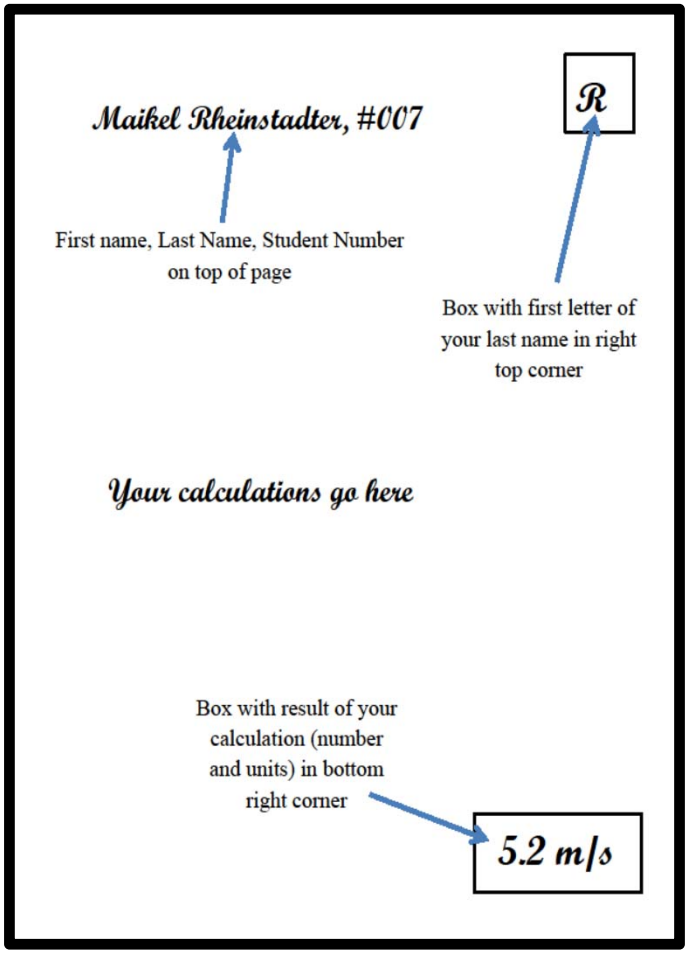
Theme 2
Mechanics

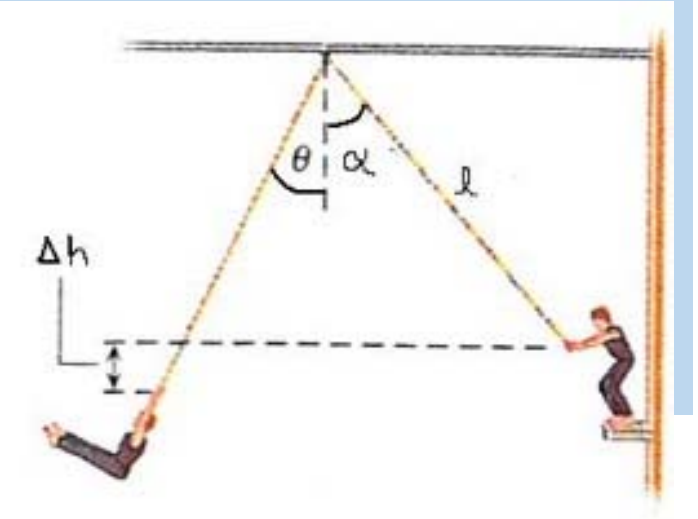
Module T2M1:
Kinematics

HOMEWORK!

LONCAPA Quiz 1



A aerialist on a high platform holds on to a trapeze attached to a support by a 7.6-m cord. Just before he jumps off the platform, the cord makes an angle α of 40.9deg with the vertical. He jumps, swings down, then back up, releasing the trapeze at the instant it is 0.68 m below its initial height. Calculate the angle θ that the trapeze cord makes with the vertical at this instant.



Module Clicker Quiz!

