

Teaching and Learning Philosophy

Physics1010U

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Office Hours: Monday/Wednesday **1:00-2:00**

TA	Office/ hours	Email
To be announced	To be announced	To be announced

Lecture Time: Monday/Thursday **12:40-2:00**

On Canvas, only PDF files are available. PowerPoint animation and important notes are given in class, so it is very important to attend classes. Lecture Notes, practical exercises, and examples are given and solved during lectures.

Please Read the Syllabus on Canvas

Teaching and Learning Philosophy

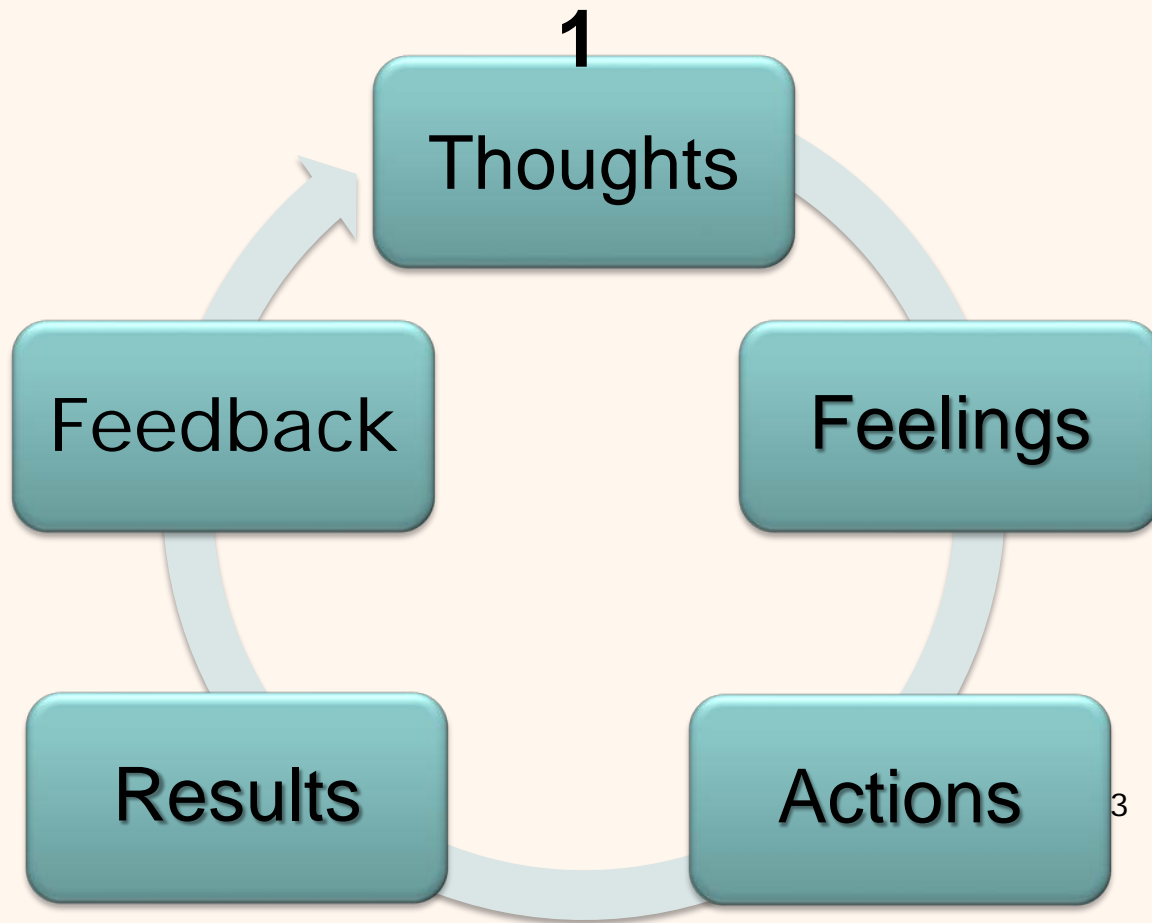
Before starting: Are you aware of this?

