ACTIVITY 1

Equipment: A narrow slit (*obtain a piece of thick paper /about 5 cm x 5 cm / and cut the slit in the middle of the paper using a sharp utility knife*); a phone with a flashlight.

Version 1: Observational experiment (as motivation, before starting the topic on a single slit diffraction)

Go into a dark room. Switch on your phone flashlight, put the phone vertically on the table and observe the flashlight from a distance of 5 m or more.

a. Observe the flashlight through the narrow vertical slit. Describe what you observe. (*The photo below shows magnified view of what students will see.*)

b. Pull the slit apart slightly. Describe what you observe.

Version 2: Application experiment (Give this activity after the students learned about a single slit diffraction)

Go into a dark room. Switch on your phone flashlight, put the phone vertically on the table and observe the flashlight from a distance of 5 m or more.

a. Observe the flashlight through the narrow vertical slit. Describe what you observe.

b. Explain why the central spot is white and why the other colors appear in the order, they do.

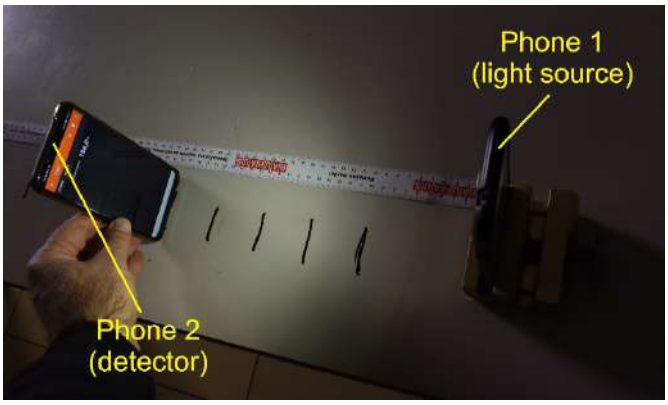
c. Predict what will happen when you pull the slit apart slightly. Will the white spot be narrower or wider? Justify your prediction. Then do the experiment and compare the outcome to the prediction.

ACTIVITY 2

Equipment: A phone with an application (such as Phyphox) that allows you to measure the intensity of light. Another phone with a flashlight or some other small but bright light source. A meter tape or a ruler.

For this activity, students do not need to know the definition of lux. They should only know that the phone application for measuring light gives numerical values that are directly proportional to the energy that light brings every second to the surface area of the light sensor.

a. Go into a dark room. Fix the light source (a phone with flashlight) on the table. Mark on the table distances r from the light source in intervals of 5 cm. Switch on the light source and start the application for measuring light intensity on the detector phone. Move the detector phone from mark to mark and record the reading of the light intensity I (see figure below).



b. Plot I -versus- r graph, using data that you recorded. Then plot the following three graphs:

I -versus- $(1/r)$ graph, I -versus- $(1/r^2)$ graph and I -versus- $(1/r^3)$ graph using same data as before.

c. Compare the graphs and suggest the mathematical expression that best describes the relationship between the light intensity emitted by a small light source and the distance from the light source. Justify your suggestion.

Typical results: