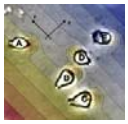
Physics 131- Fundamentals of Physics for Biologists I



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9/19/2012

-How can we describe motion (Kinematics)

- What is responsible for motion (Dynamics)

Movie of the Day
My grad student flying on the "vomit comet"

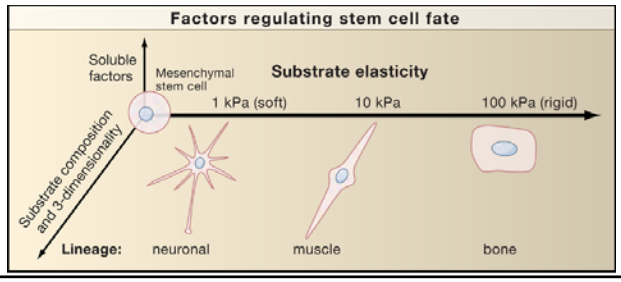
Outline

- Switch in office hours
  - Thu 10.30-12.15
  - Thu 1.30-3
- Important Forces in Life Sciences?
- Quiz 2 review
- What is responsible for motion (Dynamics)
  - Newton's Laws

"Since this is physics for life sciences what's the most important force our bodies exert (inside or out)?"

We hope you will help in answering this question in your future career! Researchers are only now realizing that forces are VERY important in cell and developmental biology

One example: It had been well known that Stem Cells differentiate into, e.g. brain, or muscle or bone cells given the right chemical differentiation signals. In 2006 it was discovered that stem cells can also differentiate in response to the mechanics of their surroundings without any chemical signals –they differentiate in such a way as to match the mechanical properties of their environment. For example, when grown in soft gel, stem cells can turn into neurons.



Engler, …, Discher Cell 2005

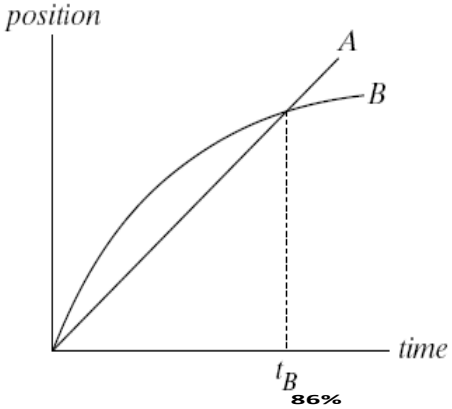
BCHY	AGFY	AC
wHBN	wGFN	AD
CHBY	wGFN	CD
FHBN	GGGY	A
HACB	DHFE	AC
AHAY	GFGN	ABD
AFGY	CFGN	CD
FHBY	GwwN	ABD
wHBY	FGFN	CD

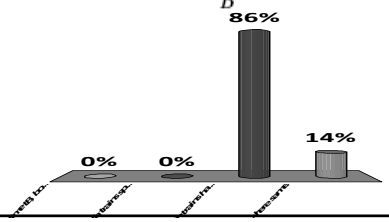
Quiz 2 review

Average 4.1

The graph shows position as a function of time for two trains running on parallel tracks. Which is true:

1. At time t_B, both trains have the same velocity.
2. Both trains speed up all the time.
3. Both trains have the same velocity at some time before t_B.
4. Somewhere same acceleration

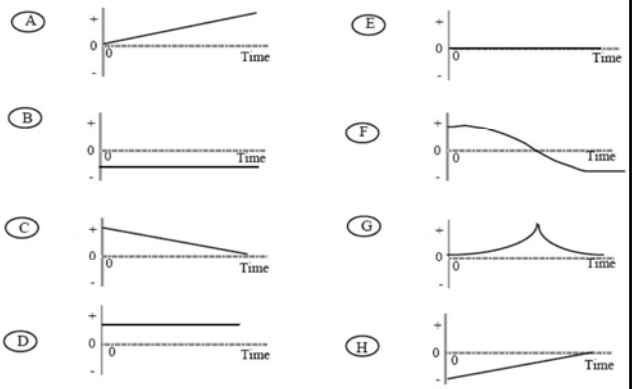


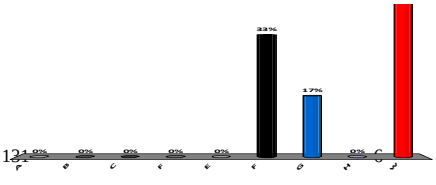


A car that is speeding up, then slowing down.

