

## Assignment 2

### Cameras and Lenses

**Instruction:** This assignment has 2 part of lab problems including part 1 is asking about cameras and lenses and for part 2 is setting camera parameters. Please try to answer all questions in English.

#### Part 1 : Cameras and Lenses

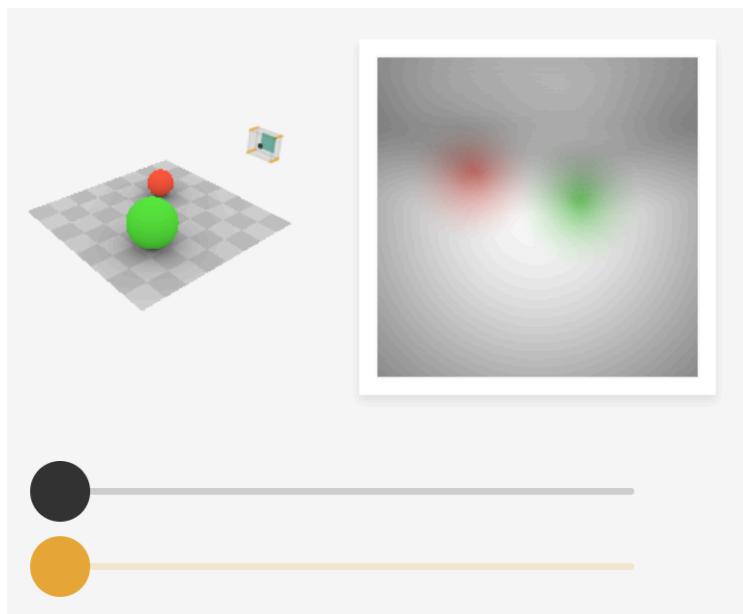
1.1 Exploring Pinhole Camera Configurations: The Effects of Hole Diameter and Sensor Distance on Image Formation

Question 1: How does the size/diameter of the pinhole affect image sharpness and brightness?

Ans 1: Bigger diameter of the pinhole makes image brighter and blur. Smaller diameter of the pinhole makes the image darker, clear, and sharp.

Question 2: How does the distance between the opening and the sensor change the size of objects and the field of view?

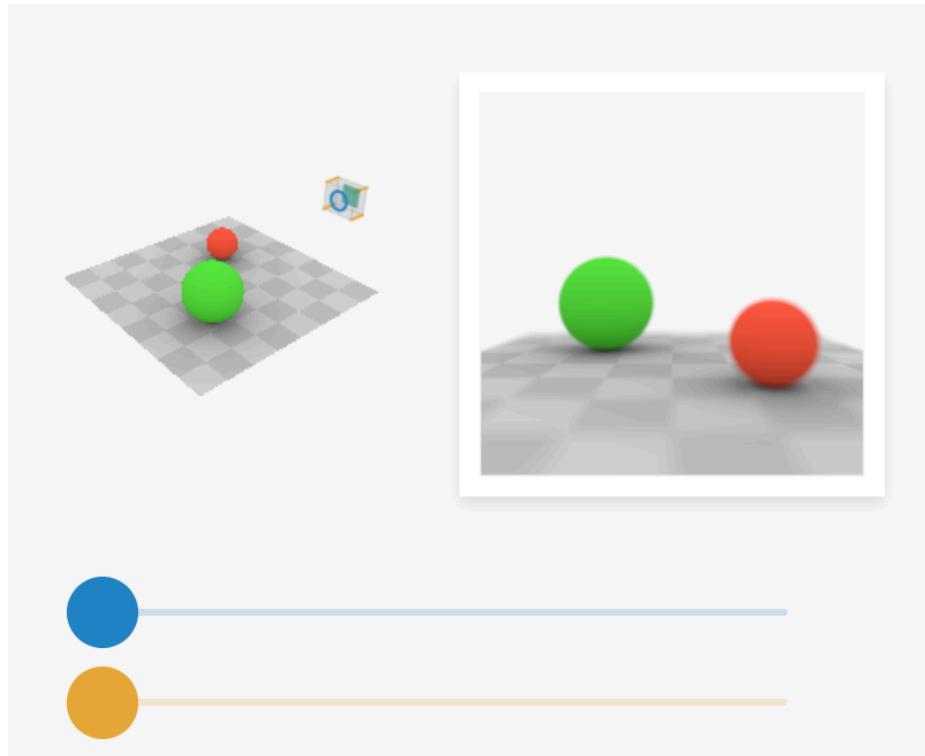
Answer 2: Closer distance between the opening and the sensor increases FOV, and objects get smaller. Farther distance decreases FOV, and objects get bigger.



