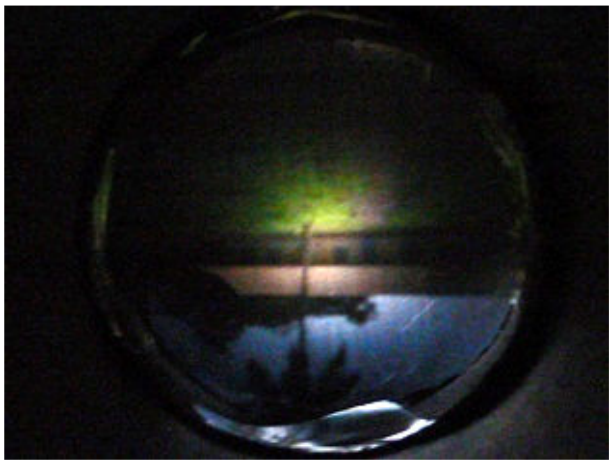
RECTILINEAR PROPAGATION OF LIGHT



1. Materials and tools (for 1 class = 30 students)

200 sheets of A3 newspaper (cut original size into two), 70 sheets of A4 plain paper, 35 toilet paper roll cores, 10 filtered water bags, 35 rubber bands, aluminum foil (35 sheets of 12cm x 12cm foil), 30 pairs of scissors, some cutters or razor blades, 15 rolls of adhesive tape, methyl alcohol, cotton gauze, some pairs of compasses, and explanation sheets

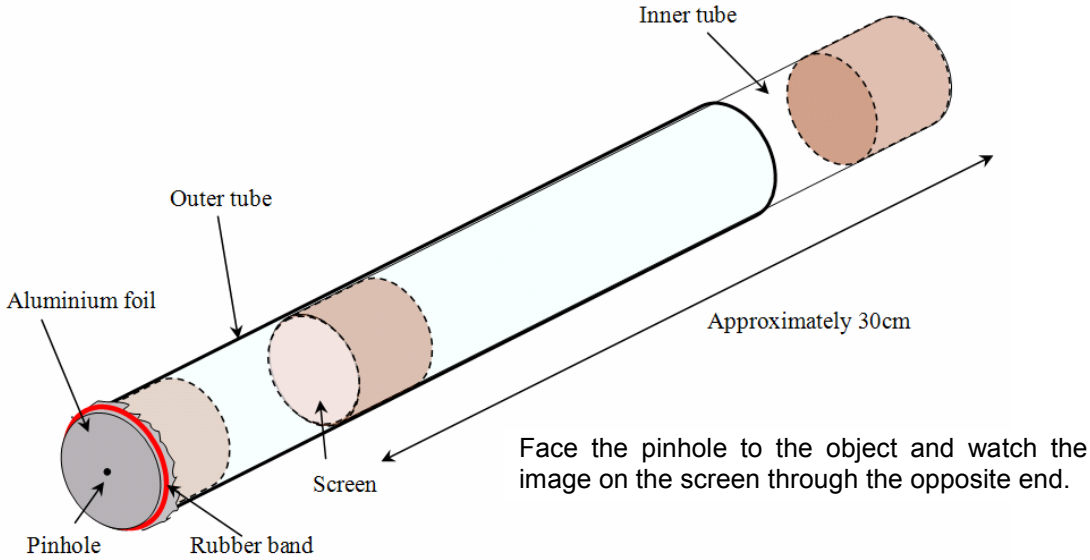
2. Preparation

1) Cut A2 newspaper sheets into A3 size sheets.
2) Remove ink from filter water bags using methyl alcohol and cotton gauze. Then cut the plain part of the bag into 35 sheets of 5cm x 5cm plastic film. They will be used to make camera screens.
3) Reinforce weak toilet roll cores using white glue (polyvinyl acetate glue).

3. Principle

Light rays from an object pass through a small hole to form an image. Since the light can only propagate straight, light rays from upper parts of the object come downward after passing through the pinhole and light rays from lower parts of the objects come upward. The inverted image on the screen shows the light propagates rectilinearly.

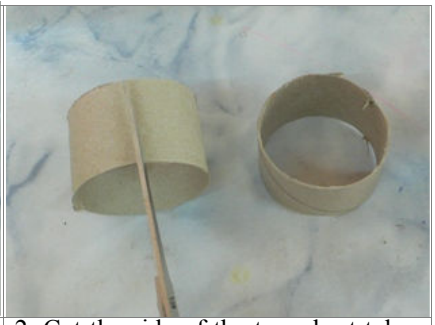
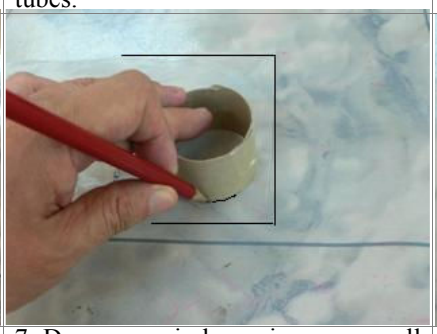
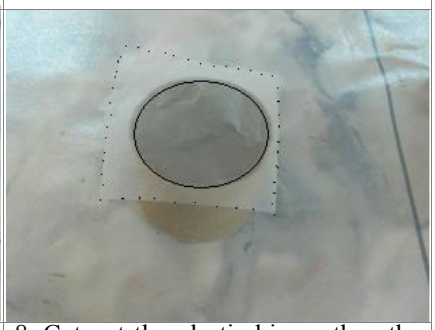
LOW COST PINHOLE CAMERA