What is position

1. A
2. B
3. C
4. F
5. E
6. F
7. G
8. H
9. W

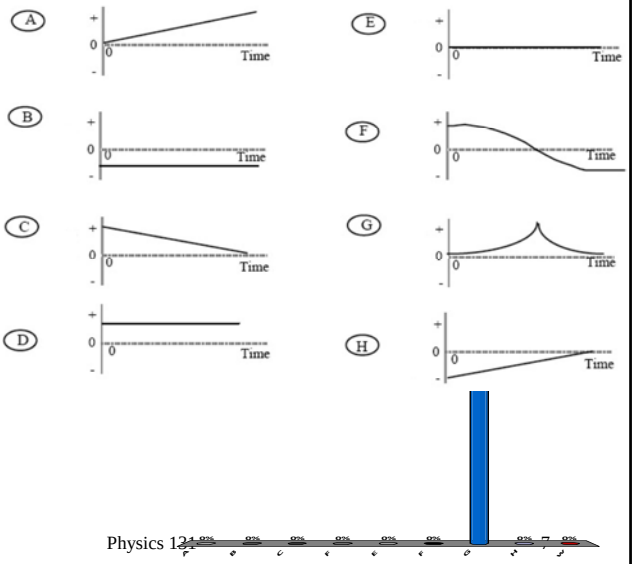




A car that is speeding up, then slowing down.

What is Velocity

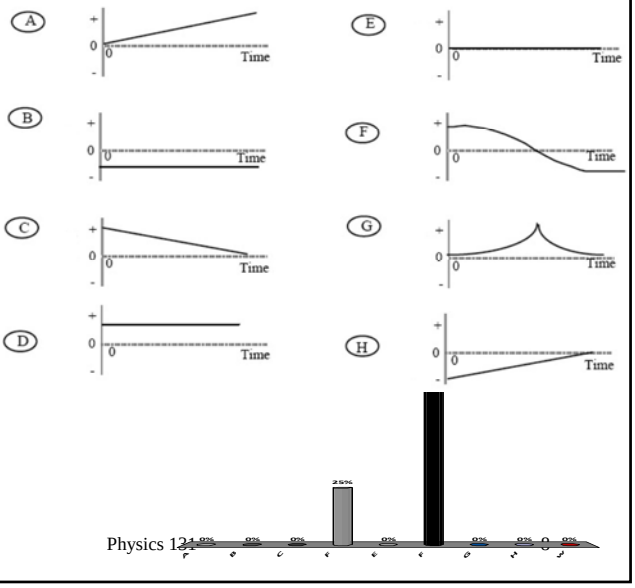
1. A
2. B
3. C
4. F
5. E
6. F
7. G
8. H
9. W



A car that is speeding up, then slowing down.

What is acceleration

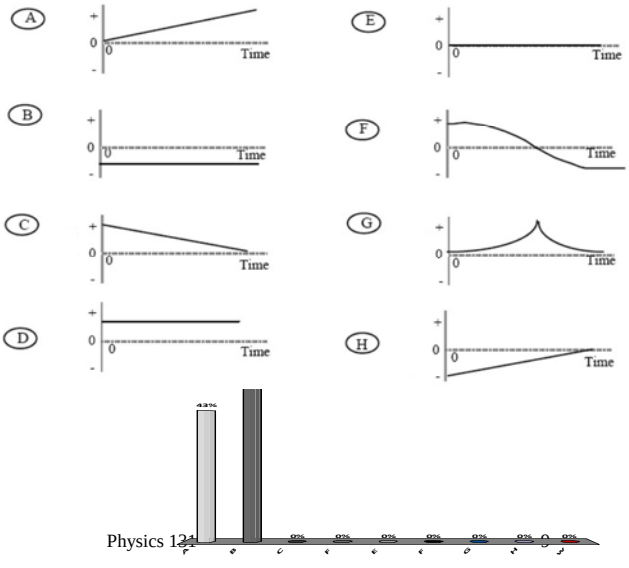
1. A
2. B
3. C
4. F
5. E
6. F
7. G
8. H
9. W



A car that is moving in reverse and reducing its speed at a steady rate.

What is position

1. A
2. B
3. C
4. F
5. E
6. F
7. G
8. H
9. W



Looking at the velocity vs time graph, where does the juggler let go of the ball?

1. Before 1
2. At 1
3. At 2
4. At 3
5. After 3