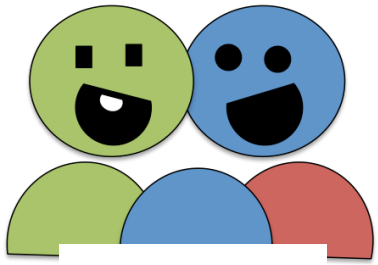
Today:
Chapter 8 – Angular Momentum
Chapter 9 – Work and Kinetic Energy

Irish Phrasebook

auldfella and auld wan – *your father and mother*

Torque and Angular Momentum

$$\vec{\tau}_{net} = d\vec{L}/dt$$



How can you explain Alex's change in angular momentum if the system includes everything?

Exam 3

- When?
  - Monday 23rd
- What's on it?
  - Conservation of momentum
  - Rotational motion
  - Energy
- Review
  - Materials on LON-CAPA
  - Extra office hours
    - Thursday 19th 5:30pm-8:30pm
    - Friday 20th 1:00pm-4:00pm

Announcements

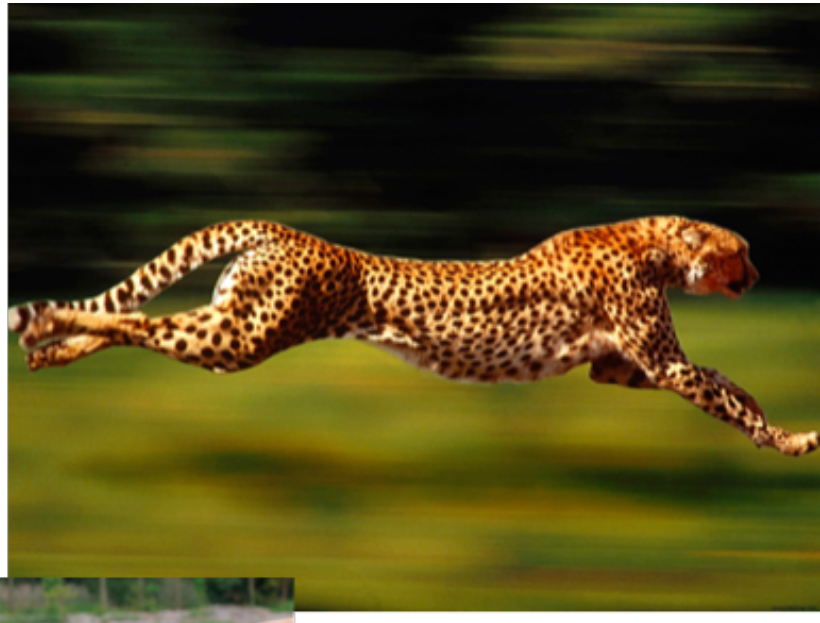
- LON-CAPA HW for Ch 9 & Ch 10 due Friday 20th
- On-paper HW due on Monday 23rd
  - This will help you prepare for Exam 3

Review session for final exam (Exam is Dec. 18th, alternative to be scheduled soon)

A. Thursday 10th at 7pm
B. Friday 11th at 5pm
C. Saturday 12th at 2pm
E. Other

TBD!

Ch 9 – Work & Kinetic Energy



Foothold ideas:
Kinetic Energy and Work

- Newton's laws tell us how velocity changes. The Work-Energy theorem tells us how speed (independent of direction) changes.
- Kinetic energy = $\frac{1}{2}mv^2$
- Work-energy theorem tells us how the kinetic energy will change as a result of exerting an external force $W = \Delta KE$

Foothold ideas: Kinetic Energy and Work

- So how do we relate this idea of work back to forces? $W_F = \vec{F} \bullet \vec{\Delta r}$
- The dot product here tells us that direction matters; which we know.
- Work done by a force $W_F = \vec{F} \bullet \vec{\Delta r}$ or $F_{||} \Delta r$

(part of force || to displacement)

Each row in the following table pairs a force vector with a corresponding displacement resulting in work *W* being done. In which of these rows is the work done zero?

	$\vec{F}$	$\Delta\vec{r}$
A.	→	←
B.	←	←
C.	↑	→
D.	↖	→
E.	↓	↖

Each row in the following table pairs a force vector with a corresponding displacement resulting in work *W* being done. In which of these rows is the work done zero?

	$\vec{F}$	$\Delta\vec{r}$
A.	→	←
B.	←	←
C.	↑	→
D.	↖	→
E.	↓	↖

The force and the direction of the displacement vector are perpendicular so the work done is 0.

Each row in the following table pairs a force vector with a corresponding displacement resulting in work *W* being done. In which of these rows is the work done positive?

	$\vec{F}$	$\Delta\vec{r}$
A.	→	←
B.	←	←
C.	↑	→
D.	↖	→
E.	↓	↖

Each row in the following table pairs a force vector with a corresponding displacement resulting in work *W* being done. In which of these rows is the work done positive?

	$\vec{F}$	$\Delta\vec{r}$
A.	→	←
B.	←	←
C.	↑	→
D.	↖	→
E.	↓	↖

The force and the direction of the displacement vector are in the same direction – so the work is positive.