## 1.2 Camera Configurations

Question 3: What happens to the image when we adjust the distance between the lens and the sensor? How does it affect focus and image clarity?

Answer 3: Adjusting distance between the lens and the sensor can focus objects at different distances. It affects the object image to be clear at the right focus.



Question 4: When the object (source) moves further away from the lens:

- Does the image's position become closer to or further from the lens?
- Does the size of the object's image on the sensor become larger or smaller?

$$\frac{1}{S_o} + \frac{1}{S_i} = \frac{1}{f}$$

$$M = \frac{S_i}{S_o}$$

$S_o$ : Distance between the object and the lens

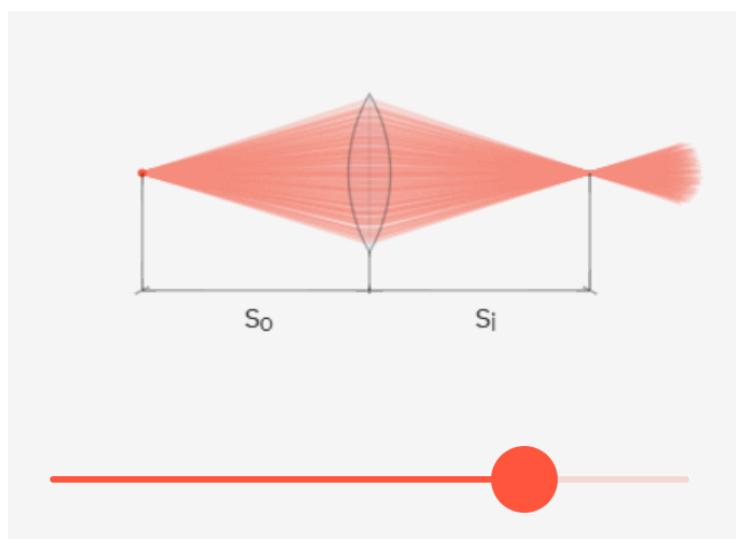
$S_i$ : Distance between the image and the lens

$f$ : Focal length

$M$ : Magnification

Answer 4:

- Image's position will become closer from the lens.
- Image's size will become smaller.

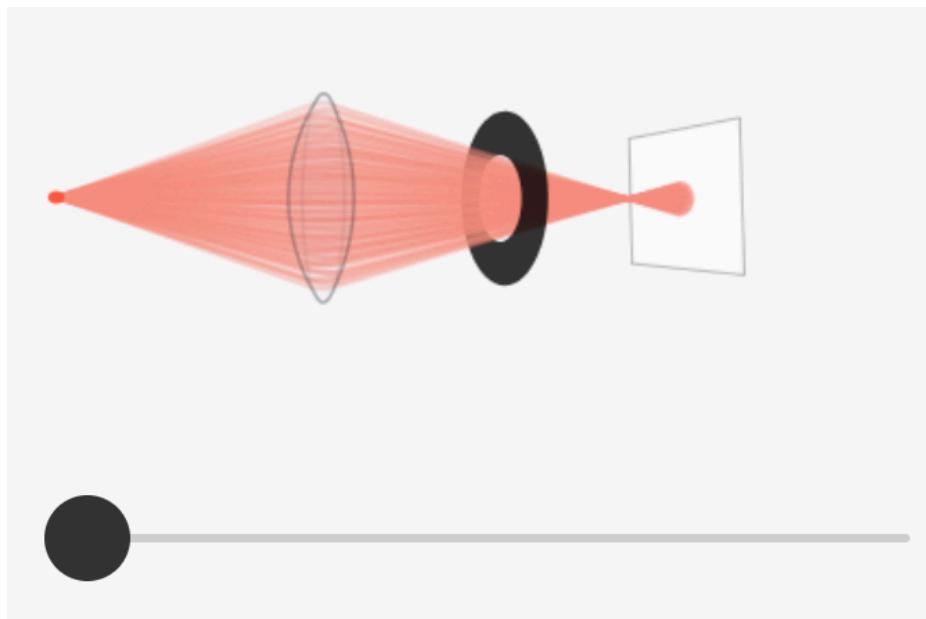


Question 5: What is depth of field?

Answer 5: Depth of field is Depth of area that light will focus on sensor.

Question 6: How does decreasing the aperture size affect the depth of field?

Answer 6: Decreasing the aperture can get more depth of field.



