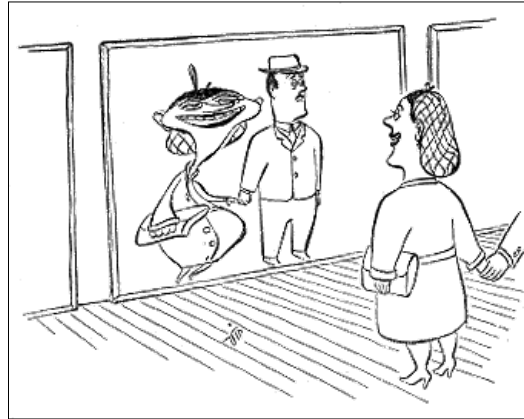


April 19, 2017

Physics 132

Prof. E. F. Redish

- **Theme Music:**
Arvo Pärt
Spiegel im Spiegel
(*Mirror in Mirror*)



- **Cartoon:**
Virgil Partch

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Physics 132

1

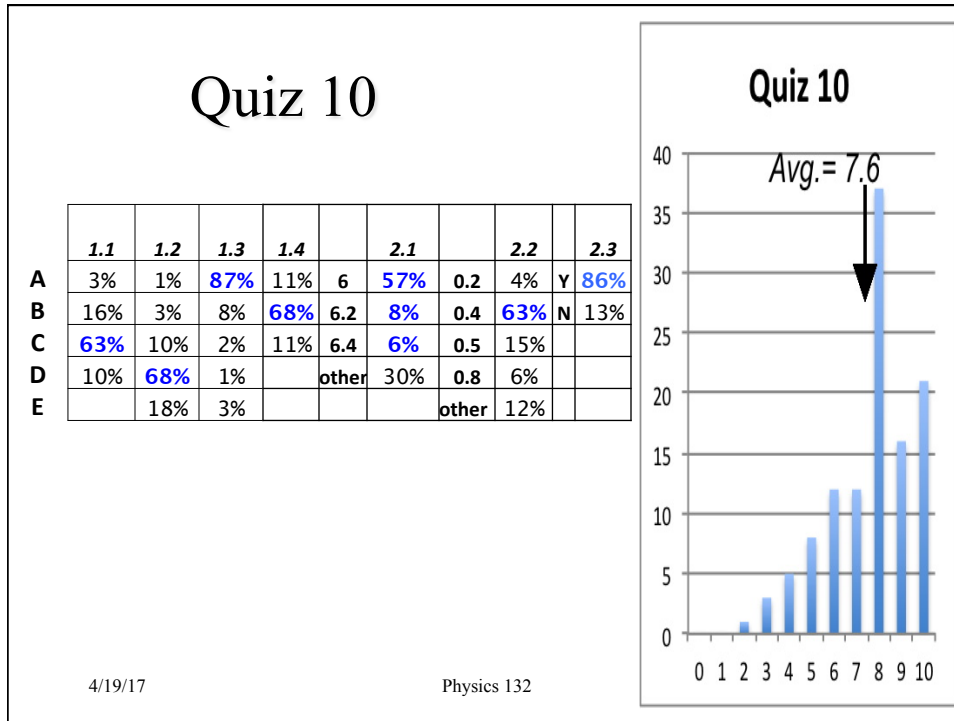
Outline

- Go over Quiz 10
- Plane mirrors
 - Virtual images
- Spherical mirrors
 - Real images
- Examples

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Physics 132

2



Foothold Ideas 1:

The Physics



- Certain objects (the sun, bulbs,...) give off light.
- Through empty space (or ~air) light travels in straight lines.
- Each point on an object scatters light, spraying it off in all directions.
- A polished surface reflects rays back again according to the rule: *The angle of incidence equals the angle of reflection.*

4/19/17 Physics 132 4

Foothold Ideas 2: The Psycho-physiology



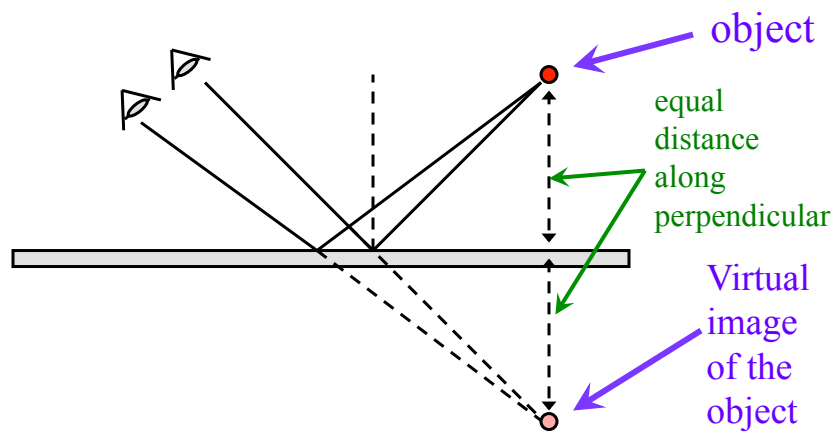
- We only see something when light coming from it enters our eyes.
- Our eyes identify a point as being on an object when rays traced back converge at that point.
(An over-simplification)

4/19/17

Physics 132

5

Where does an object seen in a mirror appear to be?

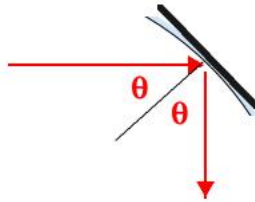


4/19/17

Physics 132

6

What happens when a ray hits a curved mirror?



