



## COMPOSITION OF THE EYE

- Follow instructions in this worksheet, if you have difficulty understanding them, ask us.
- Write down both your partial and final results into the text and prepared graphs.
- If you want, you can record videos and take photos of conducted experiments, etc.

### The goal and idea of the experiment

You will explore the function of the iris and the ciliary muscles and you will explore parts of the retina.

### Task 1: Proving the function of the iris

Find the *iris* on the eye and find out what it is used for.

*We can verify its function by alternately exposing the eye to a bright light and a dim light and watching what the iris will do.*

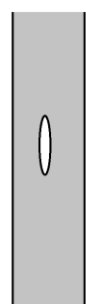
### Procedure

1. Will the iris be dilated or contracted in bright light? Justify your answer.

2. Look into a mirror and alternately shine light from your mobile phone into your eye (approximately 1 second of shining and 2 seconds of darkness). Watch what your iris does. Compare your observation with your prediction.

*The dilation and contraction of the iris is a reflex which happens at both eyes simultaneously. The brain will follow the dominating eye in this. Let's use this in the next step.*

3. Place the paper with a small hole inside closely to your eye. Look through the hole at a bright spot (for example outside) and alternately cover and uncover the second eye (with approximately 2 second interval). You will see the hole dilate and contract.
4. Draw the field of view of the eye (that is, what the eye can see) with the iris contracted and dilated into the pictures bellow and try to explain why the hole seemed to dilate and contract.



Hole in  
paper



Contracted  
iris



Hole in  
paper



Dilated iris





### Task 2: Proving the function of the ciliary muscles

Find the *lens* and *ciliary muscles* on the eye and find out their function.

*We can verify their function by trying to perceive objects that are placed at a different distance than we are focusing at.*

#### Procedure

1. Place the text *Romeo and Juliet* to about half a meter from your head.
2. Point with the tip of your pen to words you read but keep it about half the distance between the text and your head. Close one eye and Focus the other on the pen tip. Try to read the text without refocusing the eye.
3. What inconvenience troubled you during reading and why did you have it?

4. Look outside the window and raise your thumb to about 20 cm in front of your eyes and focus on it. Keep refocusing between an object in the distance and your thumb and watch how long this refocusing takes.
5. Decide which refocusing pressed the lens and which pulled the lens.

### Task 3: Finding parts of the retina

Read what are the *retina* and the *choroid* are used for and what the *blind spot* is.

*We can't see with the blind spot and our brain fills in the unseen area with things around it. If light from differently coloured point falls onto the blind spot, it will suddenly become invisible to us.*

#### Procedure

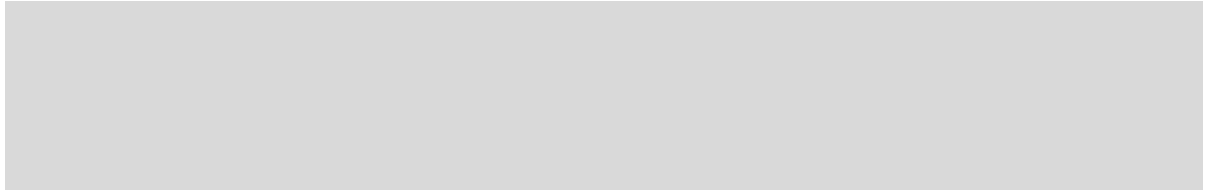
1. Put the paper with a point and a cross on the table so that the point and the cross are parallel with your eyes.
2. Close one eye and look at the cross. Move your head forwards and backwards until the point disappears (if it doesn't disappear, rotate the paper 180° and try again). Try both eyes.
3. Looking with your **right** eye, the point is to the **left/right** from the cross.





*Just how our brain ignores the blind spot, it ignores the choroid and nerves that cast their shadows onto the retina. In the following step, we will force the brain to see the choroid and the nerves.*

4. Close one eye. Look through the hole in the paper using the other eye onto a bright single coloured background. Shake with the paper slightly and watch what structure reveals itself. If you can't see any structure, change the frequency and amplitude of the shaking.
5. Describe or draw the structure you saw. What is it?

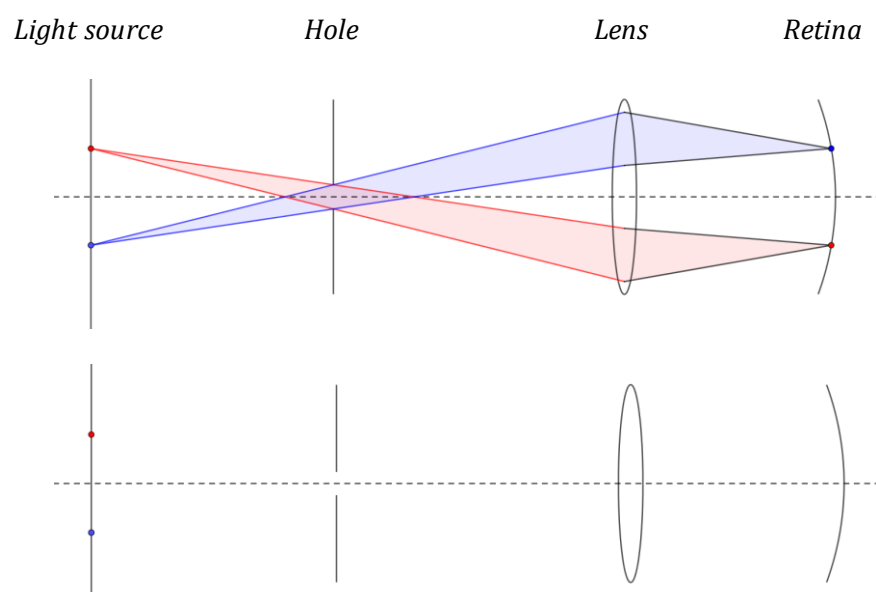


#### Task 4: The mystery of a flipped image

1. Place the paper with a hole close to your eye and look through the hole onto a bright spot. Close the other eye.
2. Slowly slide a little sheet of paper between your eye and the hole. Take note on which part of the hole gets blocked by the sheet first.



3. The picture below describes the conducted experiment. Draw the rays of light when one of the rays is blocked by the pen tip. (Make sure you draw the sheet of paper to the correct spot.)





## Conclusion

The iris must be **dilated/contracted** in a bright light, because otherwise

We refocus thanks to **accommodation**. When focusing to a near object, the lens is **thickened**.

The blind spot is located at the side of the eye **closer to nose/farther from nose**.

What causes the image on retina to be flipped?