Now that you have had a chance to review the entire first module, T2M1, here is your first

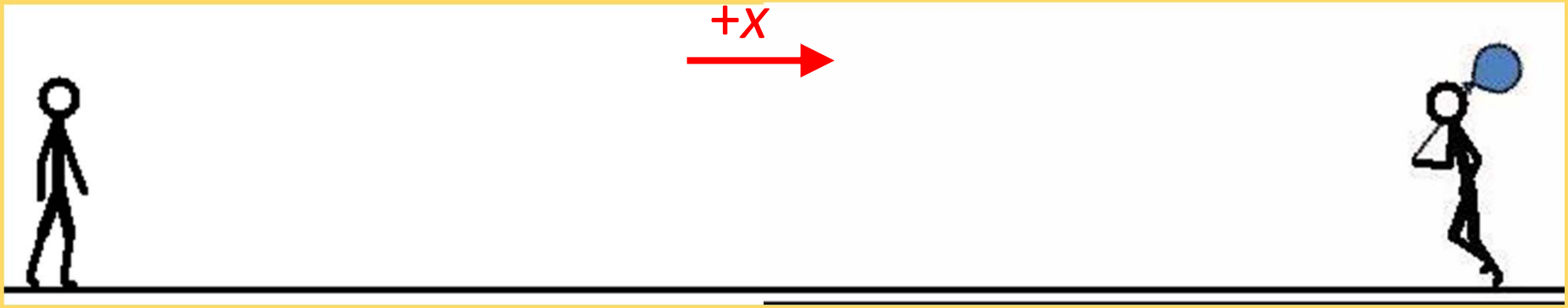
module quiz!

Module Clicker Quiz!

Direction of acceleration (120 seconds)

Person X
At rest then starts running

Person Y
At rest then starts running



A. $a_X > 0, \quad a_Y > 0$

B. $a_X < 0, \quad a_Y > 0$

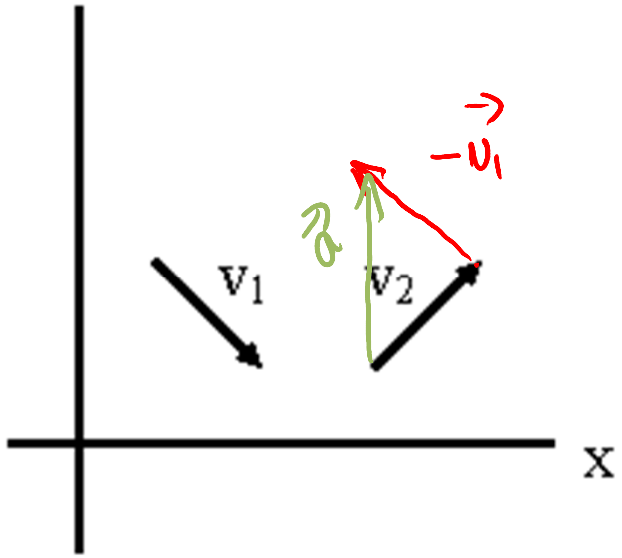
C. $a_X > 0, \quad a_Y < 0$

D. $a_X < 0, \quad a_Y < 0$

E. I don't know

RI-9. A particle is moving with <u>constant</u> acceleration. Its velocity vector at two different times is shown below. What is the direction of the acceleration?

$$\vec{a} = \frac{\Delta \vec{v}}{\Delta t} = \frac{\vec{v}_2 - \vec{v}_1}{\Delta t}$$



A)

D) B)

C)

E) Some other direction

Misconceptions

1=YES, 2=NO, 3=MAYBE

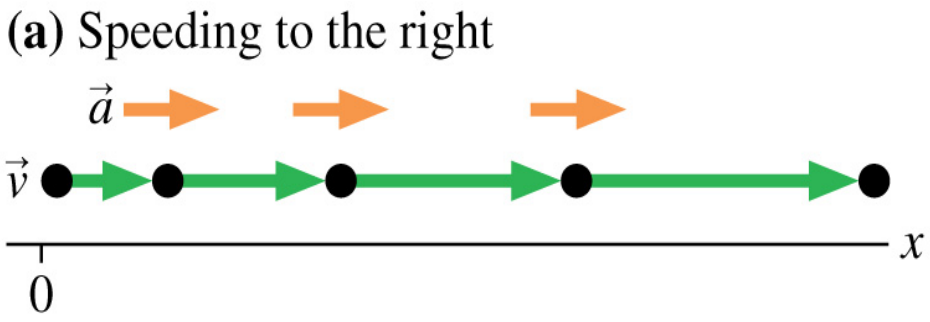
1 velocity is constant then acceleration is also constant.

