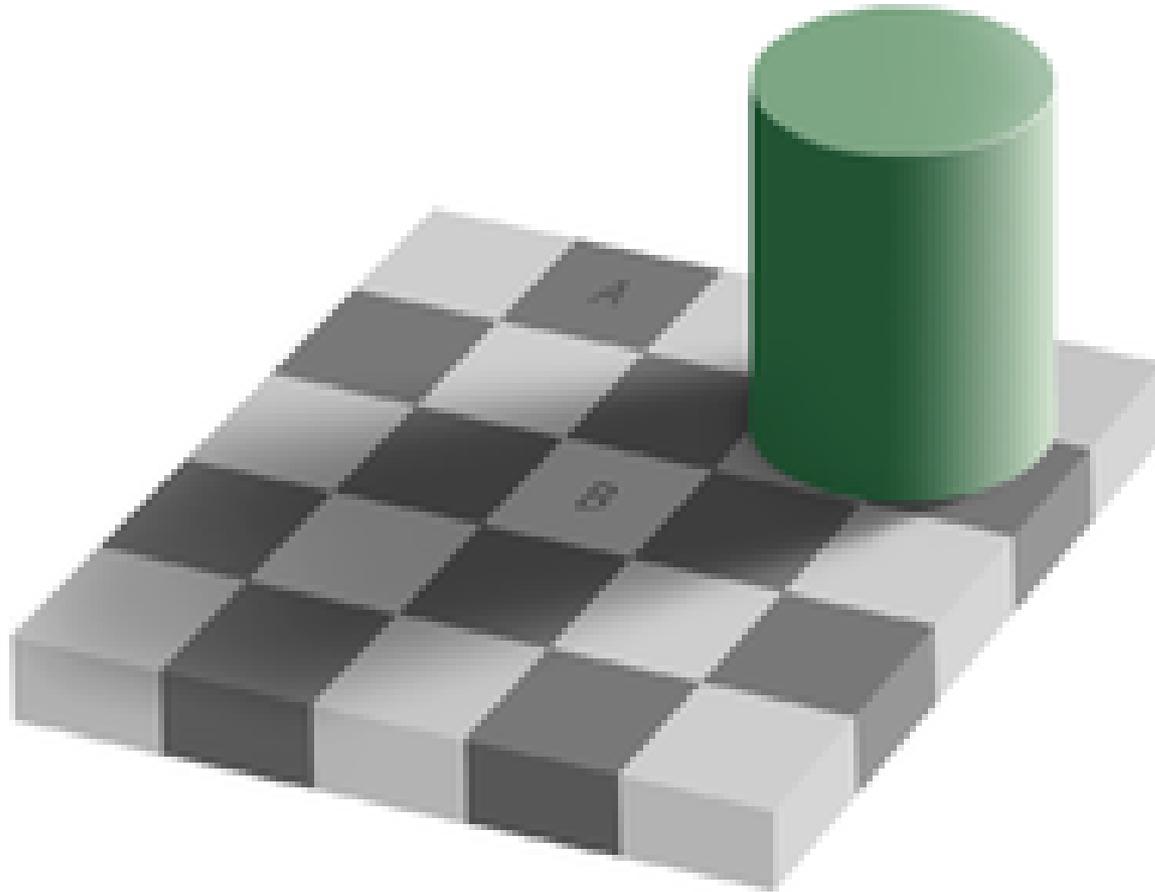




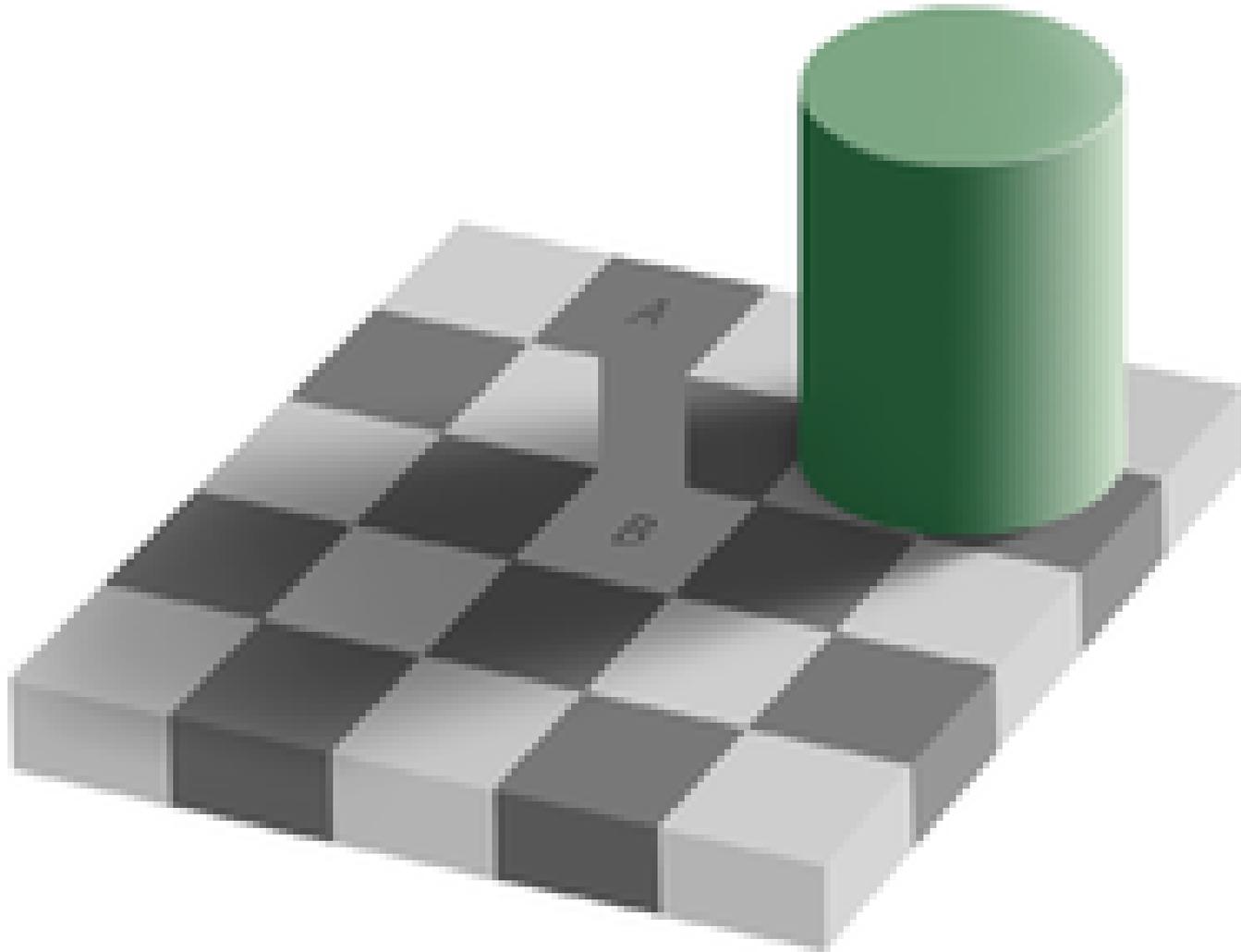
ISTA Conference Galway 2014

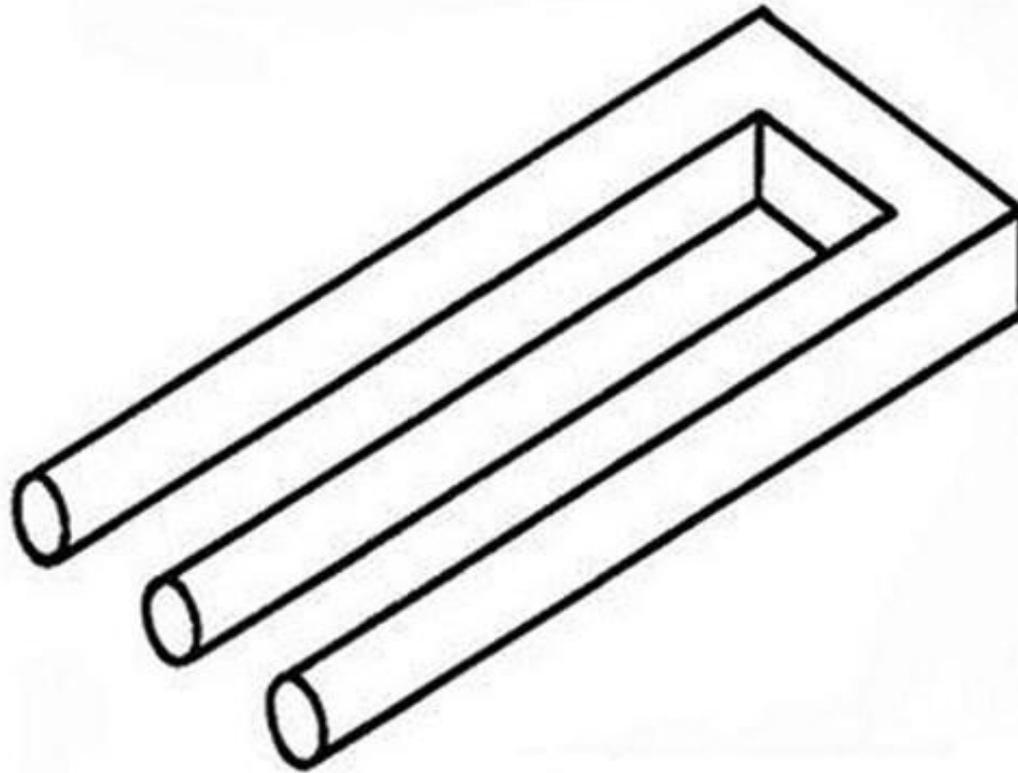
Misconceptions in Physics

Checker shadow is an optical illusion



