WebAssign
CH11-HW01-SP12 (Homework)

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PHYS 172-SPRING 2012, Spring 2012
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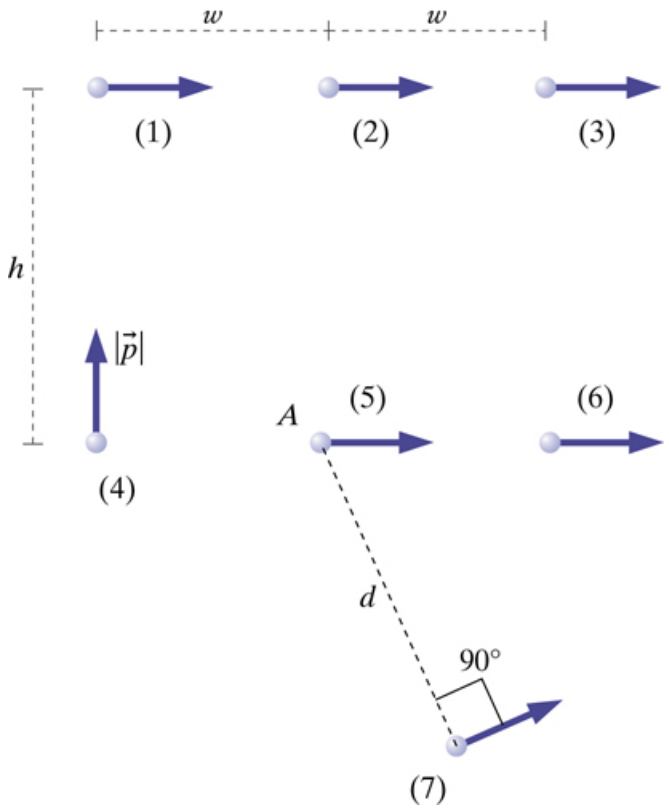
Current Score : 23 / 23 **Due :** Thursday, March 29 2012 11:59 PM EDT

1. 3.5/3.5 points | Previous Answers MI3 11.1.X.027

Here are seven particles each with the same magnitude of momentum $|\vec{p}|$ = 38 kg · m/s but with different directions of momentum and different positions relative to location *A*. The distances shown in the diagram have these values: *w* = 11 m, *h* = 17 m, and *d* = 16 m.



Calculate the z component of angular momentum L_{Az} for each particle (x to the right, y up, z out of the page). Make sure you give the correct sign.

(1) L_{Az} = -646 ✓ kg · m^2/s

(2) L_{Az} = -646 ✓ kg · m^2/s

(3) L_{Az} = -646 ✓ kg · m^2/s

(4) L_{Az} = -418 ✓ kg · m^2/s

(5) L_{Az} = 0 ✓ kg · m^2/s

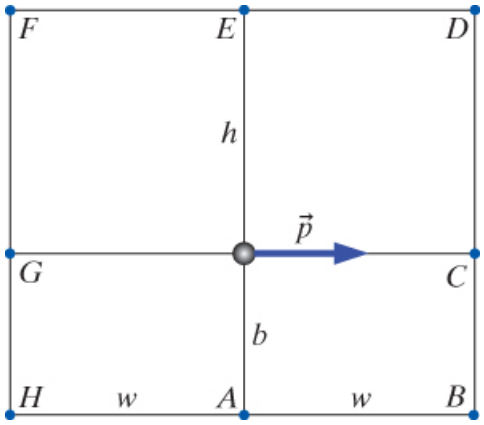
(6) L_{Az} = 0 ✓ kg · m^2/s

(7) L_{Az} = 608 ✓ kg · m^2/s

- *Read the eBook*
- Section 11.1

2. 8/8 points | Previous Answers MI3 11.1.X.002.alt01

Determine both the magnitude and direction of the translational angular momentum of the particle at location *O* relative to each point: *A*, *B*, *C*, *D*, *E*, *F*, *G*, and *H*. The magnitude of the momentum p = 80 kg·m/s, and the distances are h = 8 m, b = 5 m, and w = 7 m. Assume the usual coordinate system (+*x* to the right, +*y* up, and +*z* out of the page, toward you.)