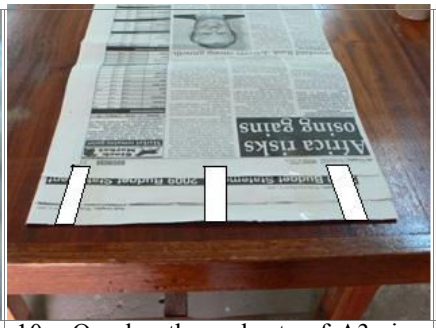
Materials and tools

Old newspapers, a toilet paper core, a filtered water pack, aluminium foil or black paper, A4 papers, a rubber band, a cutter or razor blade, a pair of scissors, adhesive tape, a pencil, a ruler, and a compass

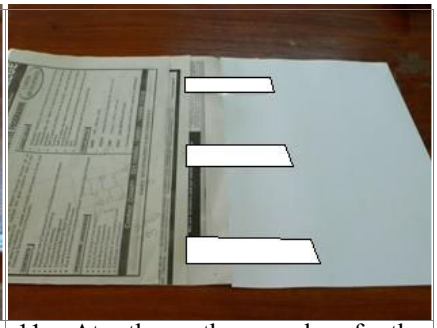
Method

		
1. Cut the toilet paper core into three short tubes.	Two shorts tubes will be used to make inner tube and one short tube will be used to make the outer tube.	2. Cut the side of the two short tubes like picture above.
		
3. Two of them are cut. One must be left as it is.	4. Overlap the open ends of the tube paper and fix them with adhesive tape in order to make small diameter tubes.	5. Finished two small diameter tubes.
		
6. Open the filtered water pack to make a plastic sheet.	7. Draw a circle using a small diameter tube on plain part of the sheet.	8. Cut out the plastic bigger than the circle and place it on an opening of one of the small diameter tube.

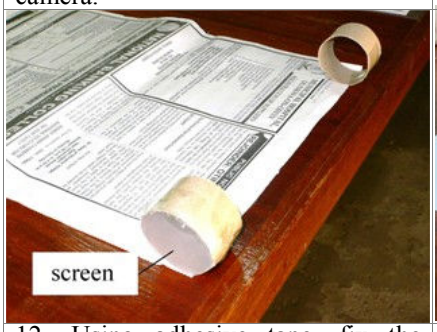
9. Fix the plastic sheet on the tube using adhesive tape. This plastic sheet becomes the screen of the camera.



10. Overlap three sheets of A3 size newspaper with 1cm gaps respectively.

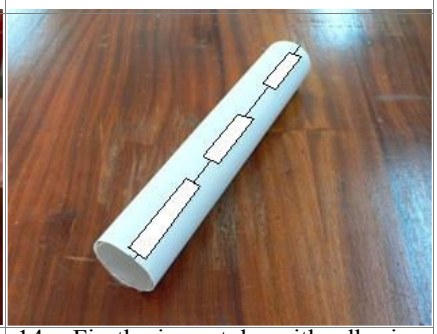


11. At the other end of the newspaper connect a sheet of A4 plain paper using adhesive tape.



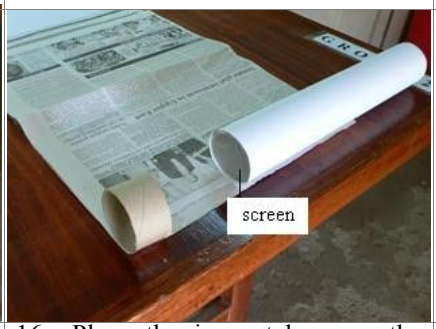
12. Using adhesive tape, fix the small tubes on the edge of the newspaper like picture above.

13. Roll up the paper neatly. This long tube becomes the inner tube of the camera.



14. Fix the inner tube with adhesive tape.

15. Place another three A3 size newspaper sheets and A4 plain paper. Fix them with adhesive tape. Then connect the last short tube on an edge of the newspaper.



16. Place the inner tube near the original diameter tube. Then start rolling up the newspaper and A4 paper around the tubes.

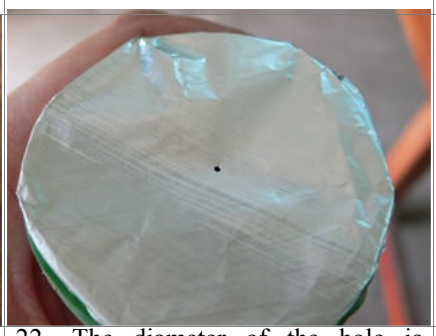
17. After you finish rolling up, fix the outer tube with adhesive tape.

18. Draw 12cm diameter circle on a sheet of aluminium foil or black paper.

19. Cut out the circle and put it on the opening of the outer tube.

20. Fix the foil with a rubber band.

21. Make a hole on the foil using the compass needle.



22. The diameter of the hole is approximately 0.5mm.

Finished pinhole camera