Checker shadow is an optical illusion

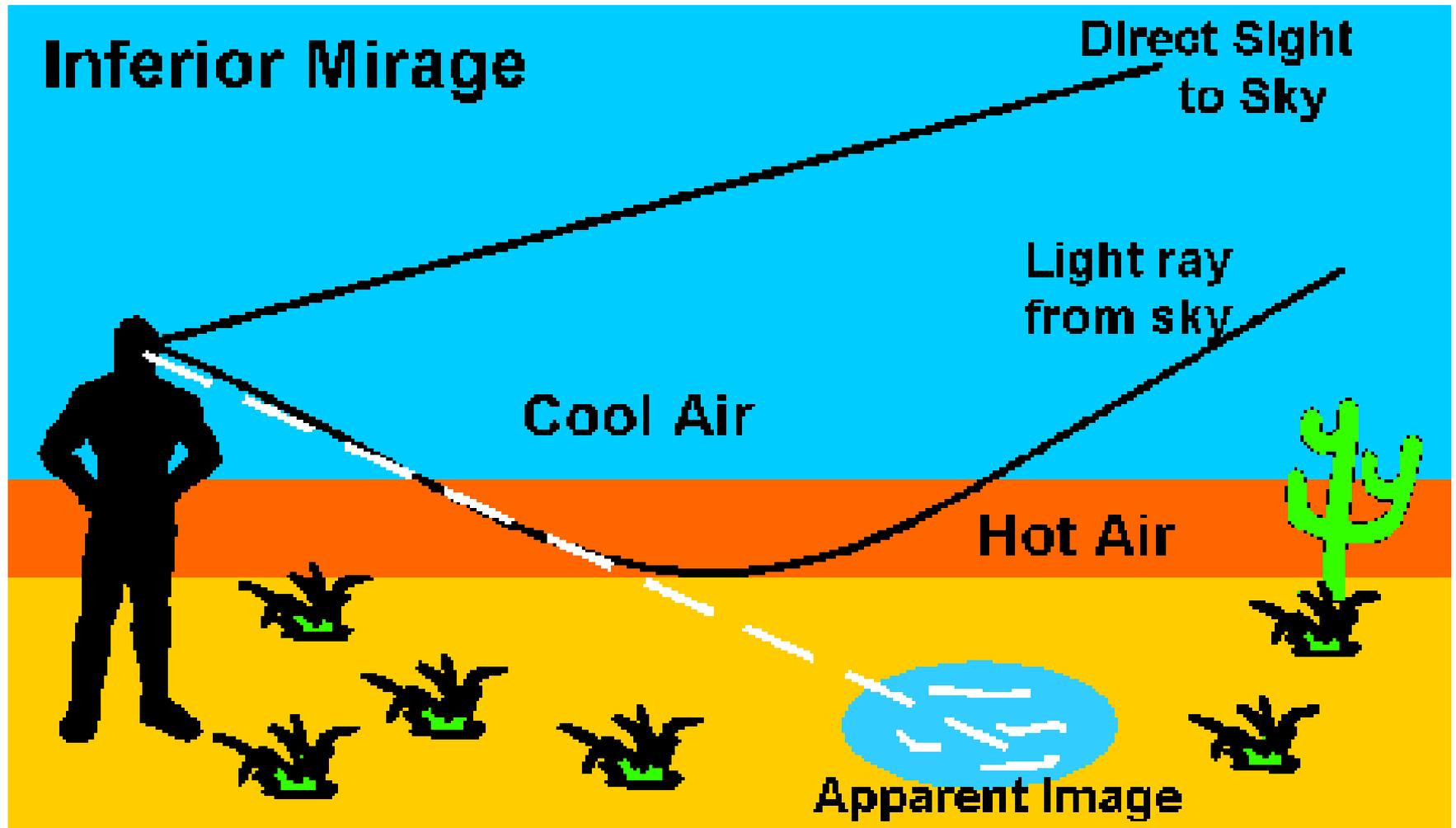




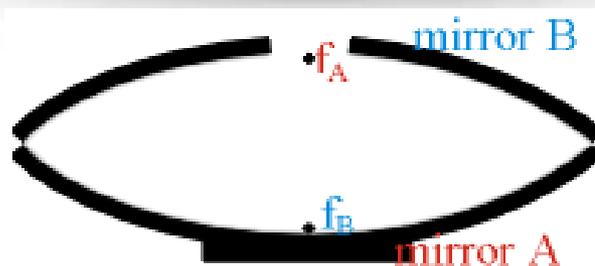
IMPOSSIBLE TRIDENT!

Natural illusions

Inferior Mirage



3D Optical Illusion



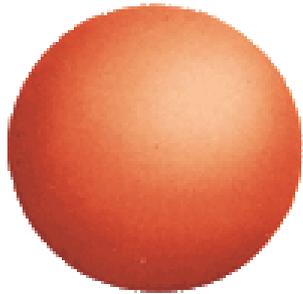
