WebAssign
CH05-HW02-SP12 (Homework)

Yinglai Wang
PHYS 172-SPRING 2012, Spring 2012
Instructor: Virendra Saxena

Current Score : 28 / 28 **Due :** Tuesday, February 14 2012 11:59 PM EST

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1. 5/5 points | Previous Answers MI3 5.3.X.023

You throw a ball straight up in the air. At the instant the ball reaches its highest location, what is the direction of the momentum $\vec{p}$ of the ball?

zero magnitude ✓

At the instant the ball reaches its highest location, what is the direction of the rate of change of momentum $\frac{d\vec{p}}{dt}$ of the ball?

-y ✓

At the instant the ball reaches its highest location, what is the direction of the net force $\vec{F}_{net}$ acting on the ball?

-y ✓

You launch a fan cart to the right along a track, with the fan blowing against the motion. At the instant the cart reaches its farthest location to the right (just before moving back to the left), what is the direction of the momentum $\vec{p}$ of the cart?

zero magnitude ✓

At the instant the cart reaches its farthest location to the right, what is the direction of the rate of change of momentum $\frac{d\vec{p}}{dt}$ of the cart?

-x ✓

At the instant the cart reaches its farthest location to the right, what is the direction of the net force $\vec{F}_{net}$ acting on the cart?

-x ✓

A block oscillates up and down at the end of a vertical spring. At the instant the block reaches its lowest position, what is the direction of the momentum $\vec{p}$ of the block?

zero magnitude ✓

At the instant the block reaches its lowest position, what is the direction of the rate of change of momentum $\frac{d\vec{p}}{dt}$ of the block?

+y ✓

At the instant the block reaches its lowest position, what is the direction of the net force $\vec{F}_{net}$ acting on the block?

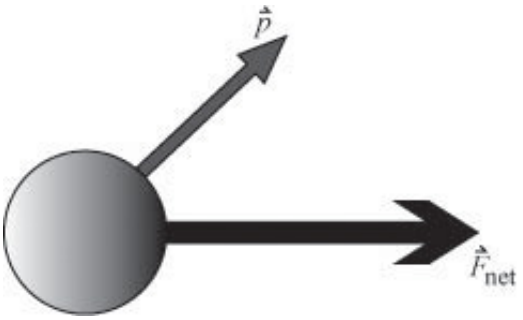
+y ✓

- *Read the eBook*
- Section 5.3

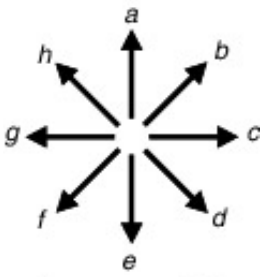
2. 1.5/1.5 points | Previous Answers

The figure below shows a moving ball, its momentum, and the net force acting on it an instant in time.

In the questions below, [ ] is rate of change of the ball's momentum, [ ] is the component of [ ] that is parallel to the ball's momentum, and [ ] is the component perpendicular to the ball's momentum.



What is the direction of [ ] at this instant? b ✓



j zero magnitude

What is the direction of [ ] at this instant? d ✓

At this instant, the ball's speed is:

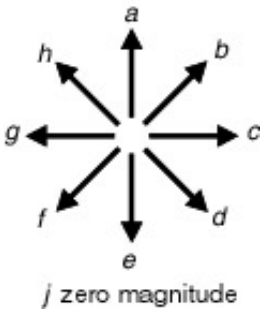
- ○ not changing
- ○ decreasing
- ◉ increasing ✓

3. 1.5/1.5 points | Previous Answers

The figure below shows a moving ball, its momentum, and the net force acting on it an instant in time.

In the questions below, [ ] is rate of change of the ball's momentum, [ ] is the component of [ ] that is parallel to the ball's momentum, and [ ] is the component perpendicular to the ball's momentum.

What is the direction of [ ] at this instant? f ✓



What is the direction of [ ] at this instant? d ✓

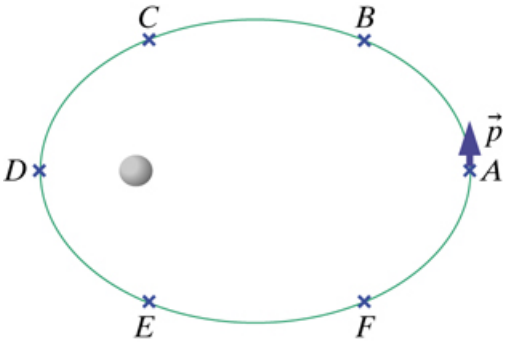
At this instant, the ball's speed is:

- ○ increasing
- ◉ decreasing
- ○ not changing

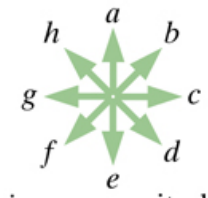
✓

4. 3/3 points | Previous Answers MI3 5.4.X.026

A comet orbits a star in an elliptical orbit, as shown. The momentum of the comet at location *A* is also shown.



