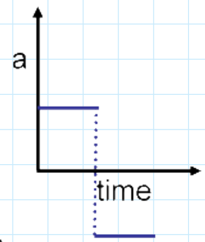
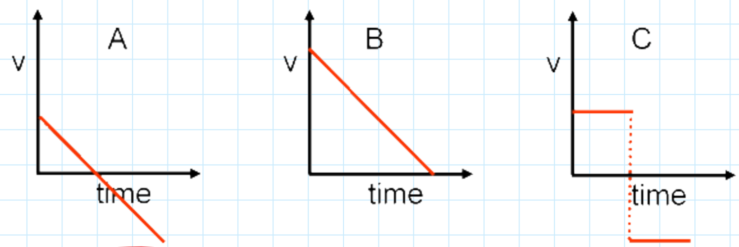
Phy 4A 12/9

Friday, December 9, 2016 8:34 AM

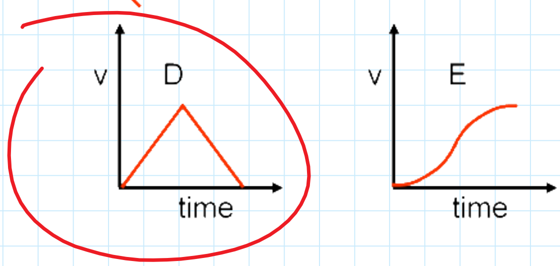
Review for Final

Which of the graphs of ***velocity*** versus time could correspond to the graph of ***acceleration*** versus time shown on the right?

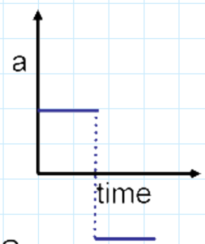


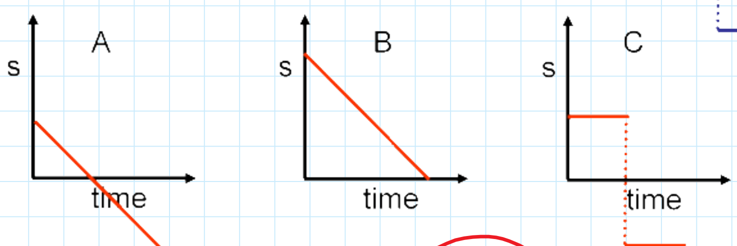


1. A
2. B
3. C
4. D
5. E

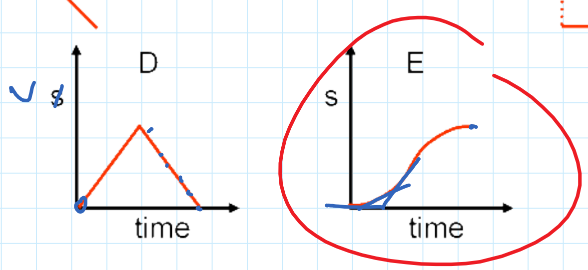


Which of the graphs of ***distance*** versus time corresponds to the graph of ***acceleration*** versus time shown on the right?

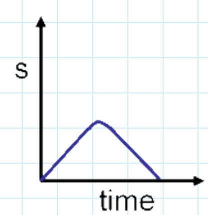


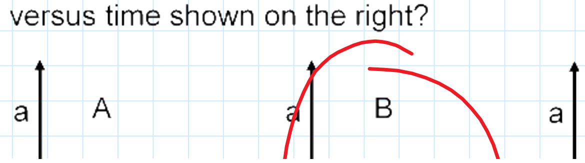


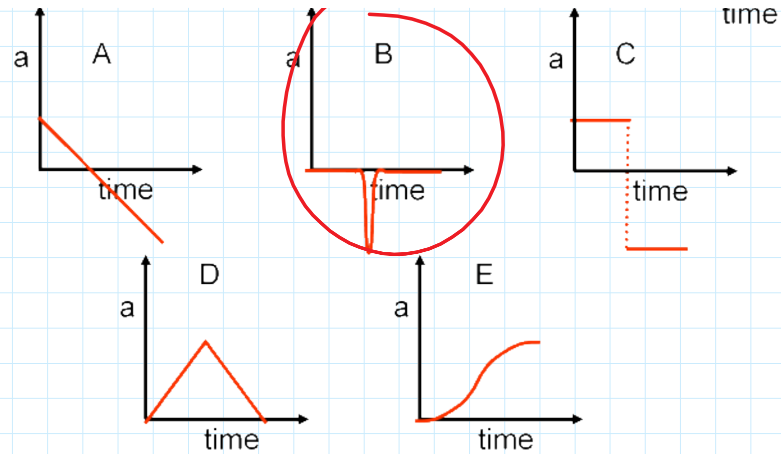
1. A
2. B
3. C
4. D
5. E



Which of the graphs of ***acceleration*** versus time corresponds to the graph of ***distance*** versus time shown on the right?