Cognitive Illusions/Perceptual Organization



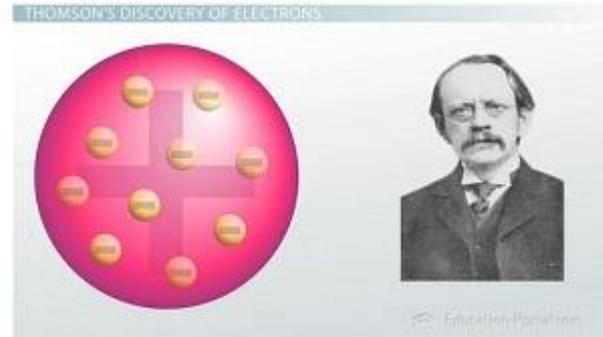
our eyes can't distinguish the illusions
and there our conception goes into
misconception

A ***misconception*** is a conclusion that's
wrong because it's based on faulty
thinking or facts that are wrong

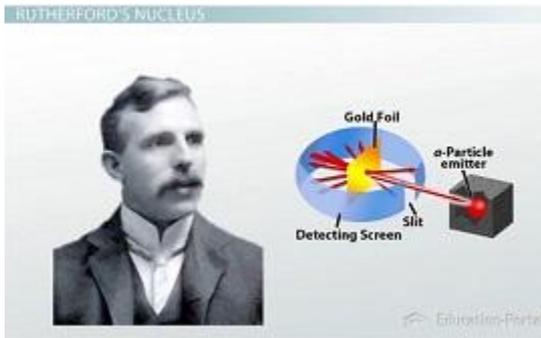
Conceptions or misconceptions?



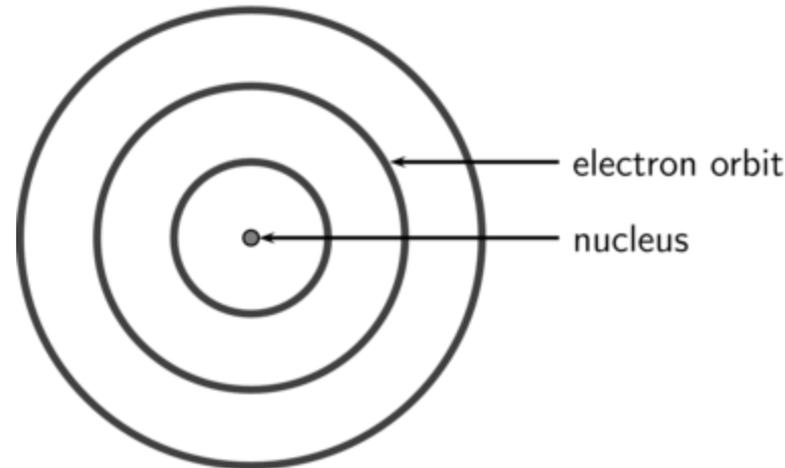
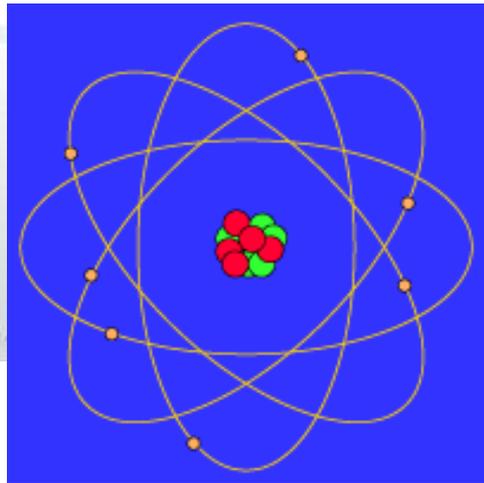
Dalton c 1800



J J Thomson 1897



Rutherford 1911



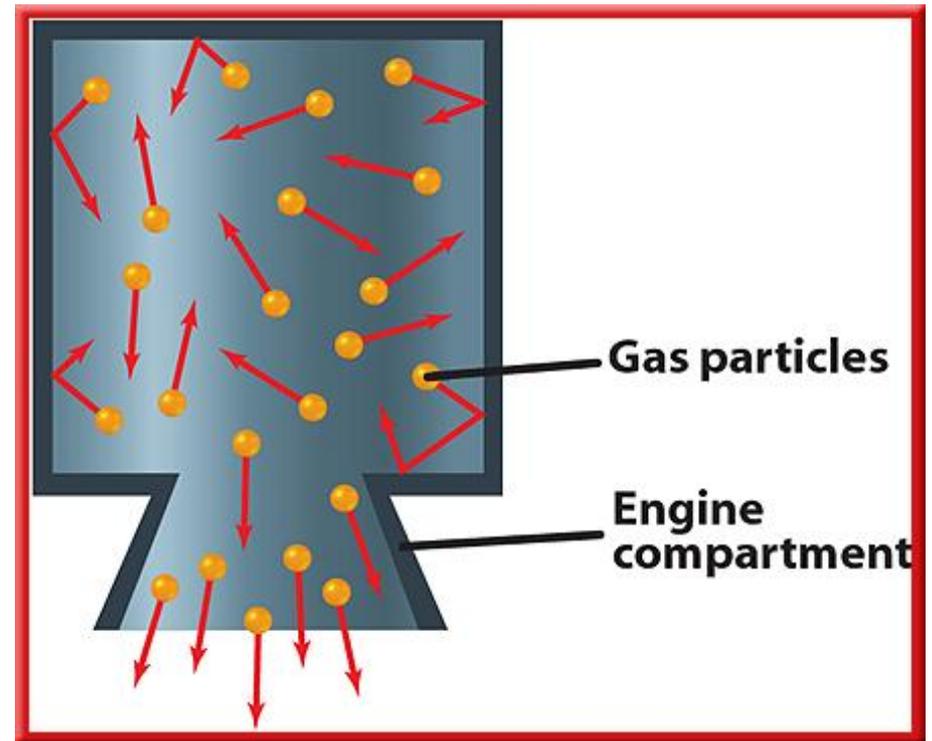
Bohr 1913

Chief Examiner's Report Physics 2013

- Candidates appeared to have difficulty applying knowledge of physical principles and laws to practical contexts, whether familiar or unfamiliar.
- In Section B, excluding the three questions with internal choice (Questions 5, 10 and 12), the mechanics question (Question 6, on gravitation) was the most popular. Yet despite this popularity of mechanics questions among candidates, these questions were not necessarily well answered: Question 6 was the second least well answered question within Section B

A Rocket Launch 2007 & 2010 OL

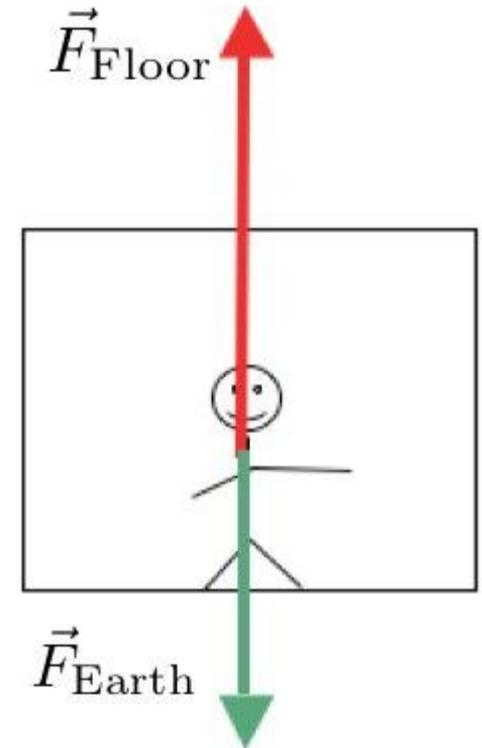
- A rocket's momentum is initially zero.
 - When the rocket fuel is ignited, a hot gas is produced and pushed out of the bottom of the engine
 - The fuel/hot gas acquires a backward momentum
 - The rocket acquires a forward momentum
 - These momentums are equal and opposite and result in the rocket moving upward.