Most people learn

- ❖ 10% of what they read
- ❖ 20% of what they hear
- ❖ 30% of what they see
- ❖ 50% of what they see and hear
- ❖ 70% of what they talk over with others
- ❖ 80% of what they use and do in real life
- ❖ 95% of what they teach to someone else, so please help each other

Teaching and Learning Philosophy

The cycle of excellence starts with a good thought

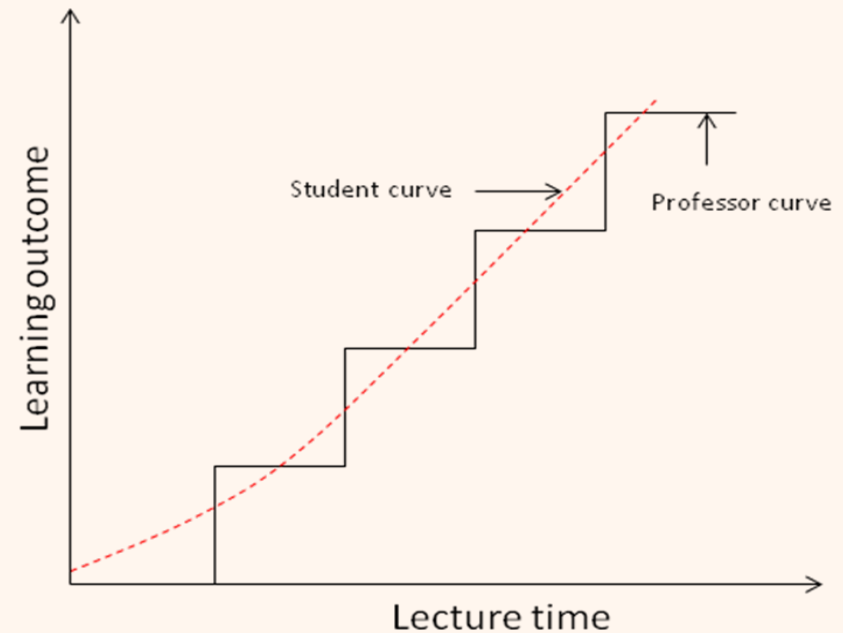
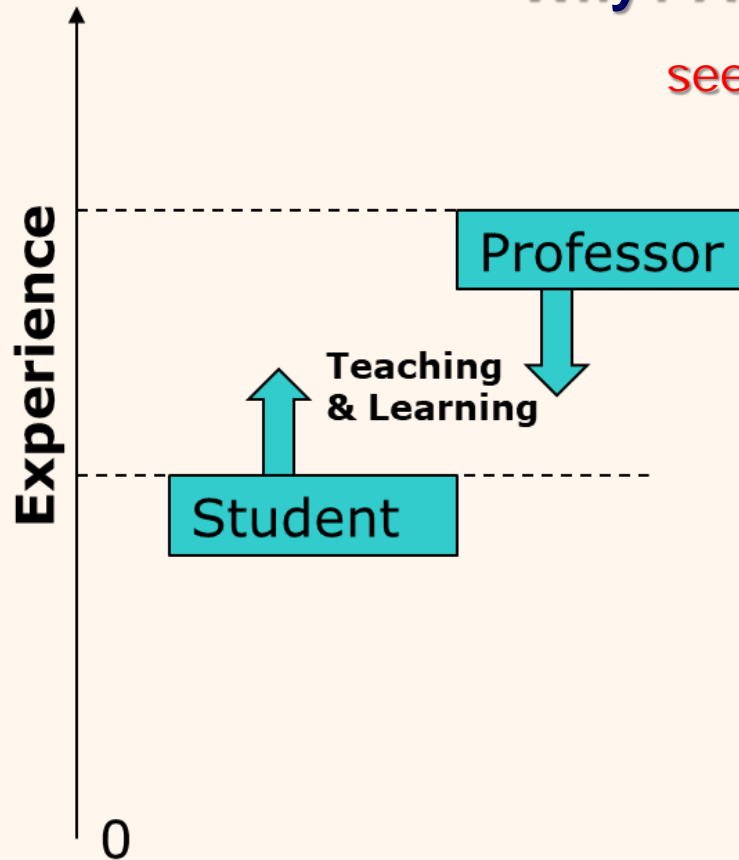


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“Two people will never learn **an arrogant** and a **shy person**”

Why? And how to avoid it?