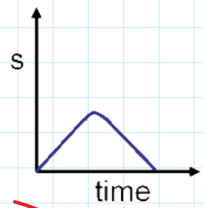


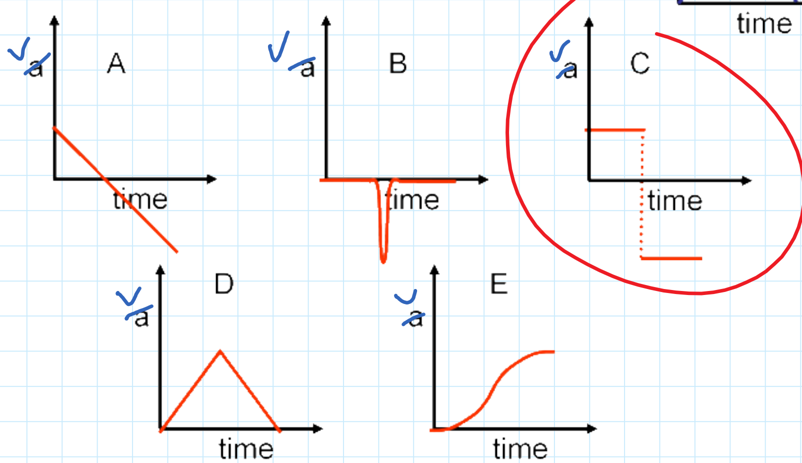




1. A
2. B
3. C
4. D
5. E

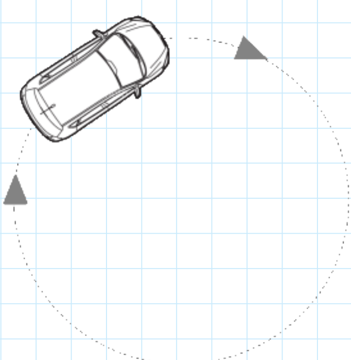
Which of the graphs of ~~***acceleration***~~ velocity versus time corresponds to the graph of ***distance*** versus time shown on the right?





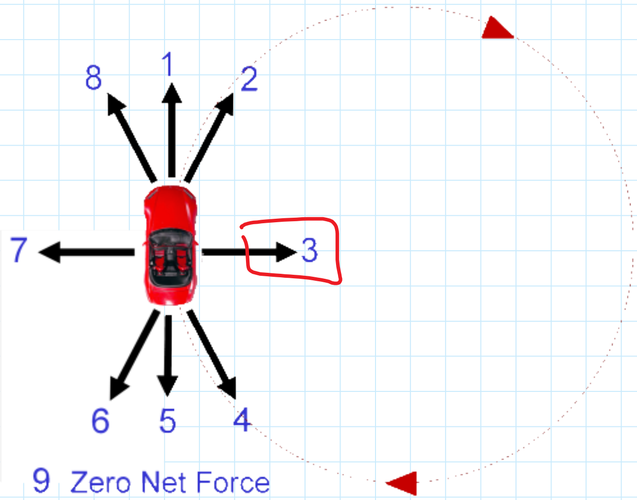
1. A
2. B
3. C
4. D
5. E

A car rounds a circle while maintaining a constant speed. At the instant shown below, is there an acceleration on the car as it rounds the curve?



1. No, because its speed is constant.
2. Yes.
3. Not enough information is given to answer this question.

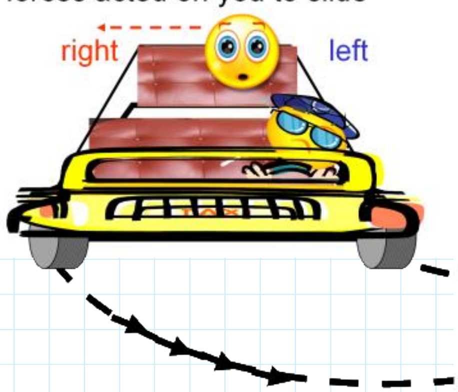
A car rounds a circle while maintaining a constant speed. Which arrow represents the direction of the net force on the car as it rounds the curve at the instant shown below?



If slowing down

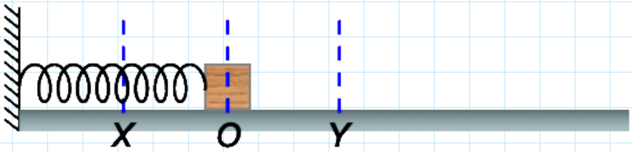
4

You are sitting in the back seat of a taxi. The taxi driver makes a very sharp turn to the left, but maintaining a constant speed. Because you did not wear the seat belt, you begin to slide to the right. Which of the following forces acted on you to slide you to the right?



