Web**Assign**
CH01-HW03-SP12 (Homework)

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

Current Score : 26 / 26   **Due :** Tuesday, January 17 2012 11:59 PM EST

The due date for this assignment is past. Your work can be viewed below, but no changes can be made.

Important! Before you view the answer key, decide whether or not you plan to request an extension. Your Instructor may *not* grant you an extension if you have viewed the answer key. Automatic extensions are not granted if you have viewed the answer key.

View Key

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1. 2/2 points | Previous Answers   MI3 1.7.X.035

Powerful sports cars can go from zero to 25 m/s (about 60 mph) in 6 seconds.
What is the magnitude of the acceleration, including units?

4.12 ✔   m/s/s ✔

How does this compare with the acceleration of a falling rock?

- ⦿ It is less.
- ◯ It is the same.
- ◯ It is greater.

✔

- • *Read the eBook*
- • Section 1.7

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2. 1/1 points | Previous Answers

A baseball has a mass of about 155 g. What is the magnitude of the momentum of a baseball thrown at a speed of 94 miles per hour? (Note that you need to convert mass to kilograms and speed to meters/second. A mile is 1.6 kilometers or 1600 meters.)

$|\vec{p}|$ = 6.48 ✔   kg·m/s

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3. 6/6 points | Previous Answers

An electron travels at speed $|\vec{v}|$ = 0.995c, where c = 3e8 m/s is the speed of light. It travels in the direction given by the unit vector $\hat{v}$ = < 0.267, -0.802, -0.535 >. The mass of an electron is 9×10^{-31} kg.

What is the value of $\gamma = \dfrac{1}{\sqrt{1 - (|\vec{v}|/c)^2}}$? You can simplify the calculation if you notice that $(|\vec{v}|/c)$ = 0.995.

γ = ☐10 ✔

What is the speed of the electron?
$|\vec{v}|$ = ☐2.985e8 ✔   m/s

What is the magnitude of the electron's momentum?
$|\vec{p}|$ = ☐2.69e-21 ✔   kg · m/s

What is the vector momentum of the electron? Remember that any vector can be "factored" into its magnitude times its unit vector, so that $\vec{v}$ = $|\vec{v}|\hat{v}$.
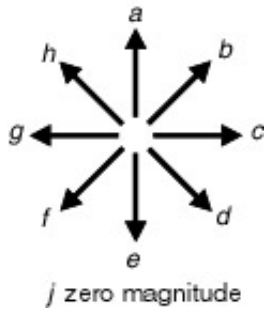
$\vec{p}$ = < ☐7.2e-22 ✔ , ☐-2.15e-21 ✔ , ☐-1.44e-21 ✔ > kg · m/s

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4. 8/8 points | Previous Answers
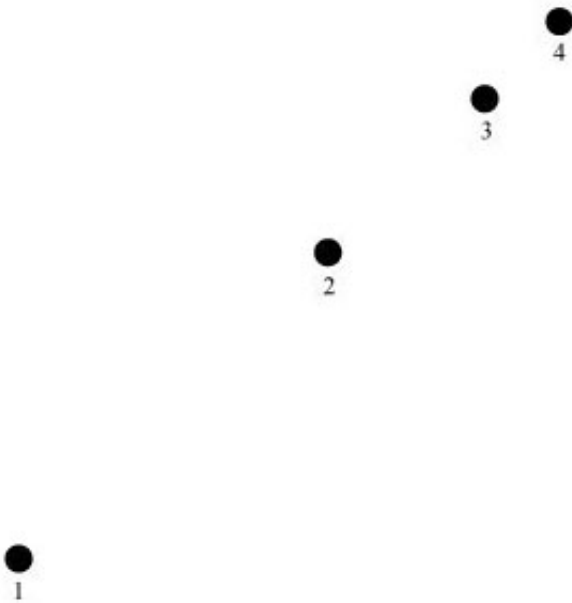
The diagram shows a single moving object at instants in time separated by *equal* time intervals.

Which arrow (a-j) best indicates the direction of the object's velocity ☐❓ at point 1? ☐b ✔

j zero magnitude

Which arrow (a-j) best indicates the direction of the object's velocity [?] at point 2? b ✔

Which arrow (a-j) best indicates the direction of the object's momentum [?] at point 1? b
✔

Which arrow (a-j) best indicates the direction of the object's momentum [?] at point 2? b
✔

Which is true about the magnitudes of the velocities at points 1 and 2?

[?] > ✔ [?]

Which is true about the magnitudes of the momenta at points 1 and 2?

[?] > ✔ [?]

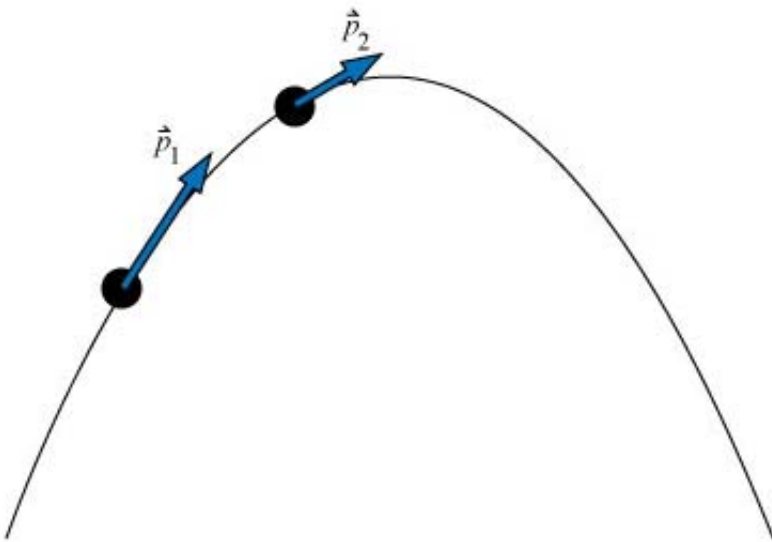Which arrow (a-j) best indicates the direction of the **change** in velocity