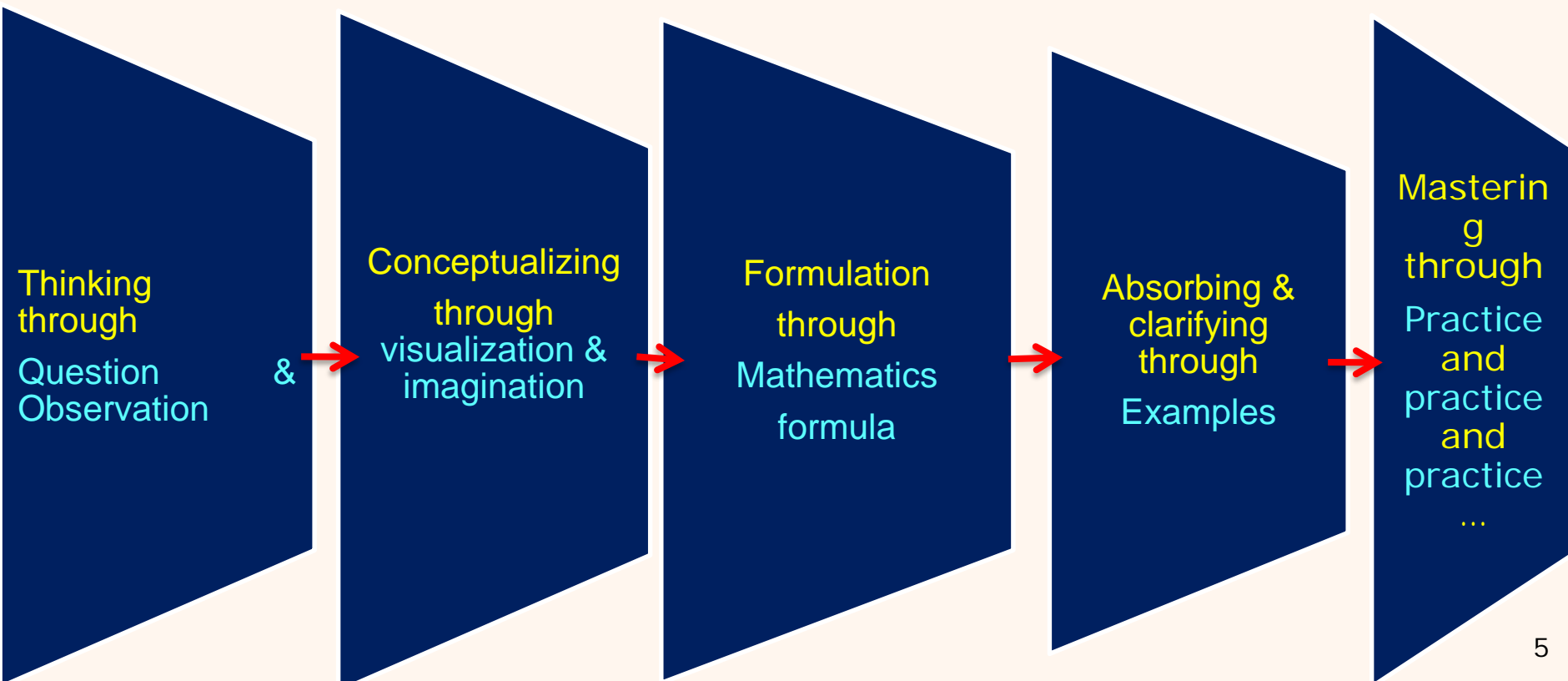
see details in class



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Strategy

Our Strategy in this course is presented in the following summary:
see details in class



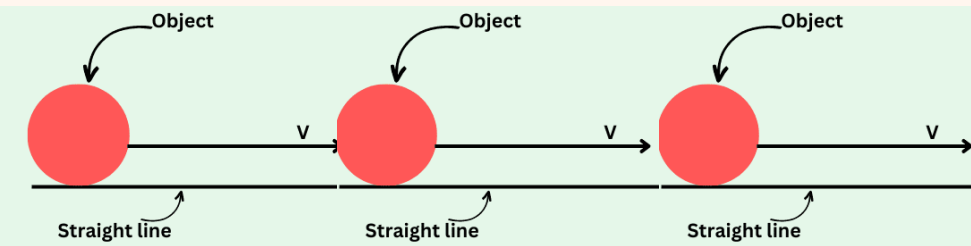
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Outline of Topics in the Course

