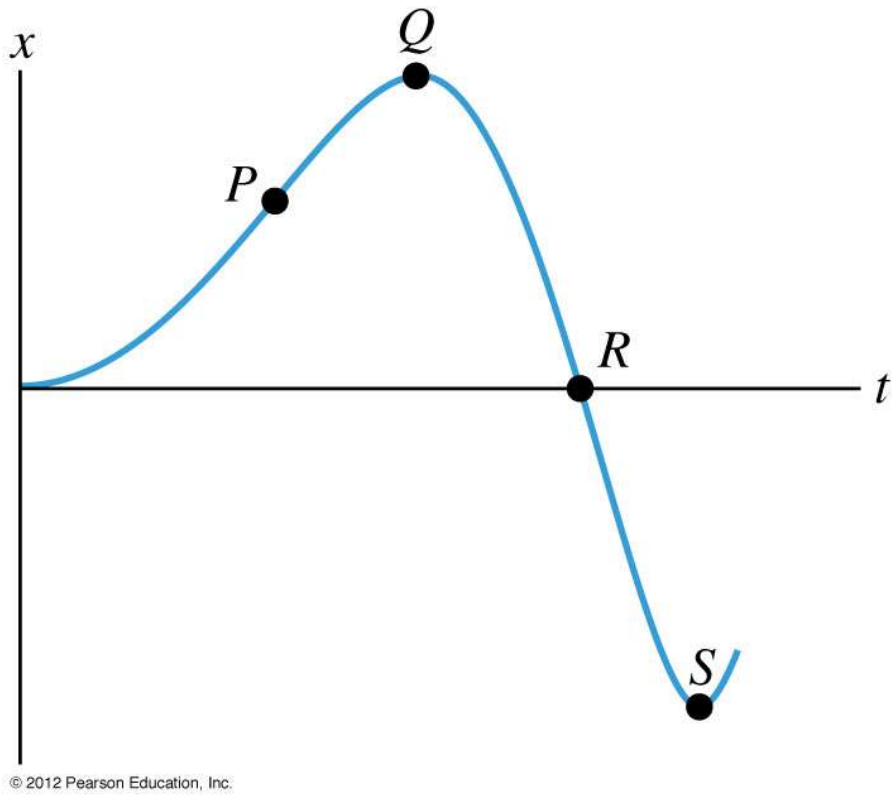


This is the *x*-*t* graph of the motion of a particle. Of the four points *P*, *Q*, *R*, and *S*, the speed is greatest at

A. point *P*. B. point *Q*. C. point *R*. D. point *S*.

E. not enough information in the graph to decide

A2.2

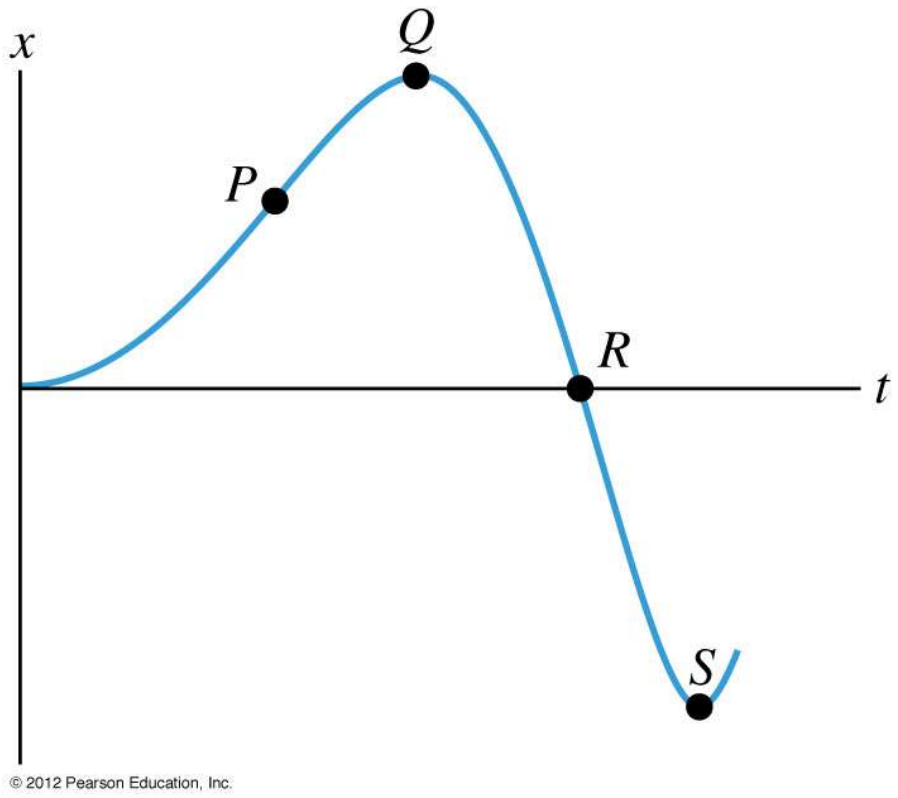


This is the *x*-*t* graph of the motion of a particle. Of the four points *P*, *Q*, *R*, and *S*, the speed is greatest at

A. point *P*. B. point *Q*. ✓ C. point *R*. D. point *S*.

E. not enough information in the graph to decide

Q2.3

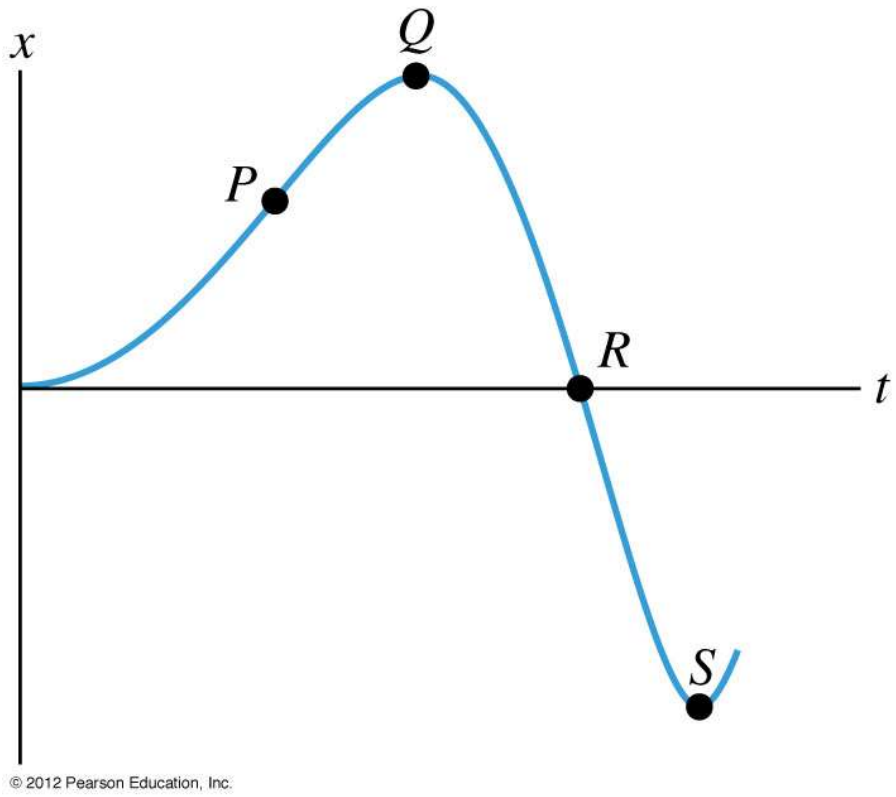


This is the *x*-*t* graph of the motion of a particle. Of the four points *P*, *Q*, *R*, and *S*, the acceleration a_x is greatest (most positive) at

