Student's Worksheet

Lesson 5

Lesson Topic: Momentum measurements

Objective:

- To define linear and angular momentum
- To estimate linear and angular momentum
- To understand the law of conservation of momentum
- To apply these theories to explain the bizarre behavior of the ball in some real situations

Work:

Momentum Measurement

- Linear momentum of the ball during a play. Make multiple measurements of time and distance to estimate the velocity of the ball:

No	Distance (m)	Time (sec)	Speed = Distance / Time (m/s)
1			
2			
3			

Calculate the average speed and find the linear momentum

$p = mv =$ _____ (include units)

- Linear momentum of the ball while it is moving at tracking speed (given earlier):

$p = mv =$ _____ (include units)

- If the ball is rotating around its center, calculate its angular momentum:

Angular Momentum = mvr = mass x velocity x radius = _____

- What are the units of angular momentum calculated above? Keep in mind that you will get correct units only if you use mass in kilograms, velocity in m/s and radius in meters. If that was not the case, convert to the correct units and record the value below:

Angular Momentum = _____

- Roll a ball on the table or desk until it stops rolling. Where has the angular momentum gone? (momentum is supposed to be conserved)

_____

_____

Reaction Time Estimation

- If the ball moves with typical speed given earlier, approximately how much time does the player have to decide his next move? _____ seconds

- List of all the things a player has to do to successfully return the ball to her opponent?

_____

_____

_____

_____

Bonus:

- First watch the Mr. Beans' video,
https://www.youtube.com/watch?v=QE6PvNohffc&feature=youtu.be&t=2m6s
https://www.youtube.com/watch?v=uphkV6pLwZo

- Why he was unable to move forward on the belt while walking backwards?

_____

_____

_____

_____

- Try to push the ball forward in such a way that the rotational motion returns the ball to you. Observe where you need to apply force to accomplish this. Discuss parallels between this observation and Mr. Bean's video:

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