- ❑ Kinematics of Straight Line Motion
- ❑ Kinematics of Projectile Motion
- ❑ Kinematics of Circular Motion
- ❑ Dynamics of Straight Line Motion
- ❑ Interactions Between Objects
- ❑ Dynamics of Circular Motion
- ❑ The Momentum Principle
- ❑ Mechanical Energy
- ❑ Work and the Energy Principle
- ❑ Dynamics of Rotating Objects
- ❑ Oscillations
- ❑ Gravity

Very Brief Overview of the Course Content

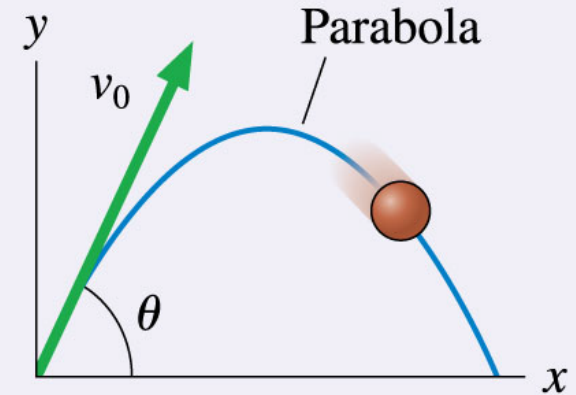
Kinematics of Straight Line Motion



- Motion is along a straight line (It can be horizontal, vertical or slanted).
- We will see concepts of average and instantaneous velocity and acceleration.
- Problems involving initial and final velocity, acceleration, displacement, and time.
- Demonstrate directions and signs for velocity, displacement, and acceleration.
- Problems involving a free-falling body in a gravitational field.

What is projectile motion?

Projectile motion is two-dimensional free-fall motion under the influence of only gravity. Projectile motion follows a **parabolic trajectory**. It has uniform motion in the horizontal direction and $a_y = -g$ in the vertical direction.

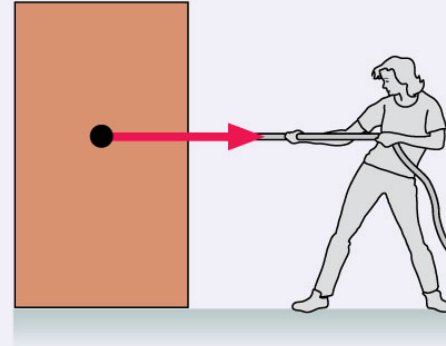


See the animation in class

What is a force?

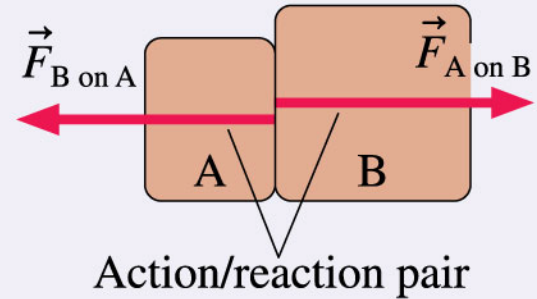
The fundamental concept of **mechanics** is **force**.

- A force is a **push** or a **pull**.
- A force acts on an object.
- A force requires an **agent**.
- A force is a **vector**.



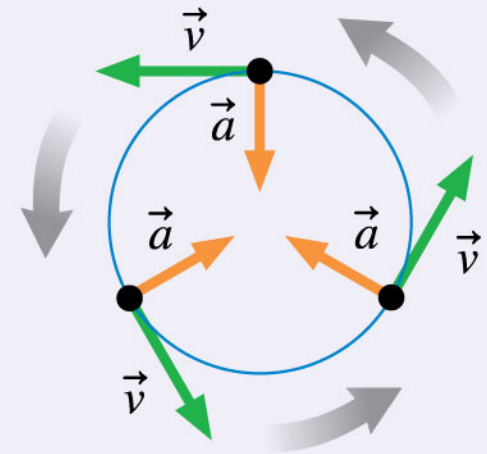
What is an interaction?

All forces are interactions in which objects exert forces on each other. If A pushes on B, then B pushes back on A. These two forces form an **action/reaction pair** of forces. One can't exist without the other.