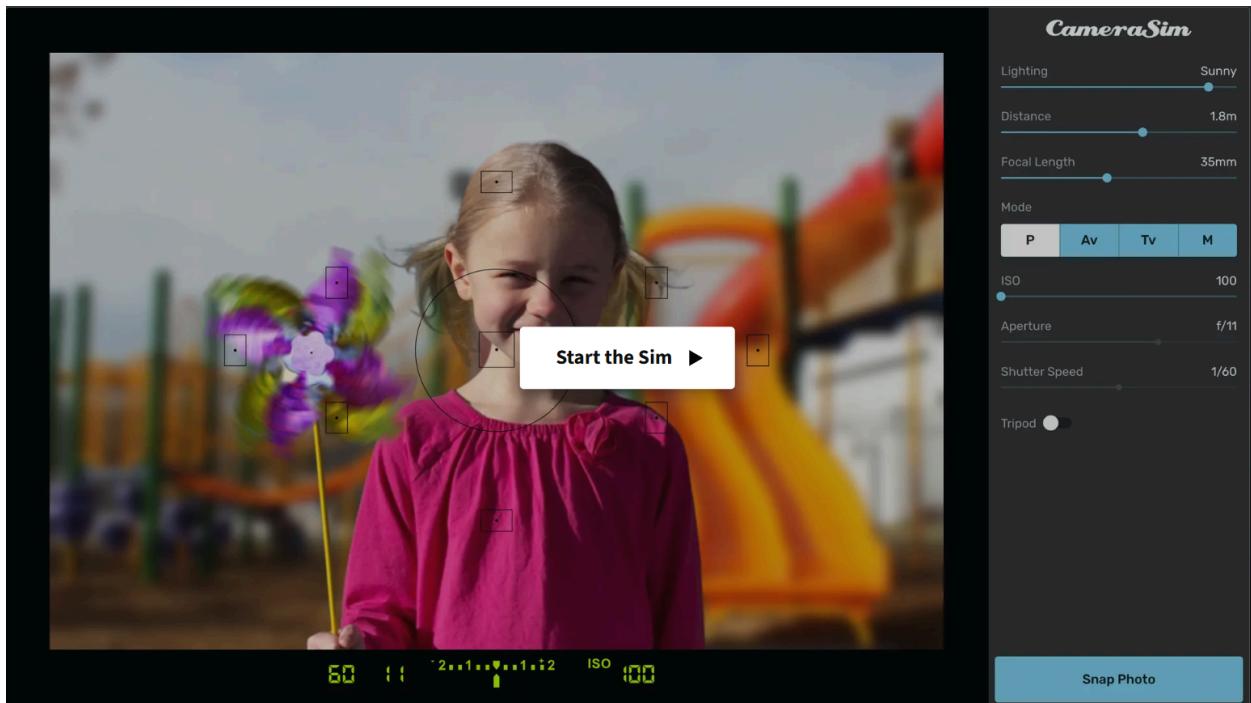
To explore and experiment with the effects, you can refer to the interactive simulations available in the link below. Use the provided controls to find answers and enhance your understanding.

<https://ciechanow.ski/cameras-and-lenses/>

## Part 2 : Exposure Triangle

**Instruction :** For 2<sup>nd</sup> challenges you'll try to adjust 3 of factors (aperture, shutter speed, ISO) for taking photo of little girl through virtual camera lenses.