2 If an object moves with a high speed then its acceleration is high and if an object moves with a low velocity then the acceleration is low.

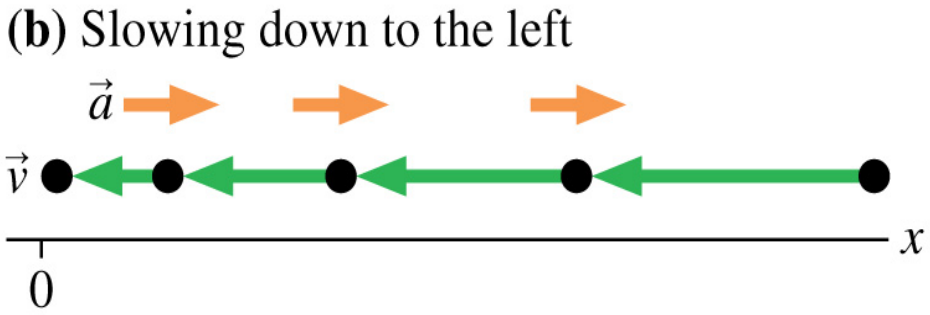
3 If the acceleration is positive than the object speeds up, and if the acceleration is negative then the object is slowing down.

4 What is negative acceleration?

Signs of position, velocity, acceleration

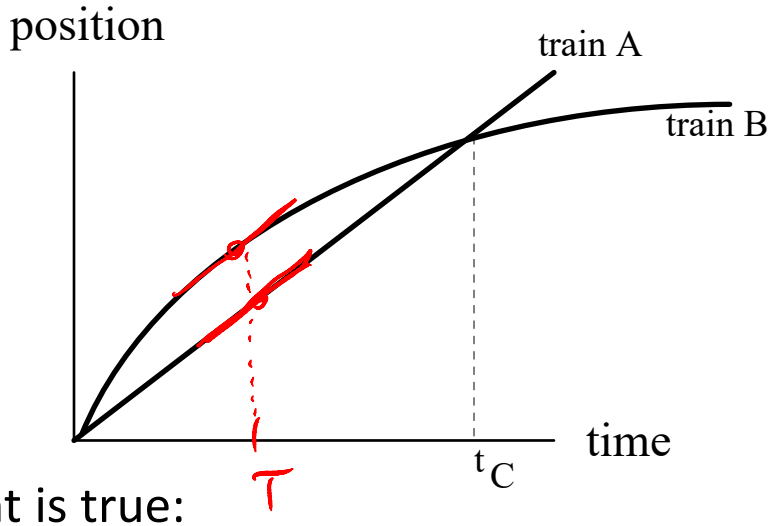


$x>0$, $\Delta x>0$, $v>0$, $a>0$



$x>0$, $\Delta x<0$, $v<0$, $a>0$

The graph show positions as a function of time for two trains running on parallel tracks.

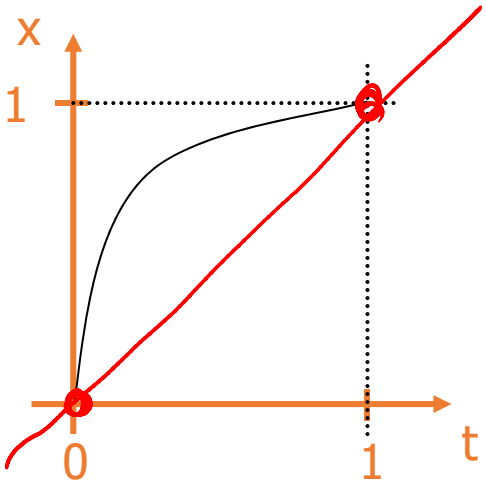


Which statement is true:

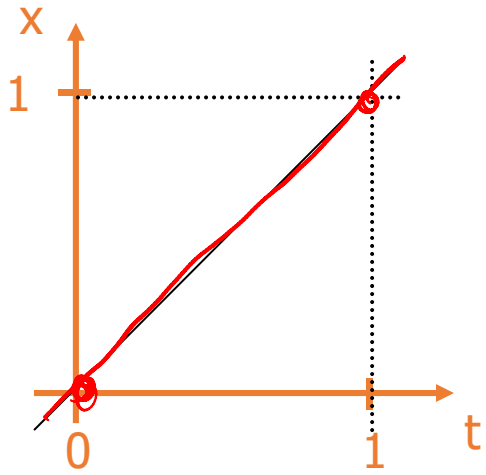
A. At time t_C, both trains have the same velocity.
B. Both trains speed up all the time.
C. Both trains have the same velocity at some time before t_C.
D. At some time, both trains have the same acceleration.
E. None of the above statements is true.

Which of the motions described has the larger **average** velocity in the interval 0s<t<1s?

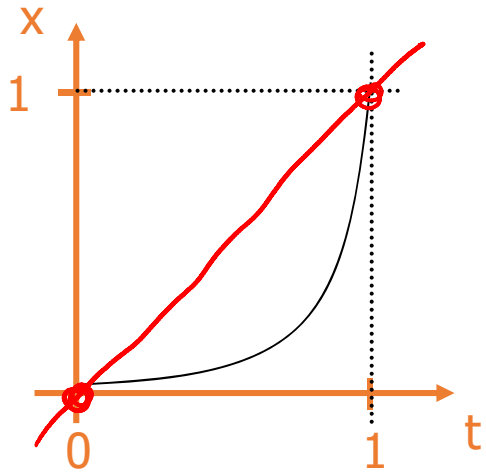
a)



b)



c)



A) $v_a > v_b > v_c$.
B) $v_c > v_b > v_a$.
C) $v_b > v_a > v_c$.
D) $v_b > v_c > v_a$.
E) $v_a = v_b = v_c$.

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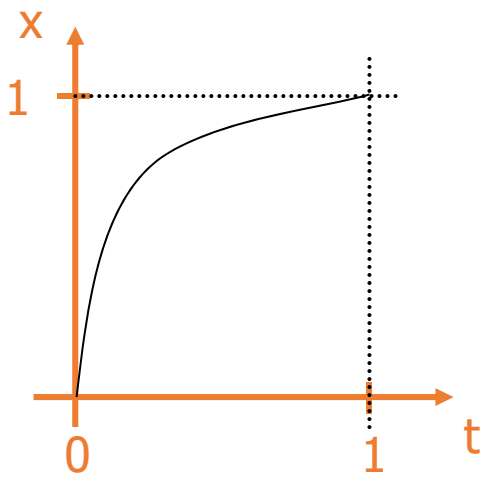
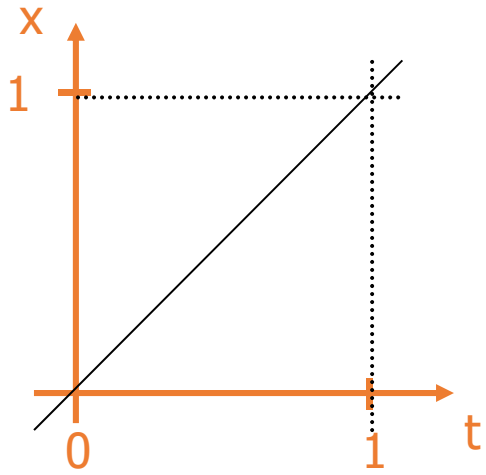
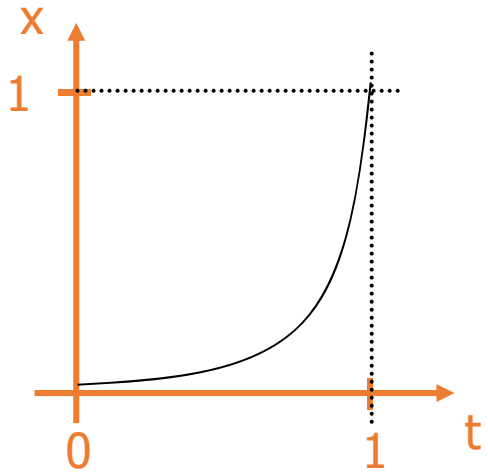


b)



c)