A. point *P*. B. point *Q*. C. point *R*. D. point *S*.

E. not enough information in the graph to decide

A2.3



This is the *x*-*t* graph of the motion of a particle. Of the four points *P*, *Q*, *R*, and *S*, the acceleration a_x is greatest (most positive) at

A. point *P*. B. point *Q*. C. point *R*. ✓ D. point *S*.

E. not enough information in the graph to decide

Q2.4

You toss a ball straight upward, in the positive direction. The ball falls freely under the influence of gravity.

At the highest point in the ball's motion,

A. its velocity is zero and its acceleration is zero.

B. its velocity is zero and its acceleration is positive (upward).

C. its velocity is zero and its acceleration is negative (downward).

D. its velocity is positive (upward) and its acceleration is zero.

E. its velocity is positive (upward) and its acceleration is zero.

A2.4

You toss a ball straight upward, in the positive direction. The ball falls freely under the influence of gravity.

At the highest point in the ball's motion,

A. its velocity is zero and its acceleration is zero.

B. its velocity is zero and its acceleration is positive (upward).

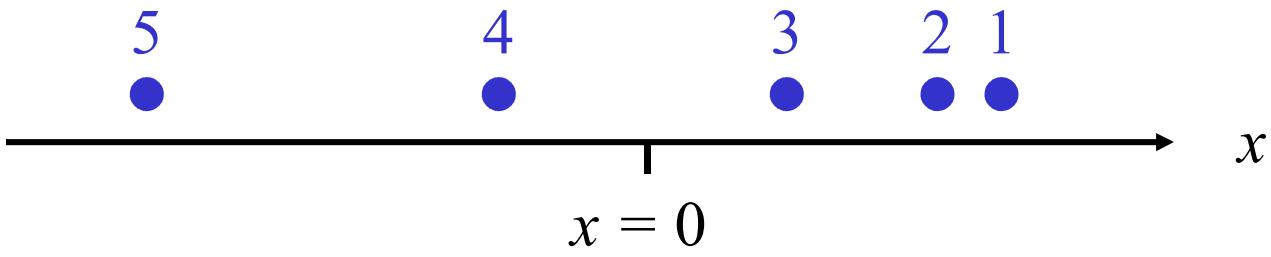
C. its velocity is zero and its acceleration is negative (downward).

D. its velocity is positive (upward) and its acceleration is zero.

E. its velocity is positive (upward) and its acceleration is zero.

Q2.5

This is a motion diagram of an object moving along the x-direction with constant acceleration. The dots 1, 2, 3, … show the position of the object at equal time intervals Δt.



At the time labeled 3, what are the signs of the object's velocity v_x and acceleration a_x?

A. $v_x < 0, a_x = 0$

B. $v_x < 0, a_x > 0$

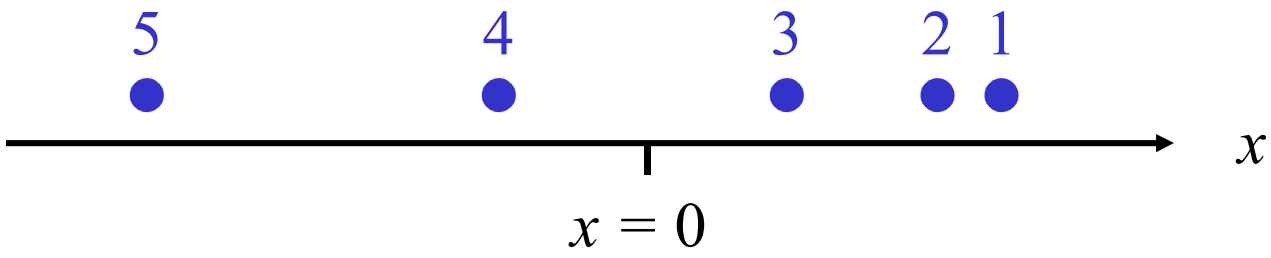
C. $v_x < 0, a_x < 0$

D. $v_x > 0, a_x > 0$

E. $v_x > 0, a_x < 0$

A2.5

This is a motion diagram of an object moving along the x-direction with constant acceleration. The dots 1, 2, 3, … show the position of the object at equal time intervals Δt.



At the time labeled 3, what are the signs of the object's velocity v_x and acceleration a_x?