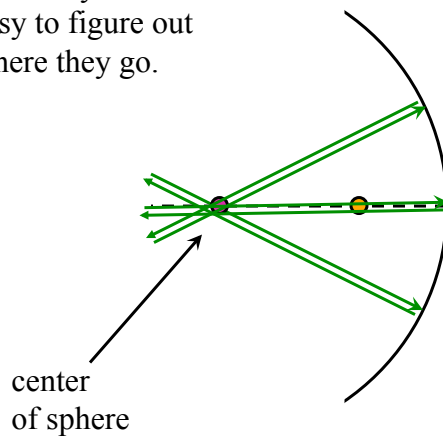
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Physics 132

12

A Spherical Mirror: Central Rays

A few rays are
easy to figure out
where they go.



All rays satisfy
the “angle of incidence
= angle of reflection”
measured to the normal
to the surface

All rays through
the center strike
the mirror perpendicular
to the surface and
bounce back
along their
incoming path.

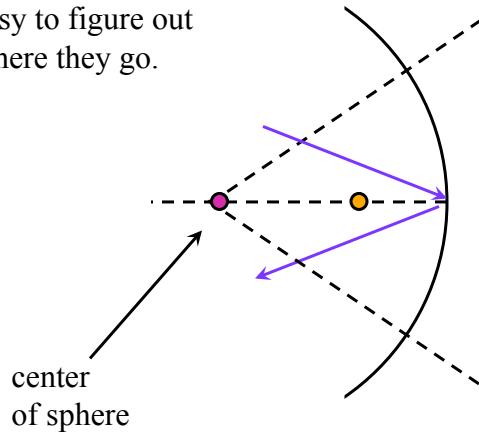
4/19/17

Physics 132

13

A Spherical Mirror: Central Ray

A few rays are easy to figure out where they go.



All rays satisfy the “angle of incidence = angle of reflection” measured to the normal to the surface

The ray hitting the central line of the diagram is particularly simple.

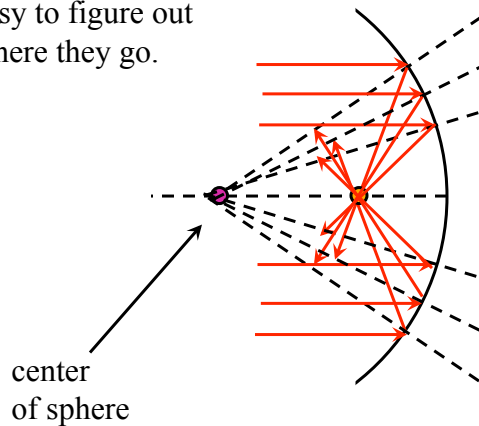
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Physics 132

14

A Spherical Mirror: Parallel Rays

A few rays are easy to figure out where they go.



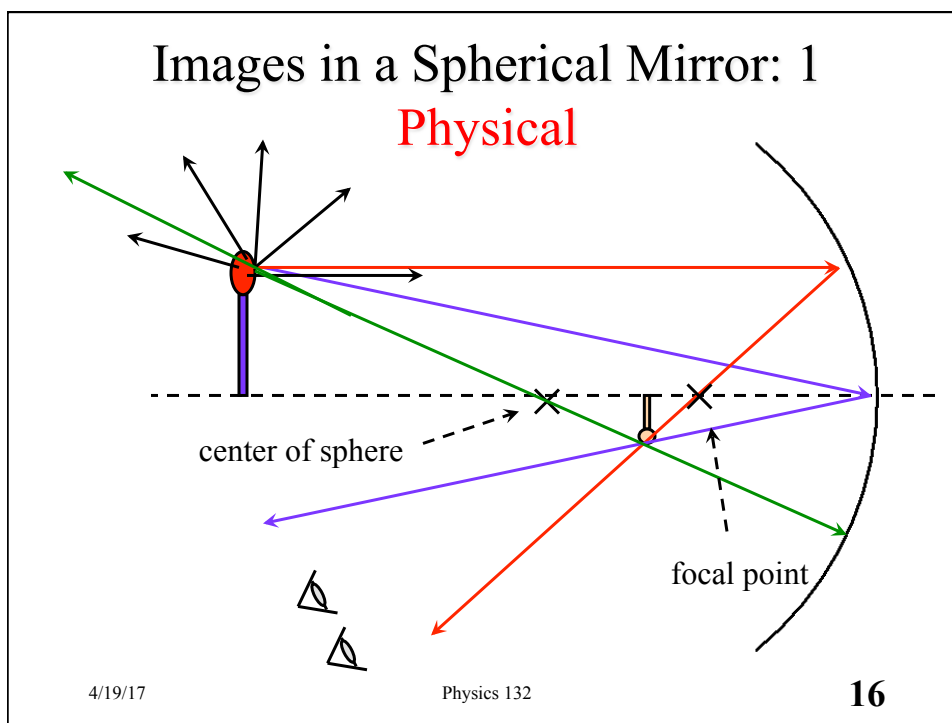
All rays satisfy the “angle of incidence = angle of reflection” measured to the normal to the surface

All rays parallel to and near an axis of the sphere reflect through a single point on the axis (the focal point)

4/19/17

Physics 132

15



Kinds of Images: Real

- In the case of the previous slide, the rays seen by the eye do in fact converge at a point.
- When the rays seen by the eye do meet, the image is called *real*.
- If a screen is put at the real image, the rays will scatter in all directions and an image can be seen on the screen, just as if it were a real object.

4/19/17 Physics 132 17