[?] from point 1 to point 2? f ✔

Which arrow (a-j) best indicates the direction of the **change** in momentum

[?] from point 1 to point 2? f ✔

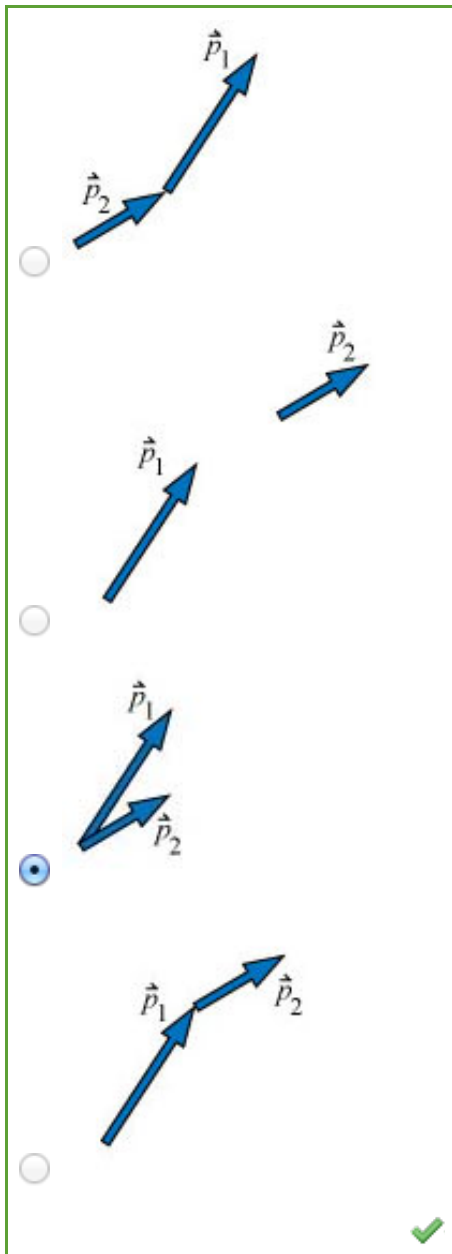---

5. 2/2 points | Previous Answers

The diagram shows the path of a moving object. The object and its momentum is shown at two instants in time.

Which of the diagrams below would be the best to use to determine graphically the change in momentum of the object from point 1 to point 2?

Which arrow (a-j) best indicates the direction of the object's change in momentum from point 1 to point 2 [e] ✔

j zero magnitude

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6. 2/2 points | Previous Answers   MI3 1.9.X.043
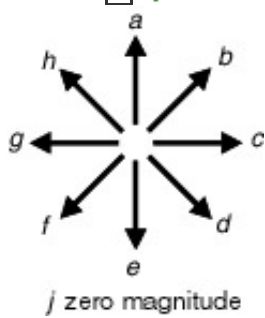
A planet has a mass of 6.8×10^{24} kg and travels in a nearly circular orbit around a star as shown. When it is at location A, the velocity of the planet is $\langle\ 0, 0, -1.7\times10^4\ \rangle$ m/s. When it reaches location B, the planet's velocity is $\langle\ -1.7\times10^4, 0, 0\ \rangle$ m/s. We're looking down on the orbit from above, with +x to the right and +z down the page.
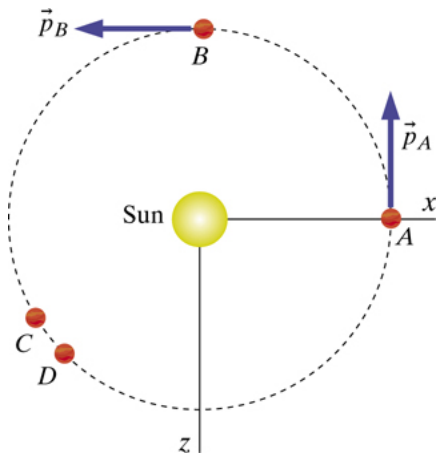
(a) What is $\Delta\vec{p}$, the change in the momentum of the planet between locations A and B?
$\Delta\vec{p}$ = ✔   kg · m/s

(b) On a copy of the diagram, draw two arrows representing the momentum of the planet at locations C and D, paying attention to both the length and direction of each arrow. What is the direction of the change in the momentum of the planet between locations C and D?

j zero magnitude

○ a

○ c

◉ b

✔

- *Read the eBook*
- Section 1.9

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7. 5/5 points | Previous Answers

A tennis ball of mass 57 g travels with velocity < 66, 0, 0 > m/s toward a wall. After bouncing off the wall, the tennis ball is observed to be traveling with velocity < -59, 0, 0 > m/s.

(a) Draw a diagram showing the initial and final momentum of the tennis ball. This will

help you answer the following questions.

(b) What is the change in the momentum of the tennis ball?

$\Delta \vec{p}$ = < -7.125 ✔ , 0 ✔ , 0 ✔ > kg · m/s

(c) What is the magnitude of the change of momentum of the tennis ball?

$|\Delta \vec{p}|$ = 7.125 ✔ kg · m/s

(d) What is the change in the magnitude of the tennis ball's momentum?

$\Delta |\vec{p}|$ = -0.399 ✔ kg · m/s

Note that the magnitude of the change of the vector momentum is large, while the change in the magnitude of the momentum is small.