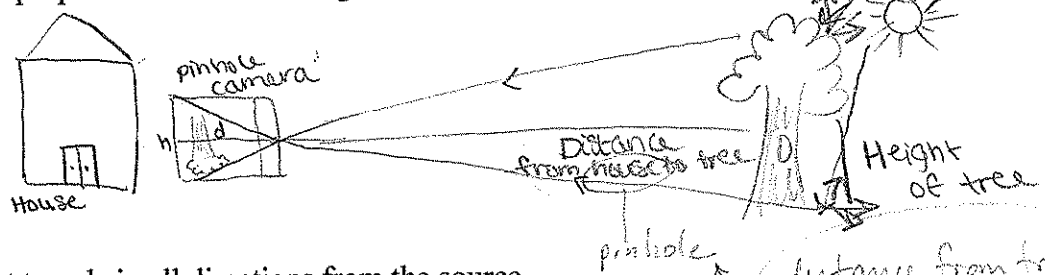


9.25/10
 very nice
 please check
 ray diagram
 with me.
 otherwise
 will be awarded

Student 14

1.75
 2
 yes

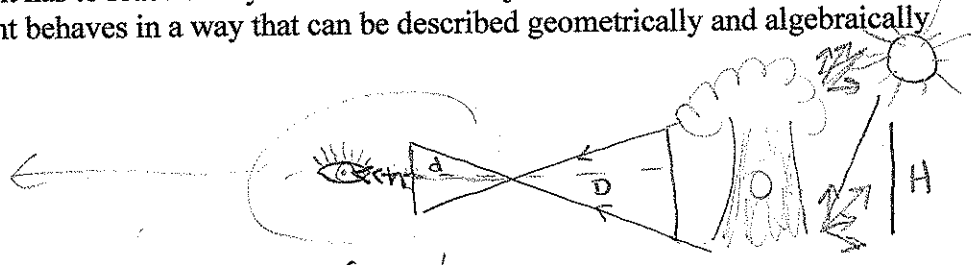
1. a. The family can look through the pinhole camera and use this information to find out if the tree will hit their house. Since they know the height of the image of the tree created when they look through the pinhole camera as well as the distance from the pinhole to the image that we see through our eye and the distance of the tree from the house, they can set up a proportion to find the height of the tree and be able to figure out if it will hit their house.



- b. *Light travels in all directions from the source
- *Light travels in a straight line
- *Light reflects off an object in all directions
- *Light has to reach the eye in order for an object to be seen
- *Light behaves in a way that can be described geometrically and algebraically

distance from tree to house \neq distance from tree to pinhole

c.
 draw continuous rays from source to eye



d. When one of the family members looks through the pinhole camera they will see the image of the tree upside down. The rays from the sun bounce off the top of the tree and travel in a straight line through the pinhole and reach the bottom of the screen in the pinhole camera which represents the top of the tree. Rays also bounce off of the bottom of the tree and travel in a straight line through the pinhole and reach the top of the screen in the pinhole camera and represents the bottom of the tree, thus creating a flipped image of the tree. Rays from all parts of the image reach the family members eye, allowing them to see this flipped image of the tree.

e. The relevant quantities that need to be represented are the actual height of the tree, the actual distance the tree is from the house, the height of the image of the tree created by the pinhole camera and the distance from the pinhole to the image that we see through our eye.

H= Actual height of the tree D= Actual distance the tree is from the house
 h= height of image seen through the pinhole camera
 d= the distance from the pinhole to the image that we see through our eye.

$H/h=D/d$ then cross multiply and get **$Hd=hD$**

$$\frac{\text{height of tree}}{\text{distance of tree from pinhole}} = \frac{\text{height of image}}{\text{distance of image from pinhole}}$$

This equation states: The actual height of the tree multiplied by the distance from the pinhole to the image that we see through our eye is equal to the height of the image seen through the pinhole camera multiplied by the actual distance the tree is from the house.

f. The family needs to solve the equation for the actual height of the tree.

$Hd/d=hD/d$ *If you divide both sides by d then the little d 's on the left will cancel out, leaving only the big H on the left side and the right side with hD/d .

The new equation is: **$H=hD/d$**

Therefore, the actual height of the tree is equal to the height of the image seen through the ~~through~~ pinhole camera multiplied by the distance from the pinhole to the image that we see through our eye all divided by the actual distance the tree is from the pinhole.

g. Relevant quantities:

$$h = 5\text{cm}$$

$$d = 20\text{cm}$$

$$D = 100\text{ meters}$$

Convert 100 meters to centimeters

$$100\text{ meters} = 10,000\text{ centimeters}$$

is it necessary to convert to centimeters?

$$h. H = \frac{5(\text{cm}) * 10,000(\text{cm})}{20(\text{cm})} = \frac{50,000(\text{cm})}{20(\text{cm})} = 2,500(\text{cm})$$

$$H = 2,500(\text{cm}) \text{ or } 250\text{ meters}$$

***The height of the tree is 250 meters.**

height!

will it hit the house?

new

1.75/2