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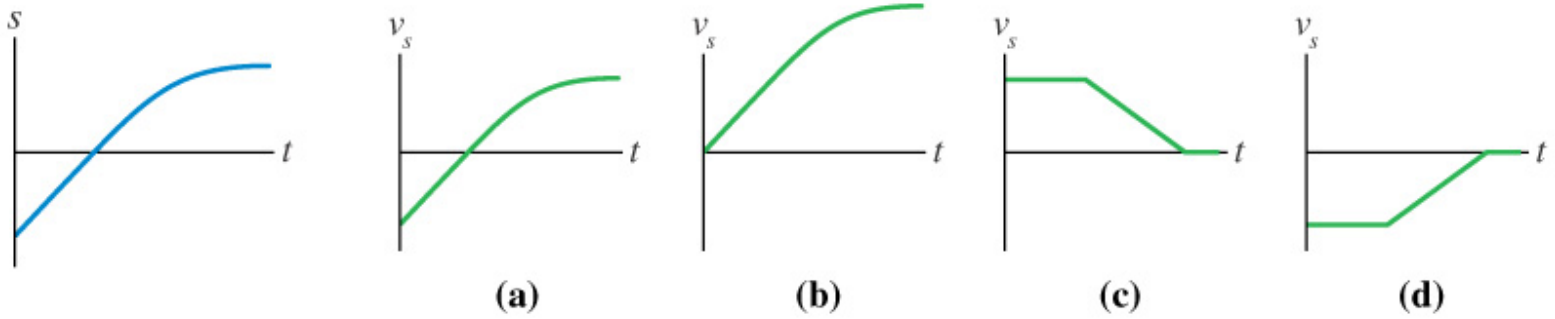
Which velocity-versus-time graph goes with this position-versus-time graph on the left?