A. $v_x < 0, a_x = 0$

B. $v_x < 0, a_x > 0$

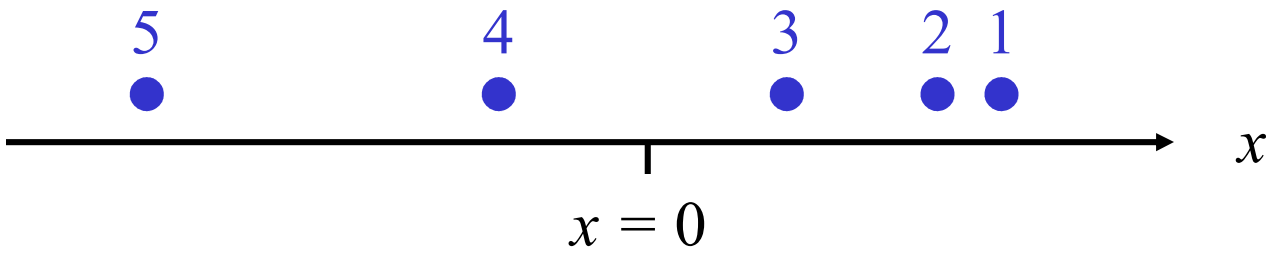
✓ C. $v_x < 0, a_x < 0$

D. $v_x > 0, a_x > 0$

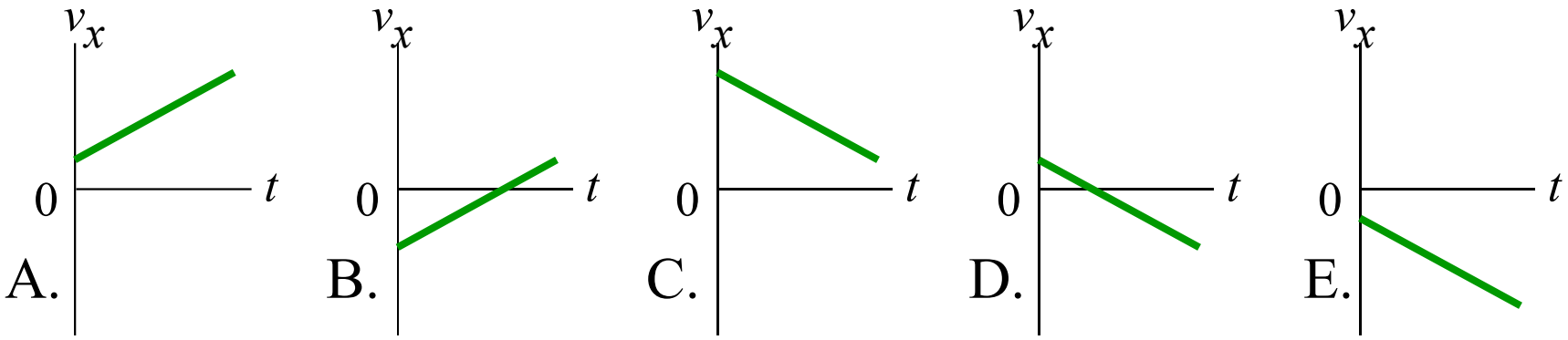
E. $v_x > 0, a_x < 0$

Q2.6

This is a motion diagram of an object moving along the x-direction with constant acceleration. The dots 1, 2, 3, … show the position of the object at equal time intervals Δt.

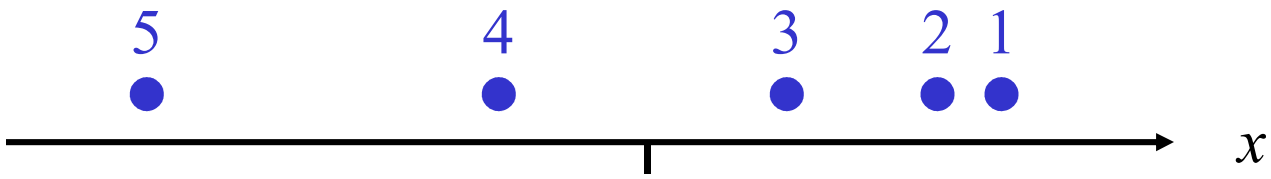


Which of the following v_x-t graphs best matches the motion shown in the motion diagram?



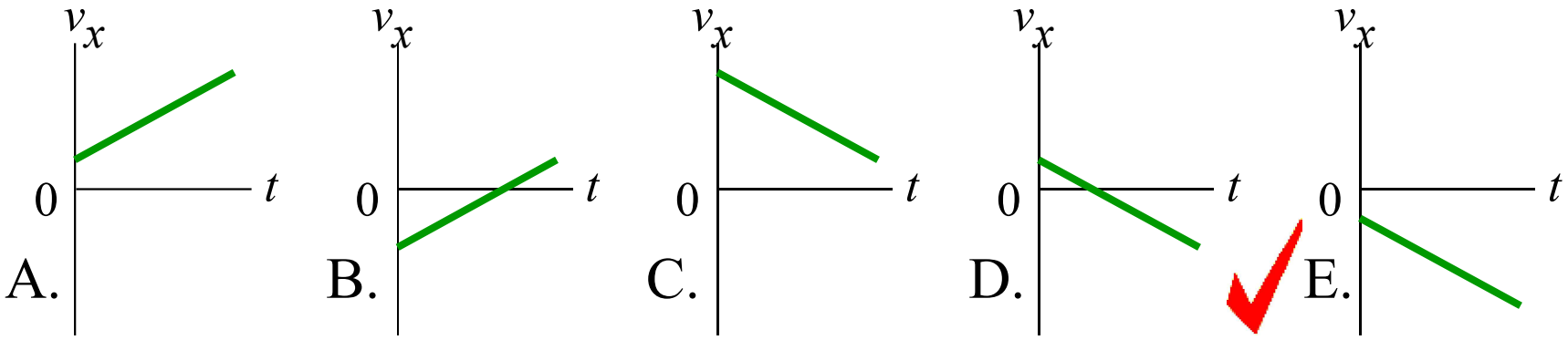
A2.6

This is a motion diagram of an object moving along the x-direction with constant acceleration. The dots 1, 2, 3, … show the position of the object at equal time intervals Δt.



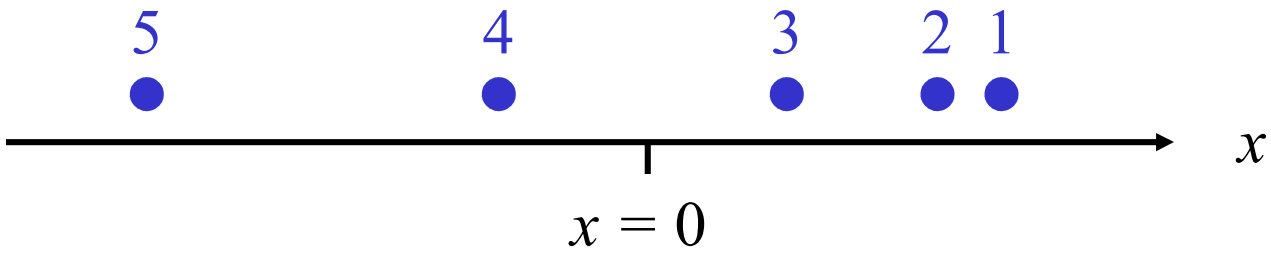
$x = 0$

Which of the following v_x-t graphs best matches the motion shown in the motion diagram?

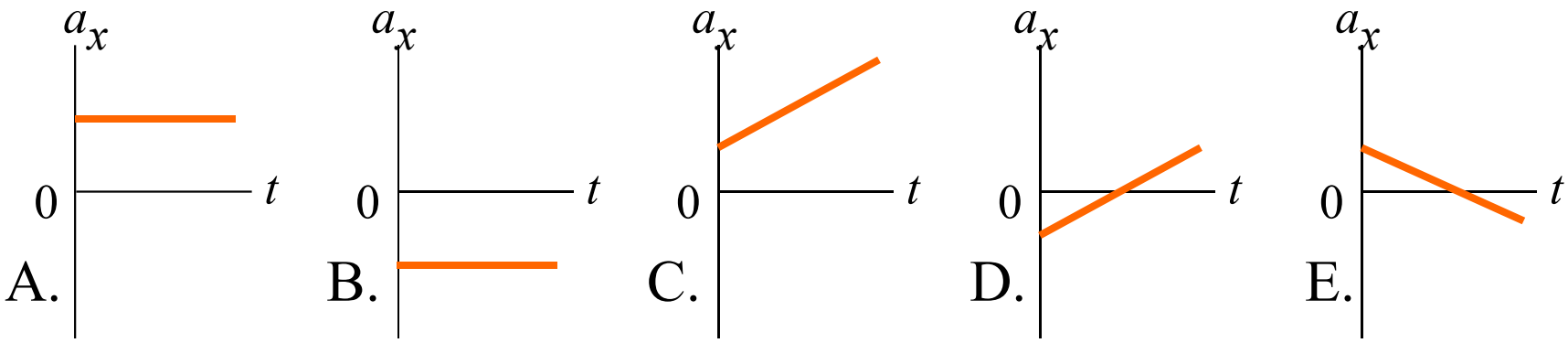


Q2.7

This is a motion diagram of an object moving along the x-direction with constant acceleration. The dots 1, 2, 3, … show the position of the object at equal time intervals Δt.