**Virtual camera lenses :** <https://www.camerasim.com/original-camerasim>



**Default environment setting :**

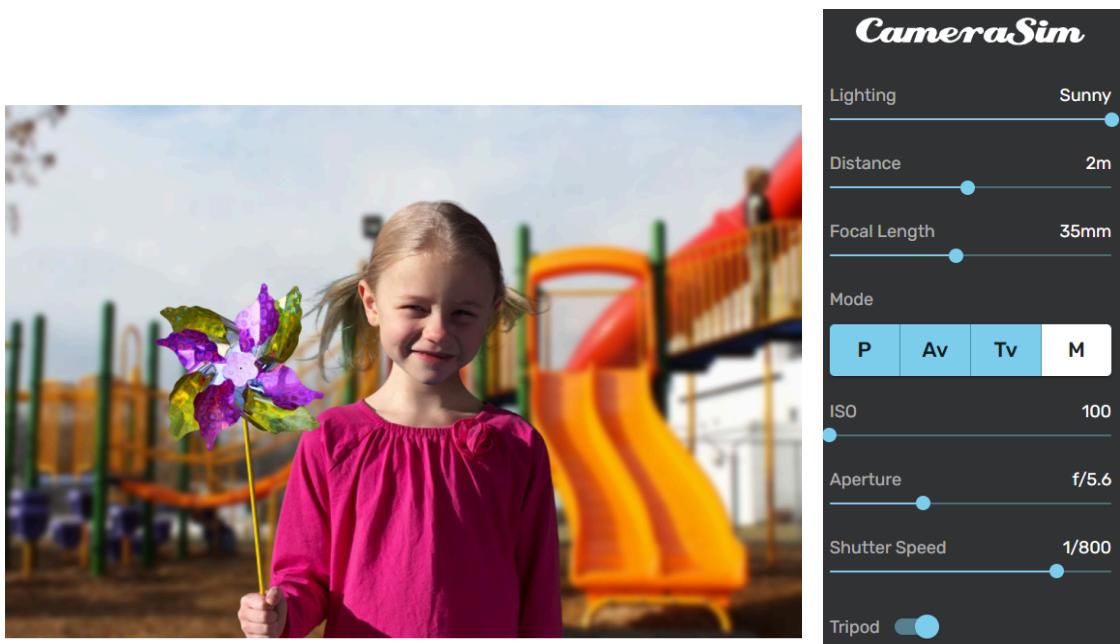
Distance : 2m.

Focal Length : 35mm.

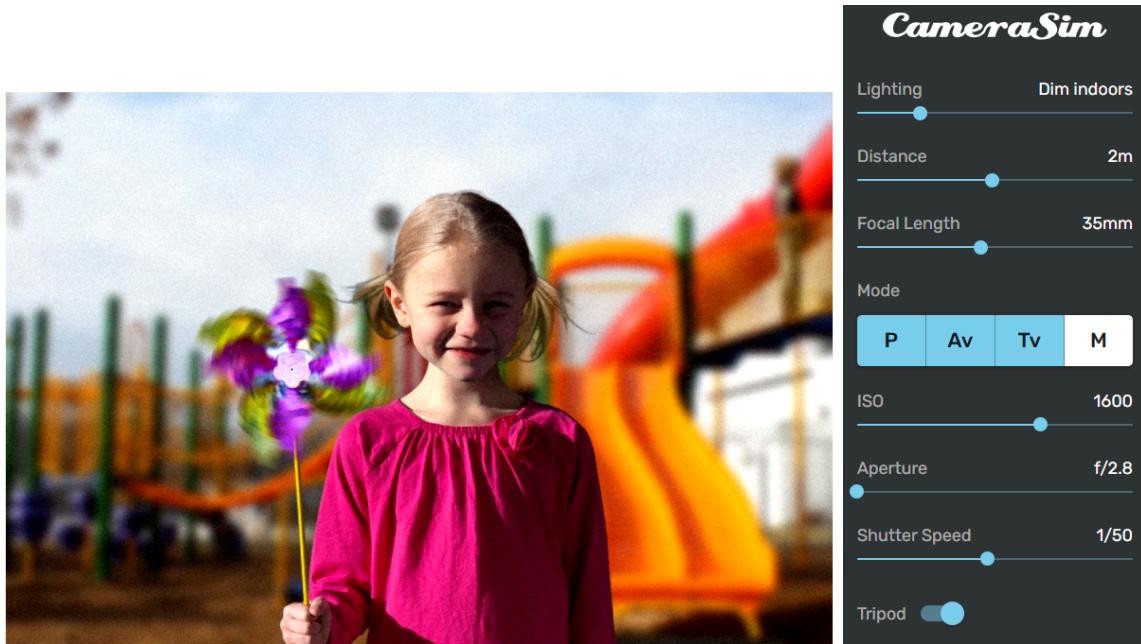
**Challenges problem :**

1. Try to adjust camera parameters and get snap photo result that showing the best looking of the girl with blur background and the lowest noise.