1. Centripetal force to the right
2. Centripetal force to the left
3. Friction force to the right
4. Friction force to the left
5. There was no force that made you slide to the right.

A block attached to a spring is oscillating between point ***X*** (fully compressed) and point ***Y*** (fully stretched). At point X, which of the following quantities would reach its maximum value?



Choose From Some or All of the Following:

1. The block's kinetic energy
2. The spring potential energy
3. The magnitude of the block's momentum
4. The magnitude of the block's acceleration
5. The magnitude of the block's velocity
6. The magnitude of the net force on the block

2, 4, 6

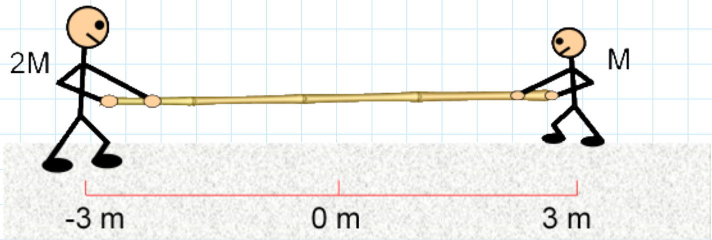
At point O, which have reached their maximum values?

1, 3, 5

At point Y, which have reached their maximum values?

2, 4, 6

A large skinny guy with mass 2M and a smaller guy with mass M are holding onto a ***massless*** pole while standing on ***frictionless*** ice, as shown below. If the big guy pulls himself toward the little guy, where would they meet?



1. -3 m
2. -2 m
3. -1 m
4. 0 m
5. 1 m
6. 2 m
7. 3 m
8. None of the above

$$X_{cm} = \frac{\Sigma mx}{\Sigma m} = \frac{(2M)(-3) + (M)(3)}{2M + M} = -1$$

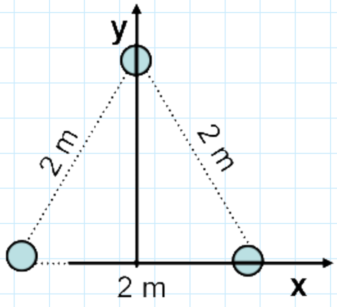
If the little guy pulls himself toward the big guy, where would they meet?

Same, $x = -1$ m

Three tiny equal-mass magnets are placed on a horizontal frictionless surface at the corners of an equilateral triangle (all sides 2 m and all angles 60^0). When the magnets are released, they attract and quickly slide to a single point. What are the x and y coordinates of that point? (Before release, the y-axis

Three tiny equal-mass magnets are placed on a horizontal frictionless surface at the corners of an equilateral triangle (all sides 2 m and all angles 60^0). When the magnets are released, they attract and quickly slide to a single point. What are the x and y coordinates of that point? (Before release, the y-axis passed through the top ball and the x-axis passed through the bottom balls.)

	x	y
1.	0 m	0 m
2.	0 m	1 m
3.	0 m	.58 m
4.	0 m	.87 m
~~5.~~	~~.67 m~~	~~.67 m~~
6.	0 m	.67 m

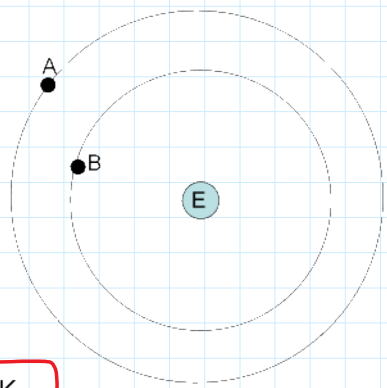


$x_{cm} = 0$

$$y_{cm} = \frac{m(0) + m(0) + m(2\cos 30)}{3m}$$

$$= \frac{2\cos 30}{3} = 0.58 \text{ m}$$

Which satellite has a larger kinetic energy, K? Assume orbits are circular and both satellites have the same mass.



1. $K_A < K_B$
2. $K_A > K_B$
3. $K_A = K_B$
4. Cannot be calculated

$$\Sigma F_{radial} = M\frac{v^2}{r}$$

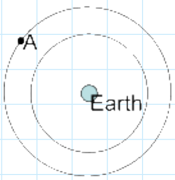
$$\frac{G m M_E}{r^2} = \frac{m v^2}{r}$$

$$\frac{G M_E}{r} = v^2$$

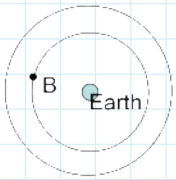
$$KE = \frac{1}{2} m v^2$$

Which satellite-earth system has a larger potential energy? Assume orbits are circular and both satellites have the same mass.

$$U_g = -\frac{GmM}{r}$$



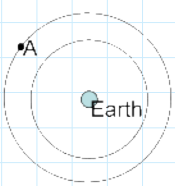
Satellite-earth System A



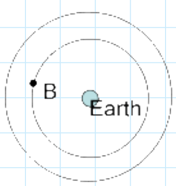
Satellite-earth System B

1. Satellite-earth System A
2. Satellite-earth System B
3. Both have the same potential energy
4. Cannot be calculated

Which satellite-earth system has a larger total energy? Assume orbits are circular and both satellites have the same mass.