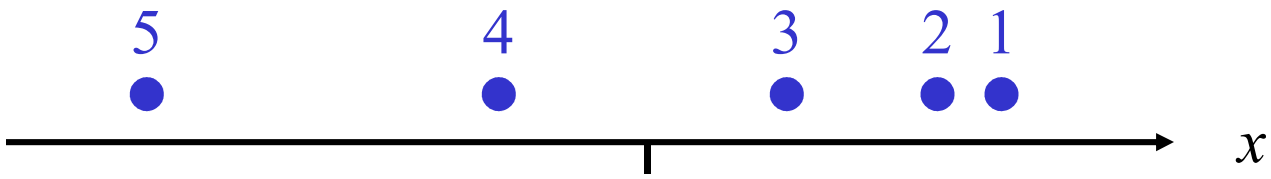


Which of the following a_x–t graphs best matches the motion shown in the motion diagram?

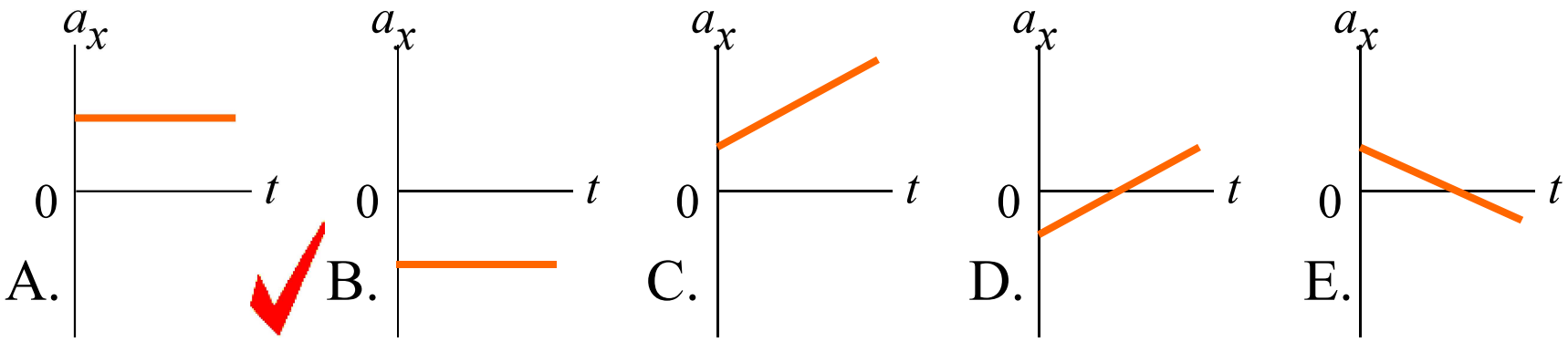


A2.7

This is a motion diagram of an object moving along the x-direction with constant acceleration. The dots 1, 2, 3, … show the position of the object at equal time intervals Δt.



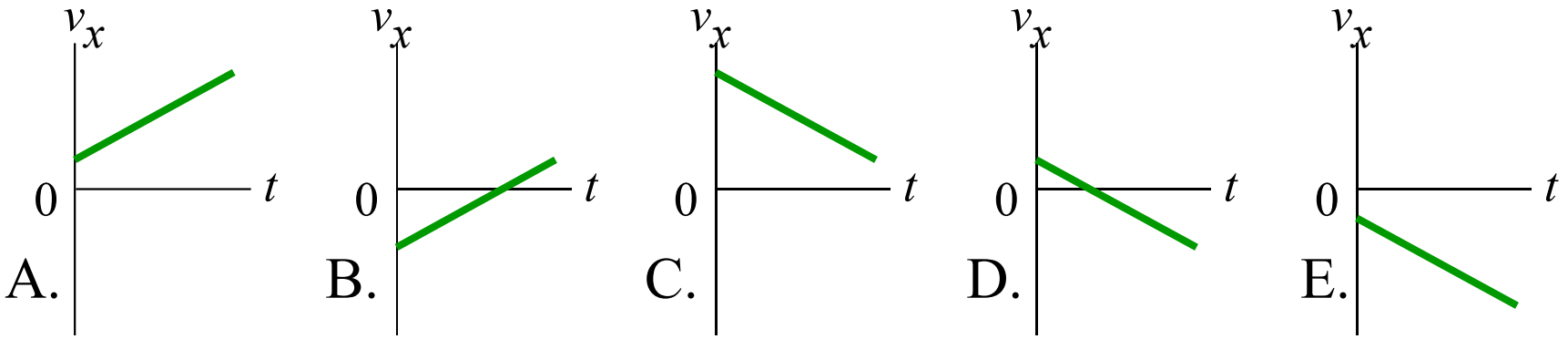
Which of the following a_x–t graphs best matches the motion shown in the motion diagram?



Q2.8

An object moves along the x-axis with constant acceleration. The initial position x_0 is positive, the initial velocity is negative, and the acceleration is positive.

Which of the following v_x-t graphs best describes this motion?



