

# Science before Science Study Group

Week Two

# Begin with Prayer

## **Prayer before Study**

Almighty God, Thou who are the creator of all things and our loving Father, send us Thy Holy Spirit to illuminate our minds so that we can understand how Thou hast revealed Thyself to us through the world around us.

Grant to me  
keenness of mind  
capacity to remember,  
skill in learning,  
subtlety to interpret,  
and eloquence in speech.

May Thou guide the beginning of my work, direct its progress, and bring it to completion.

We ask this through Thy Son, Jesus Christ

**Amen**

# Reminders

- Two books for the course
  - Kid's Introduction to Physics (from IAPWEB.ORG)
  - The Science before Science (from AMAZON)
- Meet for about 45 minutes each week
- Monday at 8:15 Central Time

# Recap

- Observing the world around us
- We study it and organize it – **physics in the broad sense**
  - Include physics (narrow sense), biology, chemistry
- We notice that
  - Things exists
  - Things change
- We are studying **PHYSICAL THINGS**
  - Definition of physical thing
    - **PHYSICAL THING IS THAT WHICH IS SOMETHING AND CAN BE SOMETHING ELSE**
- This is where we start with science
- We move from the **general to the specific**

# Recap

- Physical things have two parts
  - What they are (**form**)
  - What they can be (**matter** – not mass or atoms or stuff – but potential)
- Physical things – **Substance and Properties**
  - Have their own existence (call substances)
  - Have properties that exist in the substance (Look there is brown? No! There is a brown squirrel)
- Two types of change
  - Change in the property of a thing (i.e. color, place, etc.) – **accidental change**
  - Change in what the thing is – change in the substance – **substantial change**

# Questions

- What are some examples of physical things.
- Give me 3 properties of some physical thing.
- What are the two most general things we can say about physical things? What names do we give these things?
- What is physics in the broad sense?
- At the highest level of generality, what are the two types of changes that can happen?
- Give me an example of a substantial change.
- Give me 3 examples of accidental change.

# Properties of Physical Things (Accidents)

- **Proper accidents** – that properly belong to the thing (orange is round and orange color; man has two hands with five fingers)
- **Mere accidents** – do not arise from the thing (e.g. tattoo, hair dye, Christmas tree lights on a tree, the hotness or coldness of a thing)
- Further study reveals that all physical things have 9 proper accidents
  - Mnemonic – **QQ RARe POET**
  - One property or accident for each capitalized letter

# Nine Properties of Physical Things

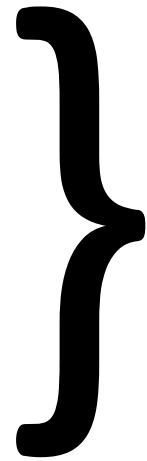
- **Intrinsic** (arise out of the thing)

- Quantity
- Quality

- **Extrinsic** (depend on other things)

- Relation
- Action
- Reception

- Place
- Orientation
- Environment
- Time



QQ RARe POET



# Aristotle - PHYSICA

- Scientific knowledge is attained
  - Through acquaintance with principles and elements

“For we do not think that we know a thing until we are acquainted with its primary conditions or **first principles**, and have carried our analysis as far as its simplest elements” (from first paragraph of *Physica*)

“...we must advance from generalities to particulars”

“...a child begins by calling all men ‘father’, and all women ‘mother’, but later on distinguishes each of them”

# Principle of Non-Contradiction

Something cannot BE and  
NOT BE at the same time  
and in the same way.

# Something cannot be.....

- An orange (the fruit) cannot be green and orange
- An animal cannot be a squirrel and a rabbit
- A rock cannot be hard and soft
- An pyramid cannot be oriented up and oriented down
- A thing cannot be bigger and smaller than a reference thing
- A fish cannot be in water and not in water at the same time
- A thing cannot be in two places at the same time
- Other examples?
- A principle you already knew but didn't know that you knew!

Another Principle: Causality

Something cannot change  
itself:

Something can not give itself  
something it doesn't have

# Examples

- A dog cannot change itself into a cat
- Red cannot change itself into blue
- A ball (at rest in one place) cannot give itself a new place
- A kitten cannot cause itself to be
- One thing causes another to change

# Is this really all physics?

- Big meaning
- Narrow meaning
- Chemistry studies non-living substances
- Biology studies living substances [www.consultssc.com](http://www.consultssc.com)
- We are giving the big sense
- Most people don't know they don't know these basic things

# Big Physics

- Aristotle figured out more than 300 years BC
- It was lost
- About 1200 AD it was sown into fertile soil of Catholic culture
- Bible teaches that
  - Creation is good
  - God became man – he became physical
- St. Thomas Aquinas understood Aristotle and wrote commentaries
  - Was a great physicist of the big physics
- In the 1600, the scientific method was invented
  - Enable science to advance rapidly
  - Very powerful method (e.g. circular saw is powerful)
  - Good and powerful in giving answers
  - Was not understood in terms of the basic physics (we are discussing)
  - This method not properly understood since the scientific revolution
  - Our understanding and love for reality has been replaced by the scientific method
  - Vast majority of intelligent people have fallen into it

# Discussion/Questions and Answers

- Does every physical thing have all nine properties?
- What is the most general observation that we can make about the world around us?



# Next Week

- Discuss Chapter 7, 8 and possibly 9
- Please read in advance
- Reread Chapters 1 to 6
- Memorize the answers to
  - What is a physical thing?
  - What are the two kinds of changes?
  - What are the nine properties (learn in order)?
  - What is the principle of non-contradiction?
  - What is the principle of causality?