Satellite-earth System A



Satellite-earth System B

1. Satellite-earth System A
2. Satellite-earth System B
3. Both have the same total energy
4. Cannot be calculated

$$E = K + U_g$$
$$= \frac{1}{2}mv^2 - \frac{GmM}{r}$$
$$= \frac{1}{2}m\left(\frac{GM_E}{r}\right) - \frac{GmM_E}{r}$$
$$= -\frac{1}{2}\frac{GmM_E}{r}$$

$r_A > r_B$

so, $E_A > E_B$ (since it is Negative $-3 > -5$)

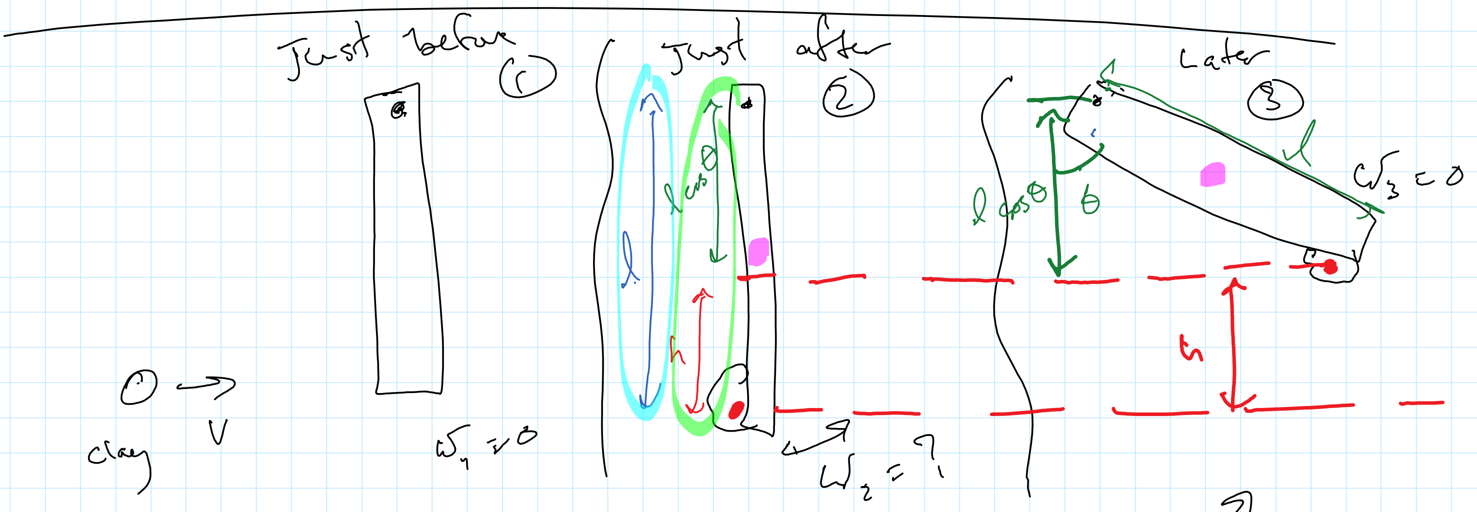
Oscillations

mass on sp

mass on spring: $\omega = \sqrt{\frac{K}{m}}$ ←

simple pendulum $\omega = \sqrt{\frac{g}{L}}$

Physical pendulum: $\omega = \sqrt{\frac{mgd}{I}}$



$L_1 = L_2$

$E_2 = E_3$

$L_{clay} + L_{board} = L_{C+B}$

$m_c V r_\perp + 0 = (I_{total})\, \omega_2$

$m_c V l = (I_c + I_b)\, \omega_2$

$m_c V l = \left(m_c l^2 + \frac{1}{3} m_b l^2\right) \omega_2$

$\omega_2 =$ ____

$E_2 = E_3$

$\frac{1}{2} I \omega_2^2 = m_c g h_1 + m_b g h_2$

I_{total}

$h_1 = l - l\cos\theta$

$h_2 = \frac{1}{2} h_1 = \frac{l}{2} - \frac{l}{2}\cos\theta$