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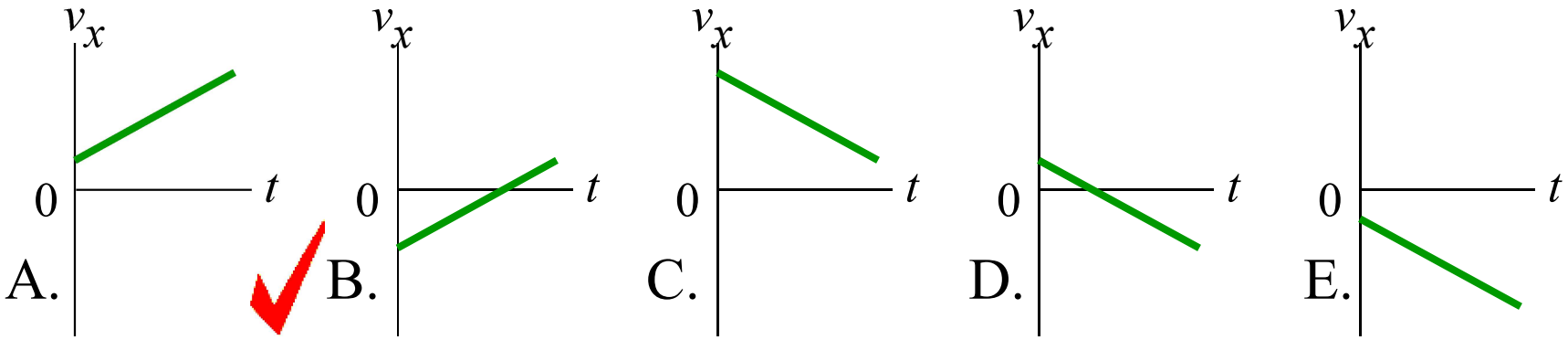

Q2.9

The position of an object moving along the x-axis is given by

$$x = (5.0\ \text{m/s})t - (10.0\ \text{m/s}^2)t^2 + (4.0\ \text{m/s}^3)t^3$$

What is the object doing at $t = 1.0$ s?

A. It is moving and speeding up

B. It is moving and slowing down

C. It is moving, but its velocity is not changing at this instant

D. It is momentarily at rest

E. Not enough information given to decide

A2.9

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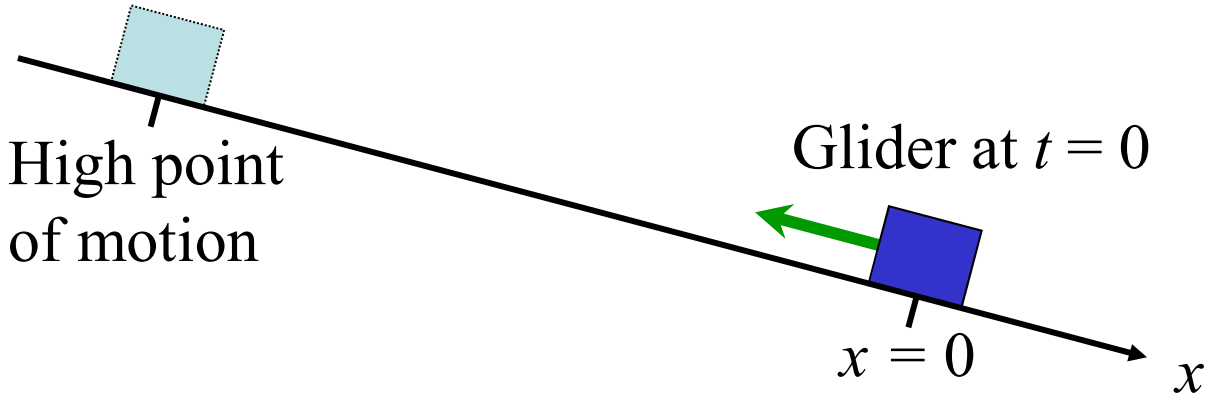
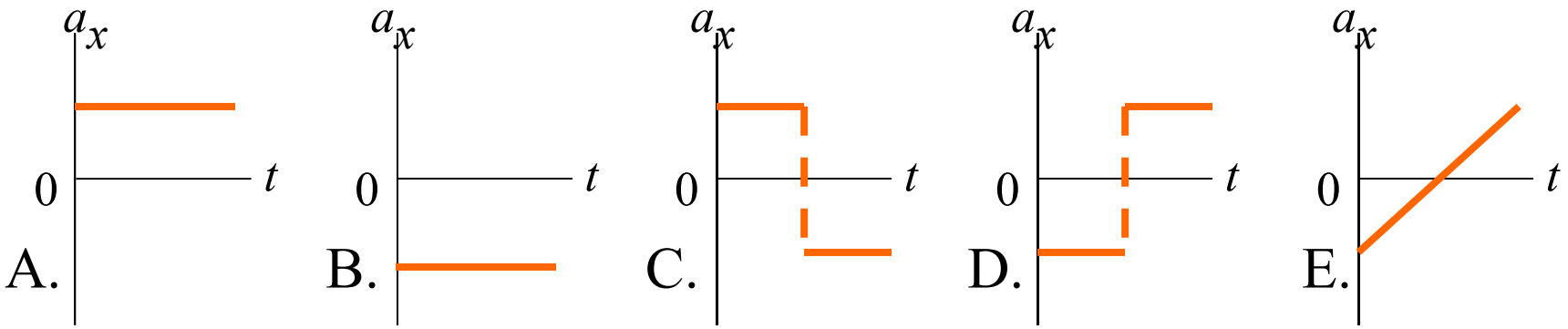
Q2.10

A glider is on an inclined, frictionless track. The x-axis points downhill. At $t = 0$ the glider is at $x = 0$ and moving uphill.

After reaching the high point of its motion, it moves downhill and returns to $x = 0$.



Which of the following a_x–t graphs (graphs of acceleration vs. time) best matches the motion of the glider?



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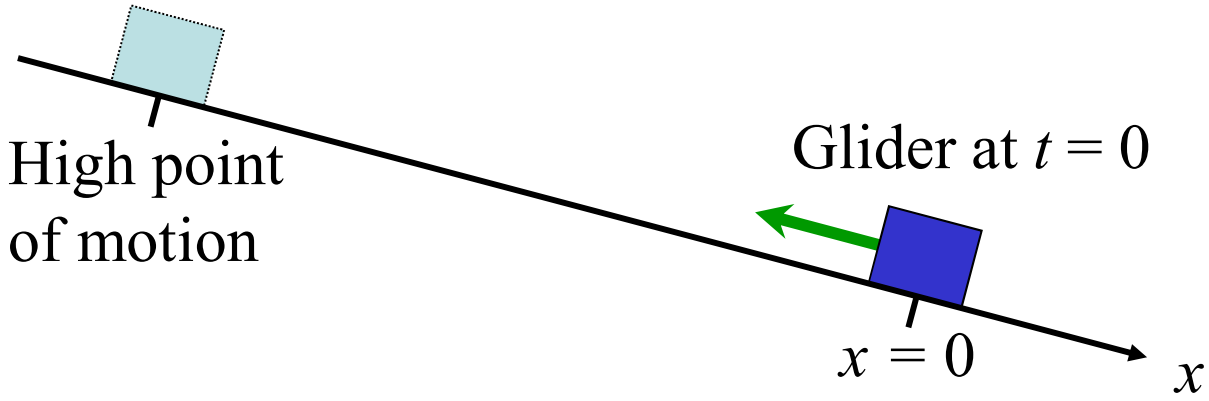