Use the directions shown to answer the following questions.



j zero magnitude

At location A:

What is the direction of the gravitational force exerted on the comet by the star? g ✔

Is the parallel component of the net force on the comet zero or nonzero? zero ✔

Is the perpendicular component of the net force on the comet zero or nonzero? nonzero ✔

Is $\frac{d|\vec{p}|}{dt}$, the rate of change of the magnitude of the comet's momentum, positive, negative, or zero? zero ✔

Is $\hat{p}$, the direction of the comet's momentum, changing or not changing? changing ✔

At location C:

What is the direction of the gravitational force exerted on the comet by the star? e ✔

Is the parallel component of the net force on the comet zero or nonzero? nonzero ✔

Iis the perpendicular component of the net force on the comet zero or nonzero? nonzero ✔

Is $\frac{d|\vec{p}|}{dt}$, the rate of change of the magnitude of the comet's momentum, positive, negative, or zero? positive ✔

Is $\hat{p}$ the direction of the comet's momentum, changing or not changing? changing ✔

At location F:

What is the direction of the gravitational force exerted on the comet by the star? h

Is the parallel component of the net force on the comet zero or nonzero? nonzero

Is the perpendicular component of the net force on the comet zero or nonzero? nonzero

Is $\frac{d|\vec{p}|}{dt}$, the rate of change of the magnitude of the comet's momentum, positive, negative, or zero? negative

Is $\hat{p}$, the direction of the comet's momentum, changing or not changing? changing

- *Read the eBook*
- Section 5.4

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5. 2/2 points | Previous Answers MI3 5.4.X.020

A review of the basics of circular motion: The radius of a merry-go-round is 11 meters, and it takes 8 seconds to go around once. We want to calculate the speed of an atom in the outer rim. First, how far does the atom go in 8 s? (This distance is the circumference of the circle.)

distance = 69.12 m

Therefore, what is the speed of the atom?

speed = 8.64 m/s

What is the direction of the velocity of this atom?

- ○ towards the center
- ○ away from the center
- ◉ tangential

- *Read the eBook*
- Section 5.4

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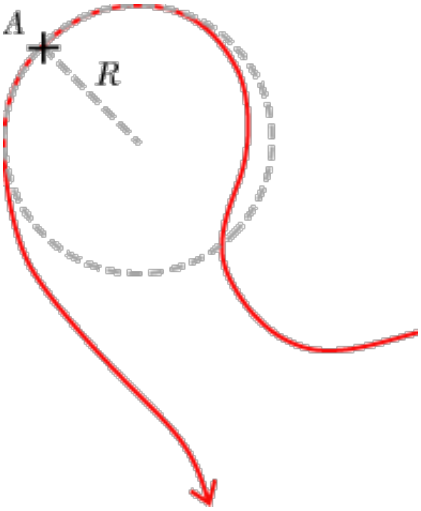
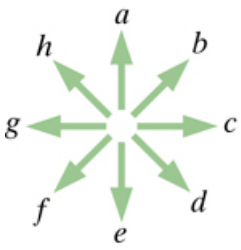
6. 8/8 points | Previous Answers MI3 5.5.X.032





⊙ *j* out of the page

⊗ *k* into the page

0 *m* zero magnitude

A proton follows the curving path shown in red. The dotted gray circle is the kissing circle tangent to the path when the proton is at location *A*. The proton is traveling at a constant speed of 4.0×10^5 m/s, and the radius of the kissing circle is 0.07 m. The mass of a proton is 1.7×10^{-27} kg. Refer to the directional arrows shown at right when answering the questions below.

When the proton is at location *A*, what are the magnitude and direction of $\frac{d|\vec{p}|}{dt}\hat{p}$, the parallel component of $\frac{d\vec{p}}{dt}$?

magnitude = 0 ✓ kg·m/s/s

m ✓

When the proton is at location *A*, what are the magnitude and direction of $|\vec{p}|\frac{d\hat{p}}{dt}$, the perpendicular component of $\frac{d\vec{p}}{dt}$?

magnitude = 3.89e-15 ✓ kg·m/s/s

d ✓

- *Read the eBook*
- Section 5.5

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7. 7/7 points | Previous Answers MI3 5.5.X.034

A child of mass 29 kg sits on a wooden horse on a carousel. The wooden horse is 4.5 m from the center of the carousel, which rotates at a constant rate and completes one revolution every 5.4 seconds.

(a) What are the magnitude and direction of $\frac{d|\vec{p}|}{dt}\hat{p}$, the parallel component of $\frac{d\vec{p}}{dt}$ for the child?

magnitude: 0 ✓ kg·m/s/s

- ○ tangential, in direction of velocity
- ○ tangential, opposite direction of velocity
- ○ radial, outward
- ○ radial, inward
- ◉ magnitude is zero, so direction is undefined

(b) What are the magnitude and direction of $|\vec{p}|\frac{d\hat{p}}{dt}$, the perpendicular component of $\frac{d\vec{p}}{dt}$ for the child?

magnitude: 176.68 ✓ kg·m/s/s

- ○ tangential, in direction of velocity
- ○ tangential, opposite direction of velocity
- ○ radial, outward
- ◉ radial, inward
- ○ magnitude is zero, so direction is undefined

(c) What are the magnitude and direction of the net force acting on the child?

magnitude: 176.68 ✓ N

- ○ tangential, in direction of velocity
- ○ tangential, opposite direction of velocity
- ○ radial, outward
- ◉ radial, inward
- ○ magnitude is zero, so direction is undefined

(d) What objects in the surroundings contribute to this horizontal net force acting on the child? (There are also vertical forces, but these cancel each other if the horse doesn't move up and down. Select all that apply.)

- [ ] The centrifugal force
- [x] The wooden horse
- [ ] The child

- *Read the eBook*
- Section 5.5