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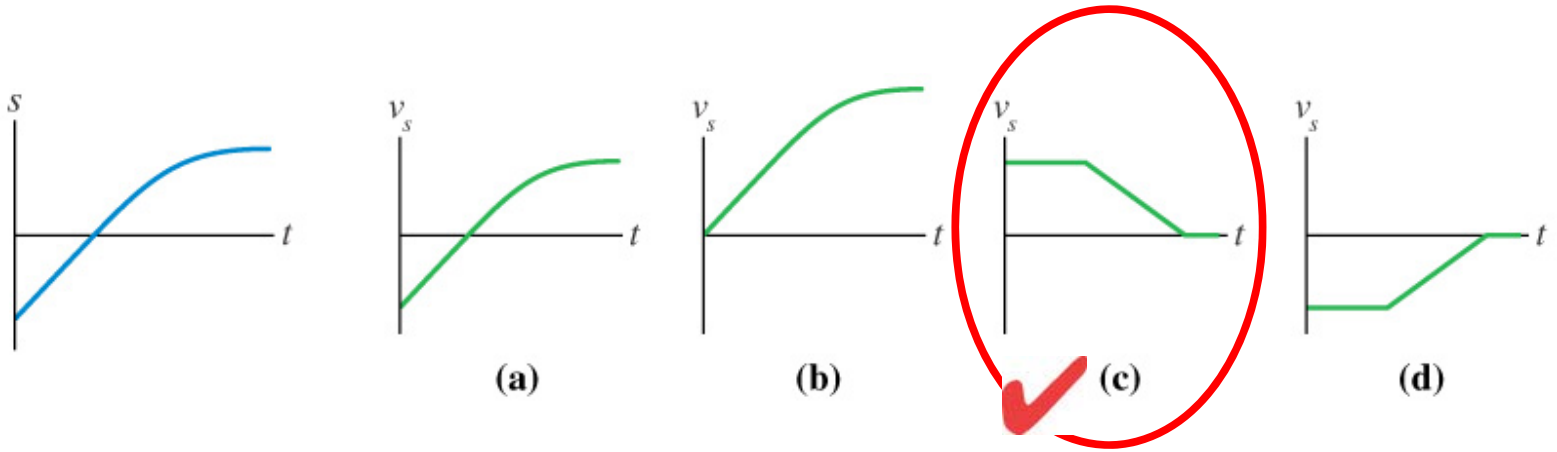
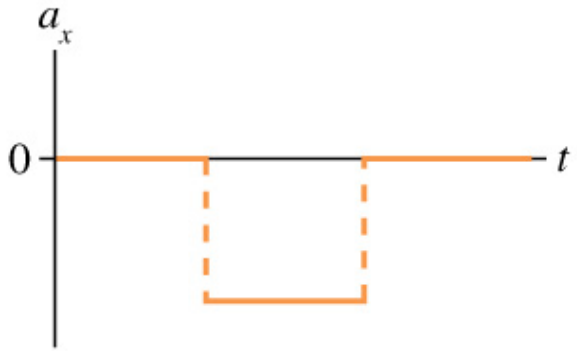
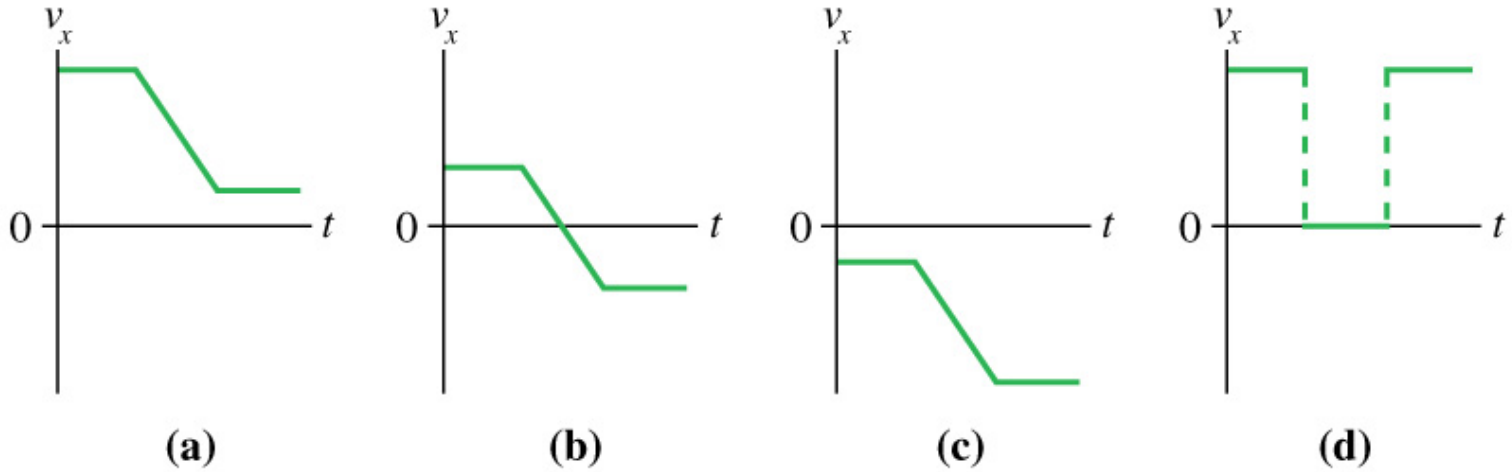


Which velocity-versus-time graph or graphs goes with this acceleration-versus-time graph? The particle is initially moving to the right and eventually to the left.