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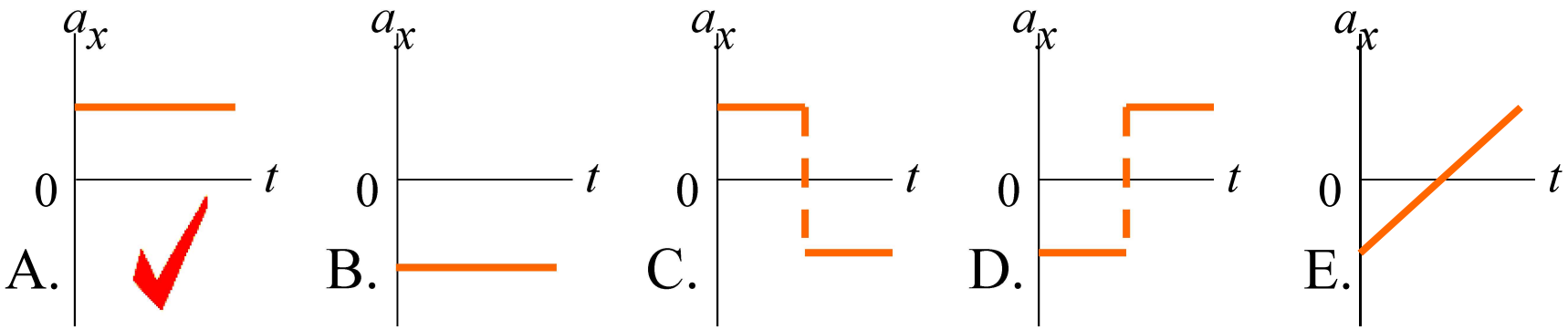

Q2.11

A glider is on an inclined, frictionless track. The x-axis points downhill. At $t = 0$ the glider is at $x = 0$ and moving uphill.

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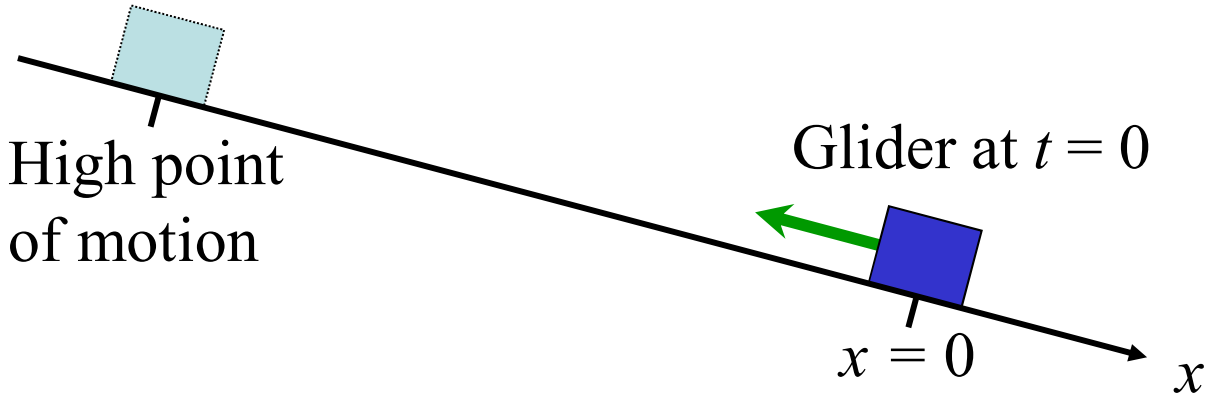
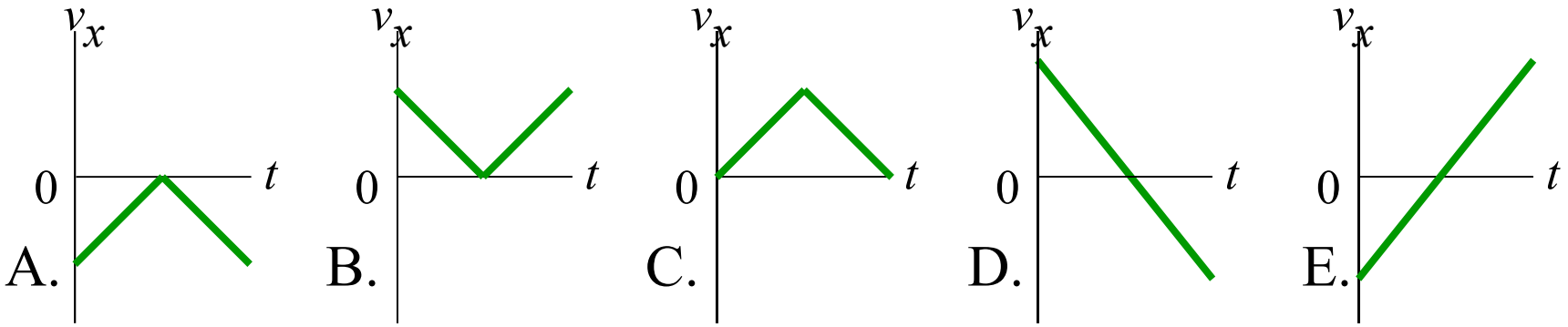


Which of the following v_x–t graphs (graphs of velocity vs. time) best matches the motion of the glider?



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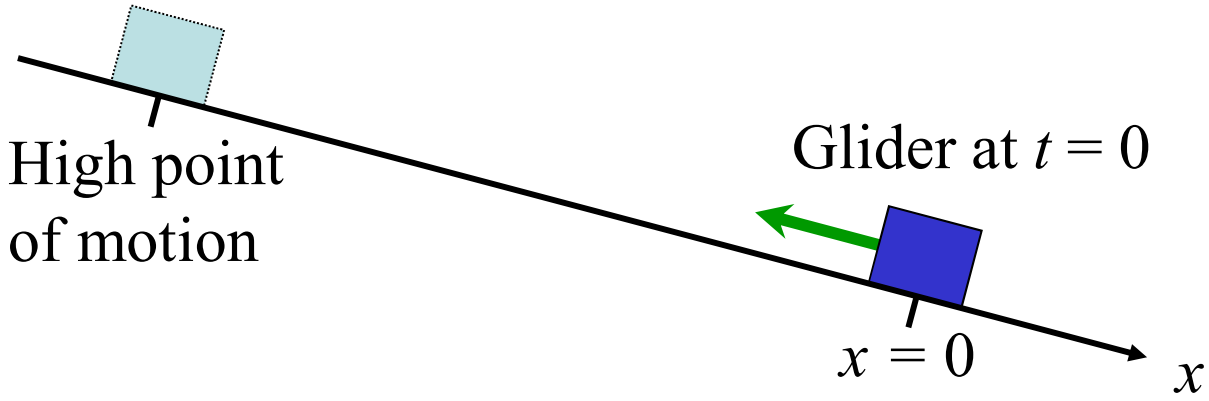