1.1 Set [Lighting: Sunny](#)

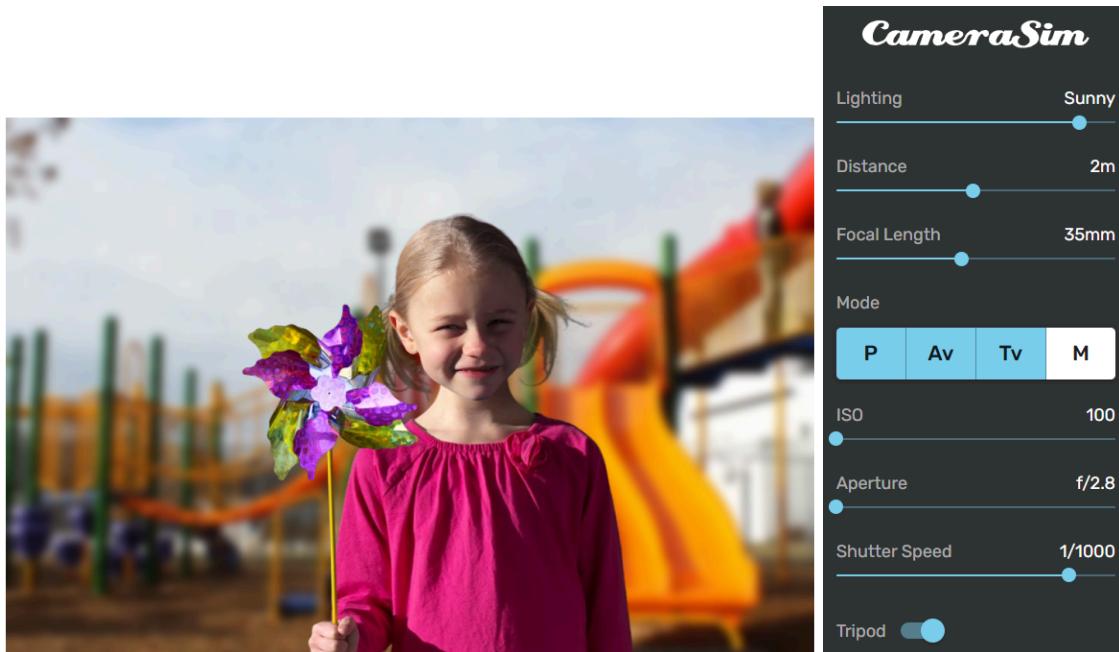


### 1.2 Set Lighting: Dim indoors

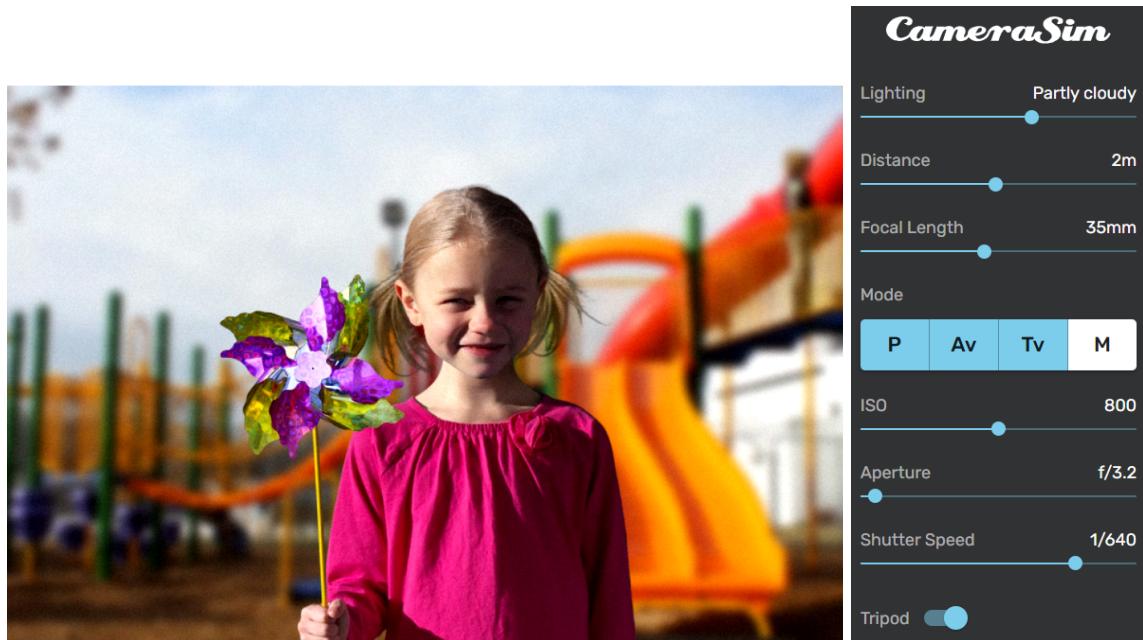


2. Try to adjust camera parameters and get snap photo result that showing stop the fan motion with the lowest noise photo.

### 2.1 Set Lighting: Sunny



## 2.2 Set Lighting: Partly cloudy



## 2.3 Set Lighting: Bright indoors