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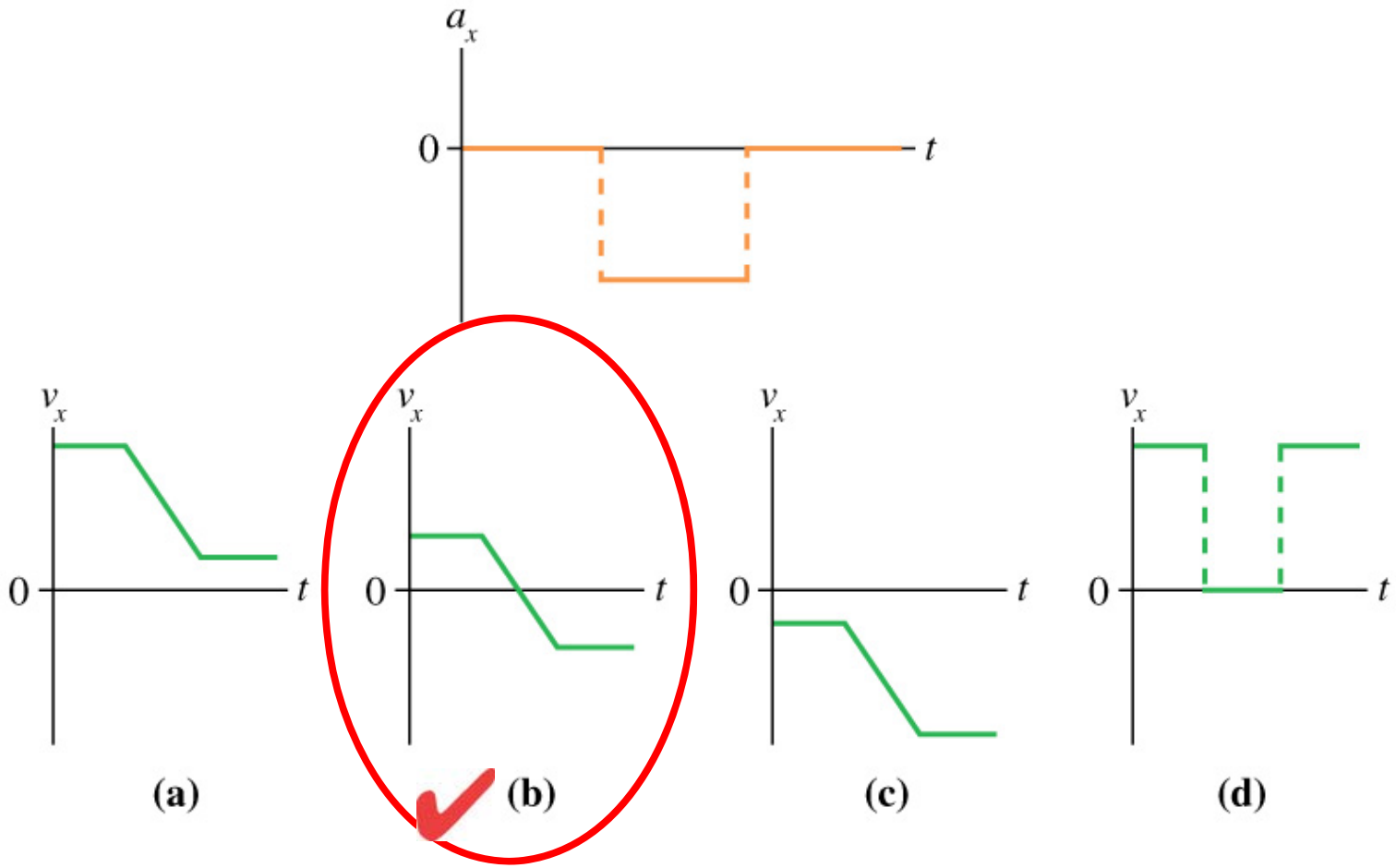


Equations of Motion

derivative

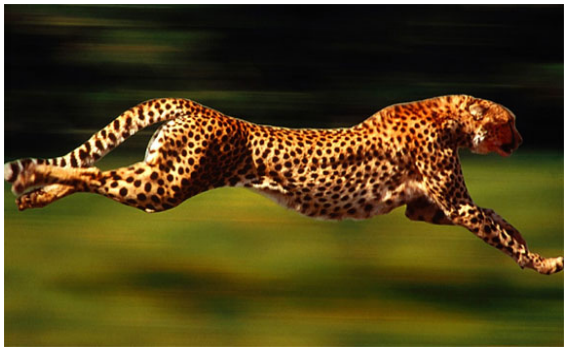
integrate

$$a = constant$$

$$v(t) = at + v_0$$

$$x(t) = \frac{1}{2}at^2 + v_0 t + x_0$$

Cheetah Sprint – Graphical Solution



A cheetah can sprint at a speed of 110 km/h. The best a human is capable of is a speed of 35 km/h. A man and a cheetah are initially 0.400 km apart. Assuming that both man and cheetah are running at their top speed, how long does it take the cheetah to overtake the man?