Consider a person standing in an elevator that is accelerating upward. The upward normal force N exerted by the elevator floor on the person is

1. larger than
2. identical to
3. smaller than

the downward weight W of the person



2013 HL 'g' on the ISS is 8.63 m s^{-2}

Why do occupants experience weightlessness

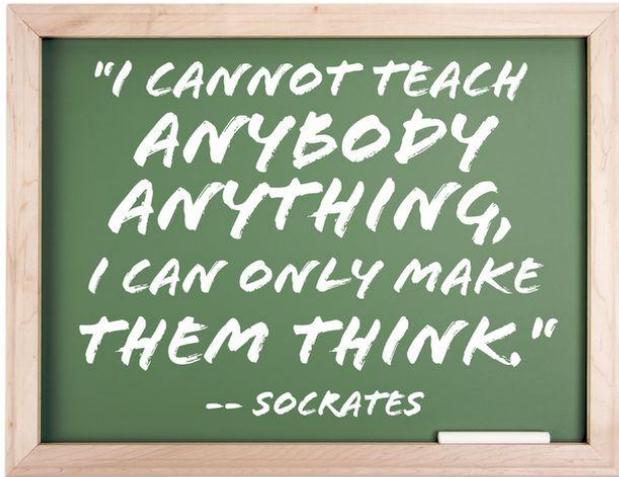
Test Ourselves

Go to **Google**

Type in; [Intuitor](#)
Basic Physics Savvy Quiz

[Do Q1-20 then scroll down and submit]

http://www.intuitor.com/physics_test/PhysicsSavvy.html



Socrates asked all the important questions but he never answered any of them

To find yourself is to think for yourself

Concept Cartoons

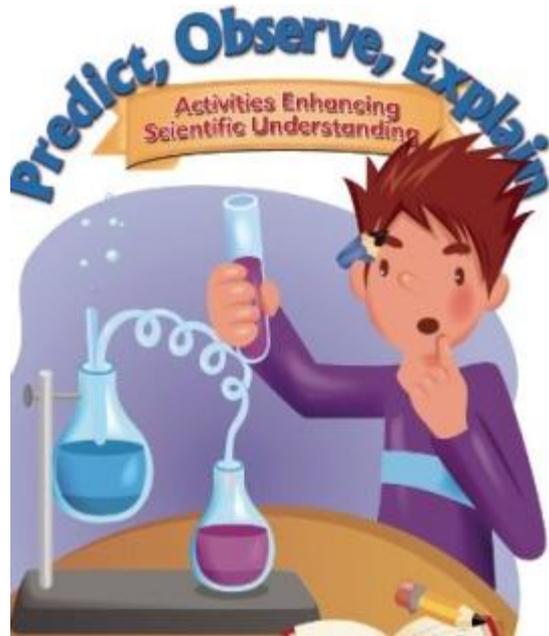


SCIENCE March 2014

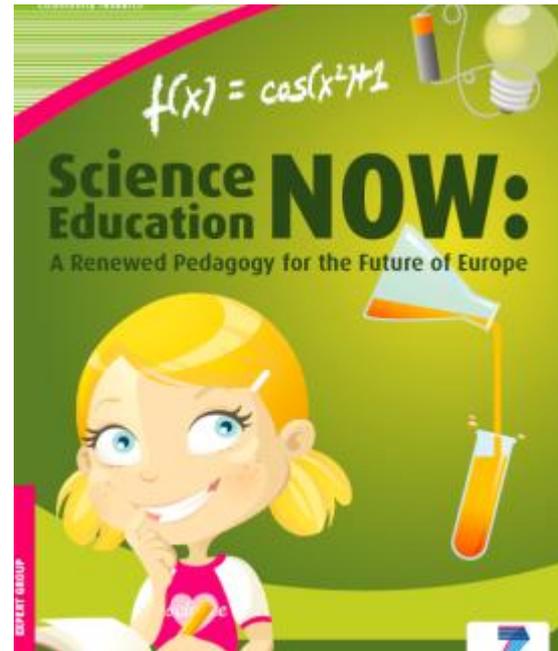
‘Concept Cartoons’ helped tease my own understanding of science concepts, my teaching has been enriched – Una Leader

