Experimental Write-up – Teacher Solution

Focal Length:

Use a far away light or the sun to measure the focal length of your lens:

$f' =$ _____ cm

Phone screen to lens:

What's the best distance between your phone and the lens?

d = _____ cm

How does this compare to your lens' focal length?

If the projected image is larger than the cell phone screen the distance between phone and lens should be between f' and 2 f' (between the focal length and twice the focal length). Effective diagrams can be found here: http://www.physicsclassroom.com/class/refrn/Lesson-5/Converging-Lenses-Object-Image-Relations

Lens to projected image:

What's the best distance between your lens and your image projected on the paper?

d = _____ cm

How does this compare to your lens' focal length?

If the projected image is bigger than the cell phone screen, the paper screen will be more than 2 f' away from the lens.

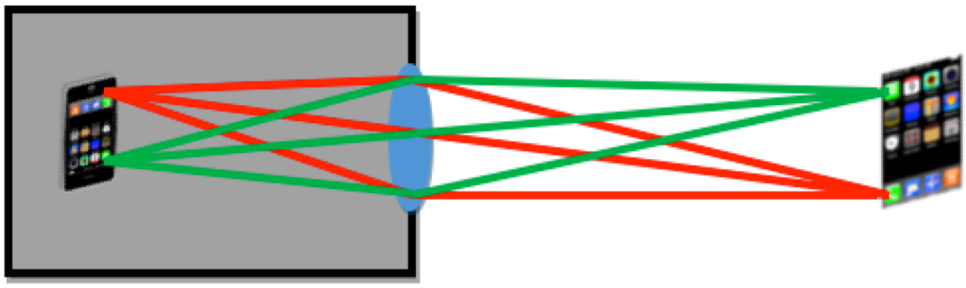
French page:
http://sites.cssmi.qc.ca/slavallee/IMG/pdf/SCT306OndesCB.pdf

Sketch:

Make a sketch of your final setup, including all measurements:

Ray Diagrams:

A Ray Diagram is drawn below. It shows how light given off from one side of the screen goes through the lens and ends up forming that part of the image on the paper. In the same way, draw a ray diagram for light coming from the **other side** of the phone. Do this in pencil first, then check with another group to compare what you drew.



Inverted Image:

To get an **UPRIGHT** image you probably needed to turn your phone upside down. Using the Ray Diagram, explain why this might be. Feel free to use words and/or pictures.

The Ray Diagram shows that the left side of the cell phone screen is refracted to meet at the right (opposite) side of the screen. The same holds true for the bottom of the cell phone screen being refracted to appear at the top of the image. Any image formed by light going through a lens in this way will be INVERTED (upside down and backwards).

Experimental Errors & Tech Issues:

Fill in the blanks below and answer the question:
Your image on the paper isn't nearly as sharp and bright as the image from a ____**classroom**_____ projector or a _____**movie theatre**____ projector.
List *at least 3* reasons (your own errors or issues with materials and technology) that prevented your image from being more perfect:

Answers will vary, but a few common ones are below:

1. **Lens is made of cheap plastic rather than nicely ground glass.**

2. **The phone kept shifting inside the box.**

3. **The phone brightness wouldn't go up as high as a normal projector.**

4. **Some light got through cracks in the box.**

5. **The phone wasn't sitting straight up and down. It was on a bit of an angle.**