$|\vec{L}_A|$ = 400 ✓ kg · m^2/s Direction: -z ✓

$|\vec{L}_B|$ = 400 ✓ kg · m^2/s Direction: -z ✓

$|\vec{L}_C|$ = 0 ✓ kg · m^2/s Direction: none (zero magnitude) ✓

$|\vec{L}_D|$ = 640 ✓ kg · m^2/s Direction: +z ✓

$|\vec{L}_E|$ = 640 ✓ kg · m^2/s Direction: +z ✓

$|\vec{L}_F|$ = 640 ✓ kg · m^2/s Direction: +z ✓

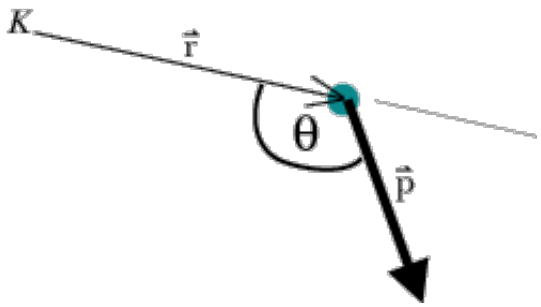
$|\vec{L}_G|$ = 0 ✓ kg · m^2/s Direction: none (zero magnitude) ✓

$|\vec{L}_H|$ = 400 ✓ kg · m^2/s Direction: -z ✓

- *Read the eBook*
- Section 11.1

3. 2/2 points | Previous Answers MI3 11.1.X.002.01

What are the magnitude and direction of the angular momentum about location *K*, for the object shown below? The magnitude of the object's momentum $|\vec{p}|$ = 5 kg · m/s, the distance $|\vec{r}|$ = 0.6 m, and the angle θ = 125 degrees.



$|\vec{L}_K|$ = 2.4575 ✓ kg · m^2/s

- ◉ out of page
- ⊗ into page
- ○ zero magnitude; no direction

✓

- *Read the eBook*
- Section 11.1

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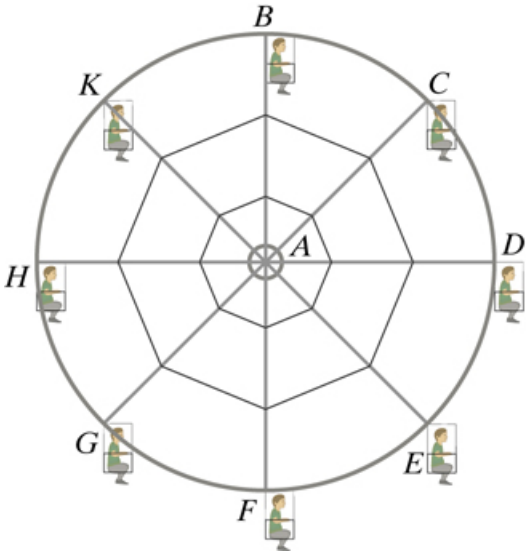
4. 8/8 points | Previous Answers MI3 11.1.X.031.alt01



A common amusement park ride is a Ferris wheel (not drawn to scale). Riders sit in chairs that are on pivots so they remain level as the wheel turns at a constant rate.

A particular Ferris wheel has a radius of 27 meters, and it makes one complete revolution around its axle (at location *A*) in 20 seconds. In all of the following questions, consider location *A* (at the center of the axle) as the location around which we will calculate the

angular momentum. At the instant shown in the diagram, a child of mass 31 kg, sitting at location *F*, is traveling with velocity < -8.5, 0, 0> m/s.

What is the momentum of the child?

= kg·m/s

In the definition what is the vector ?

= m

What is ?

= 27 m

What is the magnitude of the angular momentum of the child, about location *A*?

= 7114.5 $kg \cdot m^2/s$

Use the right-hand rule to determine the z-component of the angular momentum of the child, about location *A*:

= -7114.5 $kg \cdot m^2/s$

You used the right-hand rule to determine the z-component of the angular momentum, but as a check, calculate in terms of position and momentum:

What is ?

= 0 $kg \cdot m^2/s$

What is ?

= 7114.5 $kg \cdot m^2/s$

What is the z-component of the angular momentum of the child, about location *A*?

= -7114.5 $kg \cdot m^2/s$

The Ferris wheel keeps turning, and at a later time, the same child is at location E, with coordinates < 19.092, -19.092, 0 > m relative to location *A*, moving with velocity < -6.01, -6.01, 0 > m/s.

Now what is ?

= -3557.03052 $kg \cdot m^2/s$

What is ?

= 3557.03052 $kg \cdot m^2/s$

What is the z-component of the angular momentum of the child, about location *A*?

= -7114.0610 kg·m^2/s

- *Read the eBook*
- Section 11.1

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5. 1.5/1.5 points | Previous Answers MI3 11.1.X.002.02

What is the angular momentum $\vec{L}_A$ if $\vec{r}_A$ = <8, 9, 0> m and $\vec{p}$ = <-20, 9, 0> kg·m/s?

$\vec{L}_A$ = kg·m^2/s

- *Read the eBook*
- Section 11.1