Inquiry Based Learning (IBL)

POE



Rocard Report



Identifying and supporting Misconceptions

Eric Mazur; *Harvard Physics Professor*



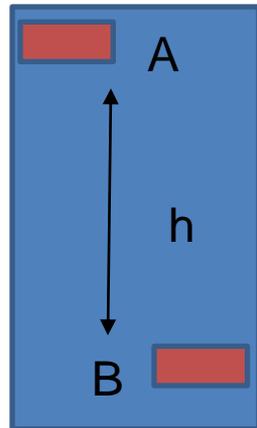
MC Concept questions – to identify
Peer Instruction model to support

Nothing clarifies Ideas better than explaining to others

*“The lecturer is not teaching us anything.
I have to learn it all myself!”*

Imagine holding two wooden bricks under water. Brick *A* is just beneath the surface of the water, while brick *B* is at a greater depth. The force needed to hold brick *B* in place is

1. larger
 2. the same as
 3. smaller
- than the force required to hold brick *A* in place

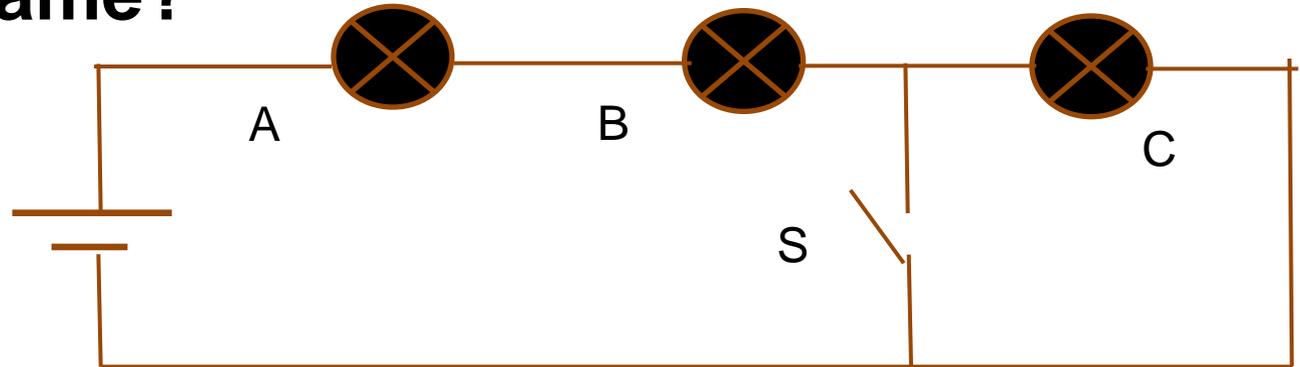


A person attempts to knock down a large wooden bowling pin by throwing a ball at it. The person has two balls of equal size and mass, one made of rubber and the other of putty. The rubber ball bounces back, while the ball of putty sticks to the pin. Which ball is most likely to topple the bowling pin?

1. the rubber ball
2. the ball of putty
3. makes no difference
4. need more information

Qualitative – conceptual exercise

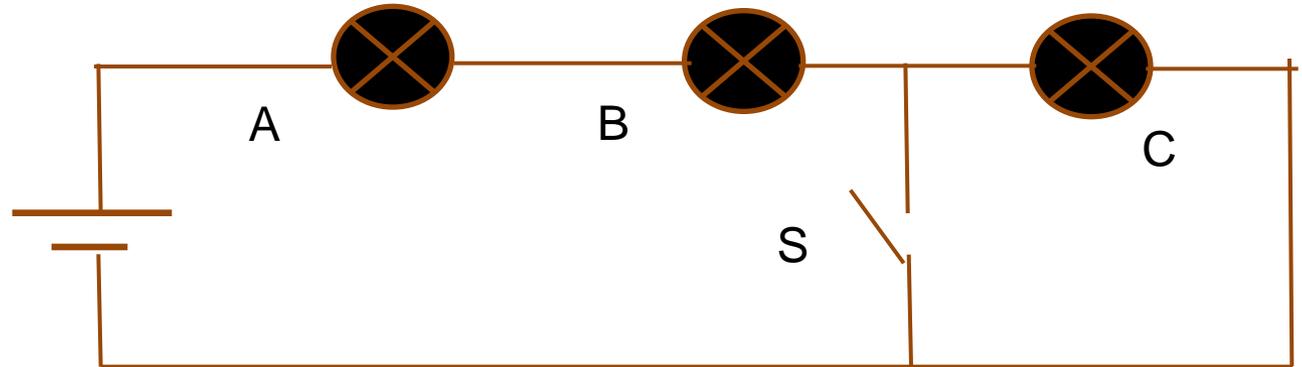
3 identical bulbs are in series, when switch S is closed do the following increase, decrease or stay the same?