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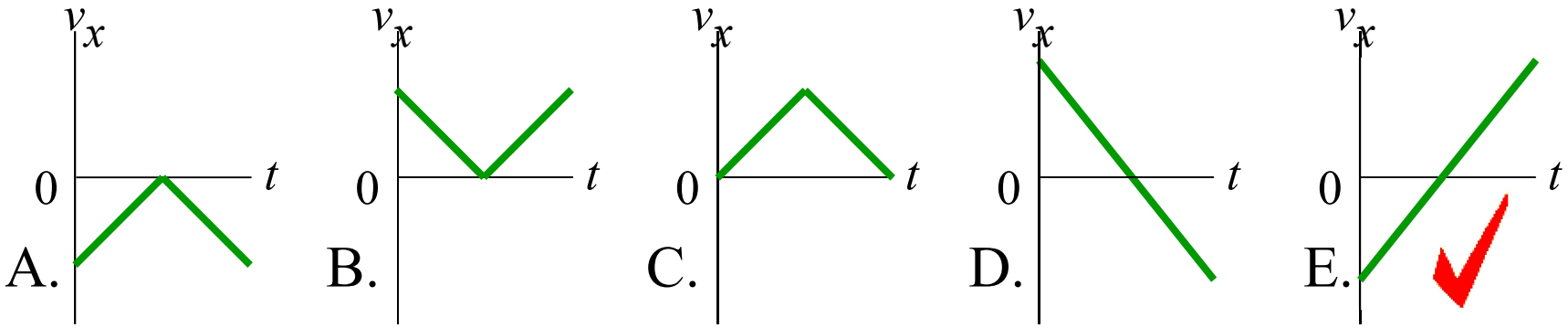
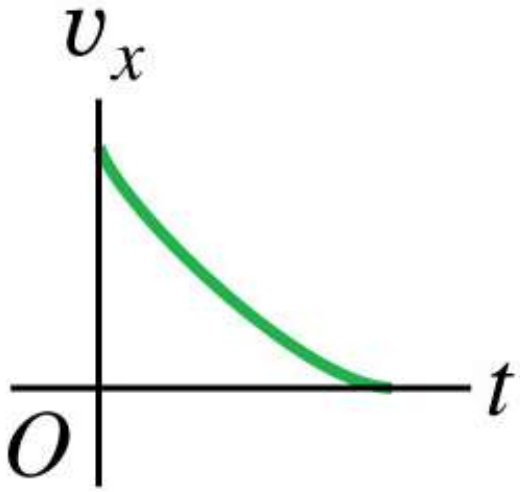


Q2.12

This is the v_x-t graph for an object moving along the x-axis.

Which of the following descriptions of the motion is most accurate?



A. The object is slowing down at a decreasing rate.

B. The object is slowing down at an increasing rate.

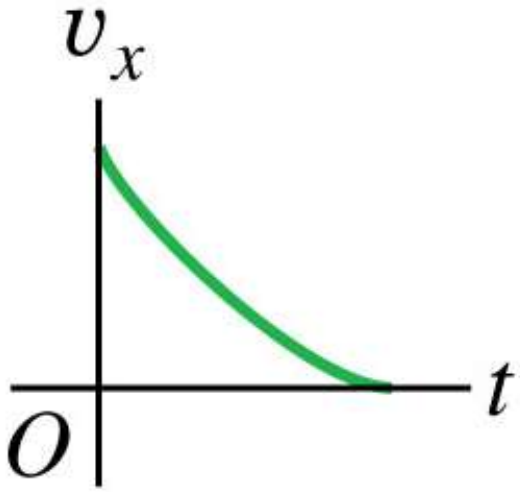
C. The object is speeding up at a decreasing rate.

D. The object is speeding up at an increasing rate.

E. The object's speed is changing at a steady rate.

A2.12

This is the v_x-t graph for an object moving along the x-axis.



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✓ C. The object is speeding up at a decreasing rate.

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Q2.13

You are given the v_x-t graph for an object moving along the x-axis with constant acceleration. Which of the following could you ***not*** determine from the information given in this graph alone?

A. the object's x-acceleration at any time t

B. the object's x-velocity at any time t

C. the object's position at any time t

D. more than one of the above

E. misleading question—you could determine all of these from the v_x-t graph alone

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E. misleading question—you could determine all of these from the v_x-t graph alone

Q2.14

The position of an object moving along the x-axis is given by

$$x = 5.0\ \text{m} - (4.0\ \text{m/s})t + (2.0\ \text{m/s}^2)t^2$$

Which statement about this object is *correct*?

A. For $t > 0$, the object is never at rest.

B. The object is at rest at $t = 0.5$ s.

C. The object is at rest at $t = 1.0$ s.

D. The object is at rest at $t = 2.0$ s.

E. More than one of B, C, and D is correct.

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Q2.15

The position of an object moving along the x-axis is given by

$$x = 5.0\ \text{m} - (4.0\ \text{m/s})t + (2.0\ \text{m/s}^2)t^2$$

How many times does this object pass through the point $x = 0$?

A. twice, first moving in the positive x-direction, then moving in the negative x-direction

B. twice, first moving in the negative x-direction, then moving in the positive x-direction

C. only once, moving in the positive x-direction

D. only once, moving in the negative x-direction

E. never

A2.15

The position of an object moving along the x-axis is given by

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C. only once, moving in the positive x-direction

D. only once, moving in the negative x-direction

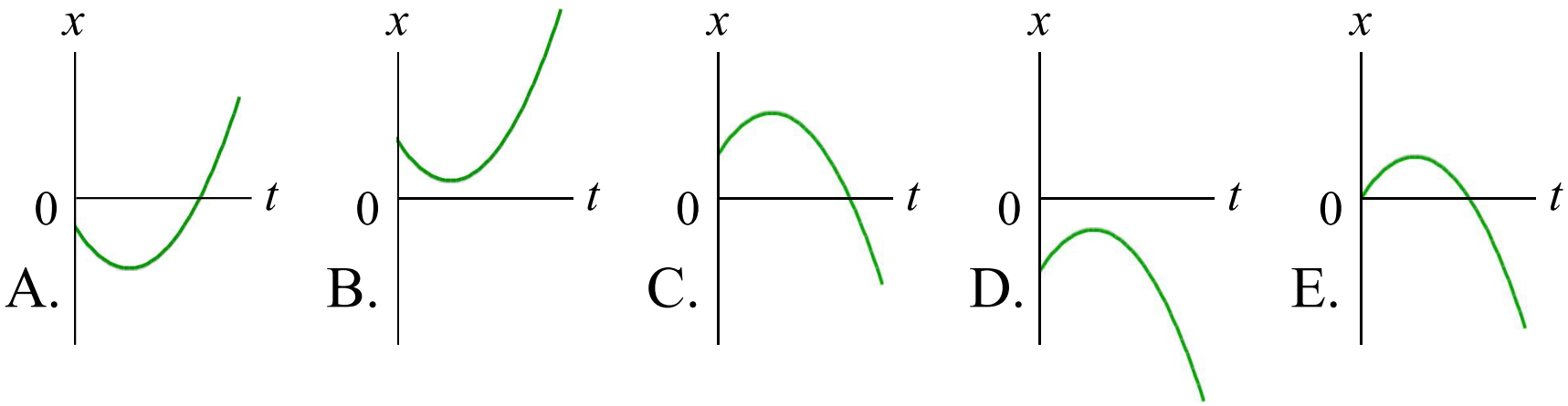
E. never

Q2.16

The position of an object moving along the x-axis is given by

$$x = 5.0\ \text{m} + (4.0\ \text{m/s})t - (2.0\ \text{m/s}^2)t^2$$

Which of the following x–t graphs (graphs of position vs. time) is correct for this motion?