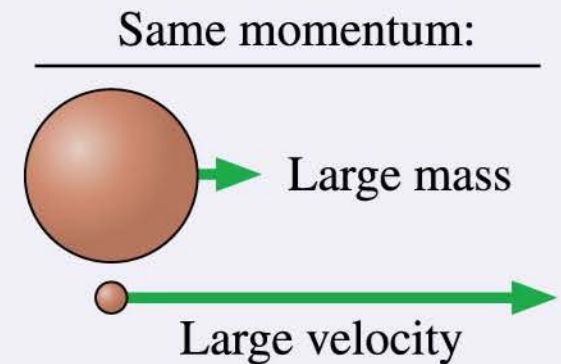


Dynamics of Circular Motion

An object in **circular motion** is always changing direction. The acceleration of changing direction—called **centripetal acceleration**—points to the center of the circle. All circular motion has a centripetal acceleration. An object also has a *tangential acceleration* if it is changing speed.



An object's **momentum** is the product of its mass and velocity. An object can have a large momentum by having a large mass or a large velocity.
Momentum is a vector, and it is especially important to pay attention to the *signs* of the components of momentum.



Work and Energy



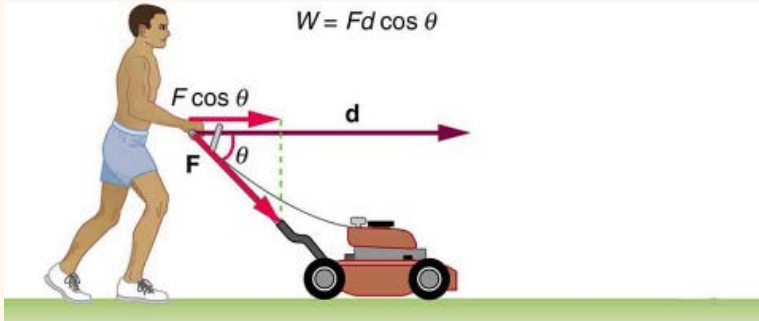
Work

- Depends on the force and the distance the force moves the object.
- Want the force in the direction of the distance

$$W = \vec{F} \cdot \vec{d}$$

$$W = Fd \cos \theta$$

○ Unit: $N \cdot m = J$ (Joule)

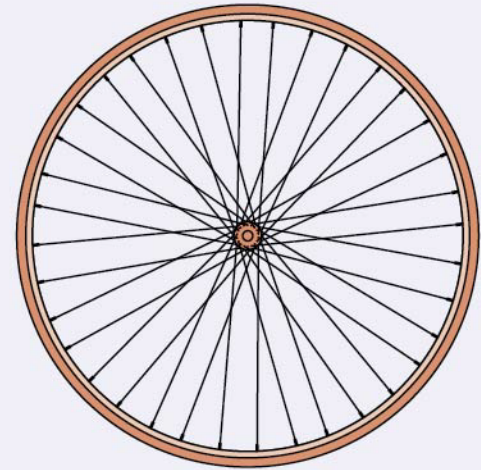


What is a rigid body?

An object whose size and shape don't change as it moves is called a **rigid body**.

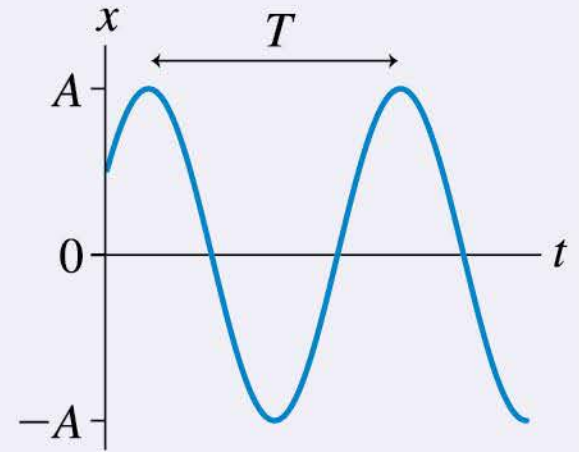
A rigid body is characterized by its **moment of inertia** I , which is the rotational equivalent of mass. We'll consider

- Rotation about an axle.
- Rolling without slipping.



What are oscillations?

Oscillatory motion is a repetitive motion back and forth around an equilibrium position. We'll describe oscillations in terms of their **amplitude**, **period**, and **frequency**.



Gravity

Newton proposed that *any* two masses M and m are attracted toward each other by a **gravitational force** of magnitude

$$F_{M \text{ on } m} = F_{m \text{ on } M} = \frac{GMm}{r^2}$$

where r is the distance between the masses and G is the gravitational constant.

- Newton's law is an **inverse-square law**.
- Newton's law **predicts the value of g** .