- (a) Intensity of bulbs A and B
- (b) Intensity of bulb C
- (c) Current drawn from the battery
- (d) Voltage drop across each bulb
- (e) Power dissipated in the circuit

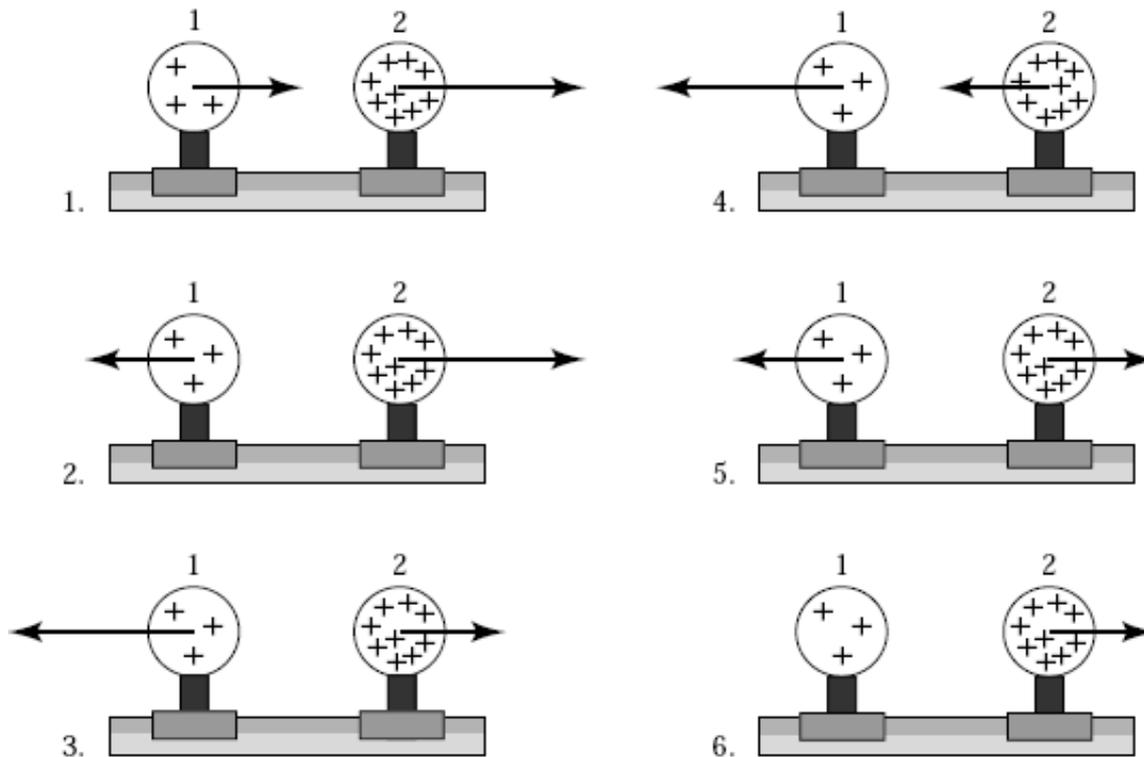
Qualitative – conceptual exercise

3 identical bulbs are in series, when switch S is closed do the following increase, decrease or stay the same?



- (a) Intensity of bulbs A and B **Increase**
- (b) Intensity of bulb C **Decreases**
- (c) Current drawn from the battery **Increases**
- (d) Voltage drop across each bulb **A&B > C <**
- (e) Power dissipated in the circuit **Increases**

Two uniformly charged spheres are firmly fastened to and electrically insulated from frictionless pucks on an air table. The charge on sphere 2 is three times the charge on sphere 1. Which force diagram correctly shows the magnitude and direction of the electrostatic forces:



7. none of the above

Resources

PDST <http://pdst.ie>

Examinations

<http://examinations.ie/index.php?l=en&mc=en&sc=cr>

Institute of Physics <http://www.iopireland.org>

Physics Teacher Noel Cunningham's website

<http://www.thephysicsteacher.ie>

How Stuff Works <http://www.howstuffworks.com>



Derek Muller

Educational Science Videos

<http://www.youtube.com/watch?v=RQaW2bFieo8>

Forms

- Discussion
- Further support
- Evaluations

Thank you for your participation