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The position of an object moving along the x-axis is given by

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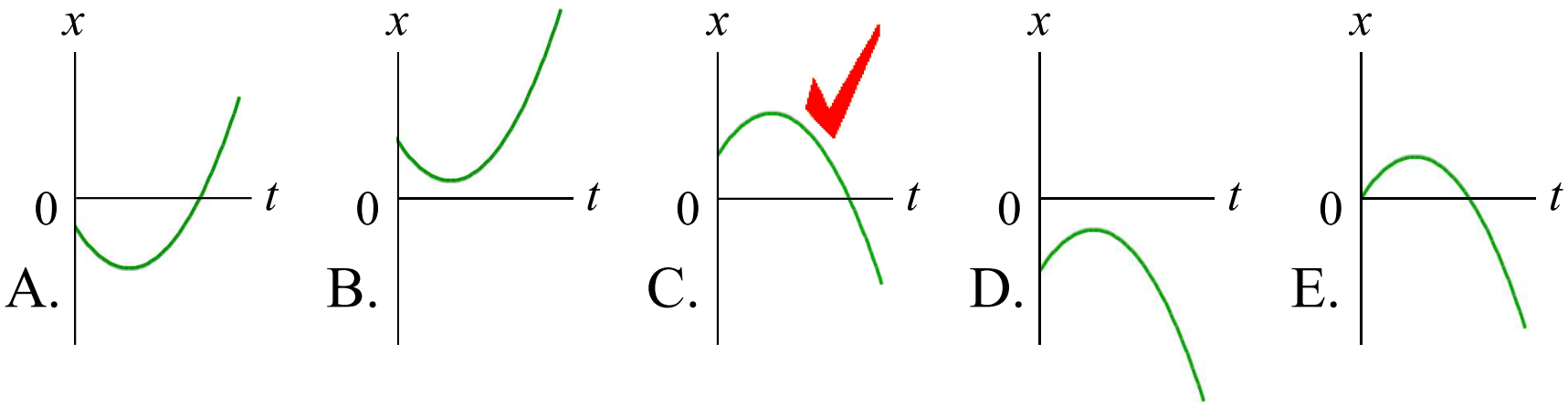
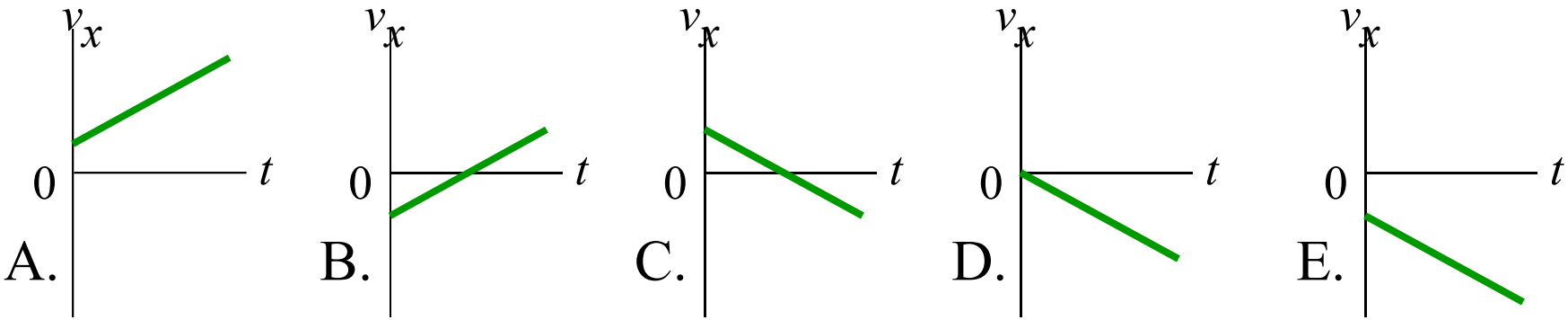


Q2.17

The position of an object moving along the x-axis is given by

$$x = 5.0\ \text{m} + (4.0\ \text{m/s})t - (2.0\ \text{m/s}^2)t^2$$

Which of the following v_x–t graphs (graphs of velocity vs. time) is correct for this motion?



A2.17

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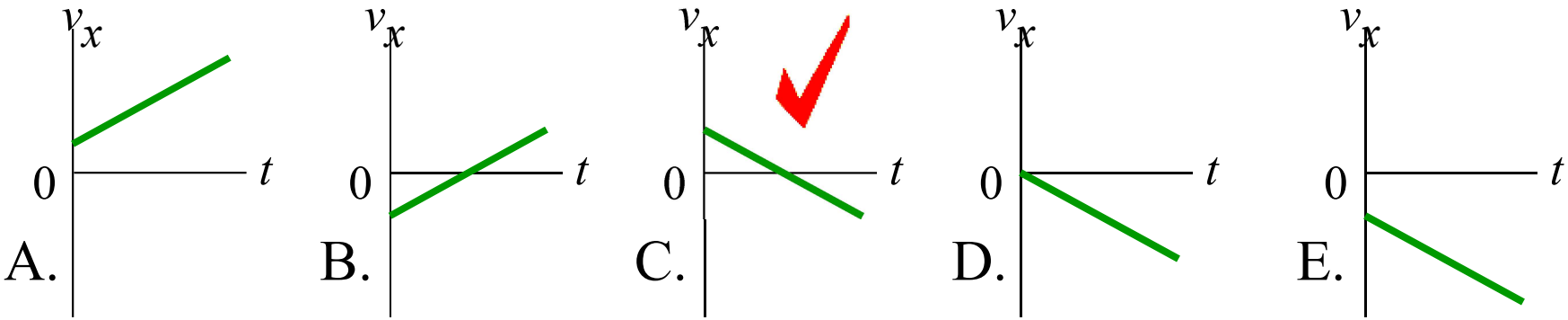

Q2.18

If you toss a ball upward with a certain initial speed, it falls freely and reaches a maximum height h.
By what factor must you increase the initial speed of the ball for it to reach a maximum height $3h$?

A. $\sqrt{3}$

B. 3

C. $3\sqrt{3}$

D. 9

E. 27

A2.18

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