(I) if without changing the pinhole camera setting, if you move the pinhole further away from the object? Compare your image in terms of what view is covered now and before, size of image etc.

smaller image.

(ii) if you increase the distance between the pinhole and the screen?

large image

(iii) if the illumination (brightness) of the object changes, or you look towards another object with lesser illumination?

Dark image [lesser] bright image [more]

Q3. Now explore what happens if pinhole size is smaller and larger respectively. First, make some guessess of how variation in the pinhole size will affect the image. [You may compare the same object with pinhole cameras of different groups, which may vary in pinhole size.]

smaller hole's clear image
large hole not clear.

Task 2: Constructing a model to explain the image formation in task 1

Here our aim is to construct a geometrical model that would explain the image formation observed in task 1.

One of the understandings that evolved over the years is that when light travels in a medium of constant refractive index, it travels in a straight line. Therefore, the path of light is represented using a ray. You must have seen ray diagrams in your science book.

Q1. Let us try to draw a ray diagram to represent the image formation obtained in task 1. One ray TP starting from an object which goes in a straight line towards the pinhole P will meet the screen at point T', as already drawn in figure 7 below. Can you draw three rays similar to TPT' originating from different points from the object in the figure?

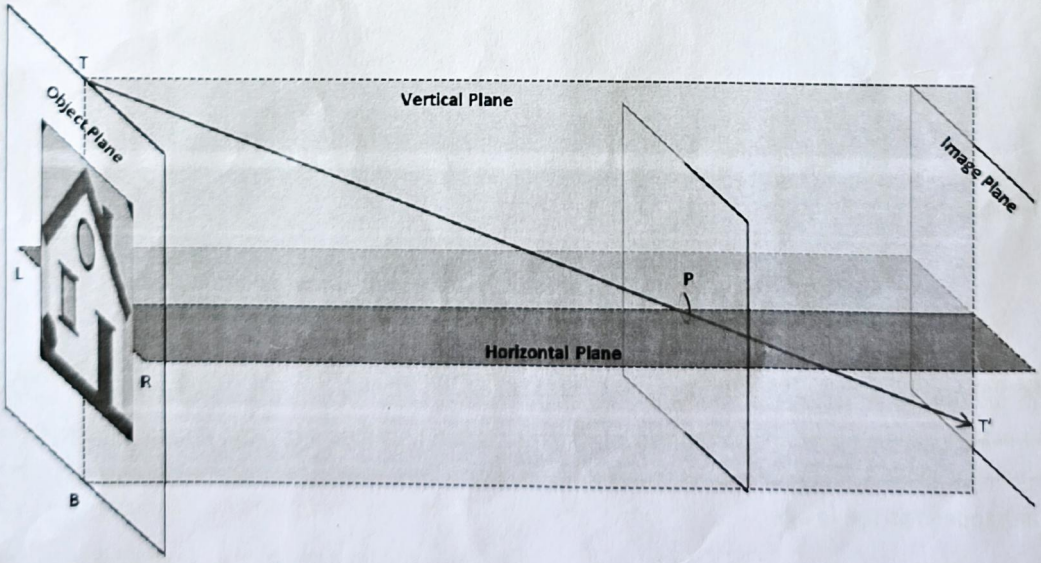

Figure 7: *Draw rays originating from the object and falling on screen*

Q2a. Refer to figure 8. Consider the ray ZPZ'. The ray starts from a green coloured point Z in the object. There is a brown coloured point at Q. What do you think will be seen at Z' in the image plane? A green dot or a brown dot? Similarly, suppose there is another ray QPQ'. What will you see at Q' in the image plane?

Vertically inverted

Laterally inveted

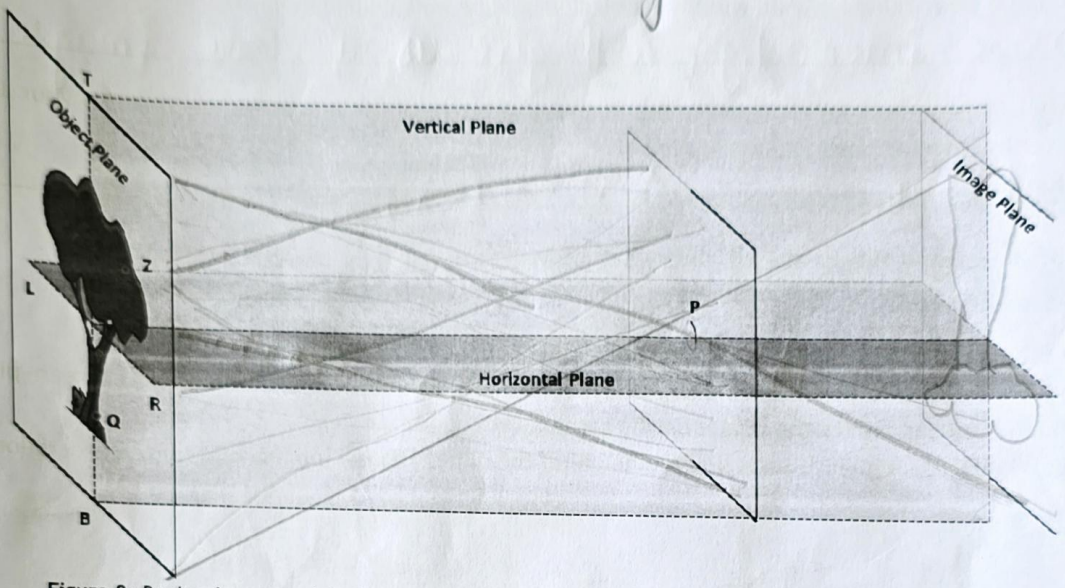

Figure 8: *By drawing rays originating from the object, predict where green and brown points would be observed on the screen (image plane).*

Q2b. Do you think there is a relation between the points on the object and the image plane? Discuss.

Q2c. Referring to figure 8, can you explain the orientation of the image observed?

Yes.

Q2d. What should be the light path if the image was to be of same orientation as the object? Check if this is observed in any of the pinhole cameras made by you or your friends.

~~Stra~~ [actually straight] curved.

Q3. Now, with the knowledge of light path discussed in the previous question, draw two rays in figure 8 which originate from the same point on the object, fall on the surface surrounding the pinhole (which acts as a blocking surface), and don't enter the hole. Where will these rays go?

reflect back (reflection)

Q4. If this blocking surface is removed, then where would these rays go? What would be the effects of these light rays on the image on the screen?

[fallon the we don't see image] screen.