07-04 Intensity Versus Distance Lab *Name:* _____

Adapted from Take-Home Physics by Michael Horton

Objective

- Find the relationship between intensity of a wave and the distance away from the source of the wave.

Materials

- Flashlight
- PASCO Light Sensor
- Ruler/Meter stick
- iPad with SparkVue app

Procedure

Observe

1. Turn on your flashlight. Shine the flashlight on a close surface and observe the brightness intensity.
2. Shine the flashlight on a far surface and observe the intensity.
3. Describe the difference in the intensity. _____

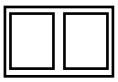
Hypothesis

4. Write a hypothesis about the intensity of the light versus distance.

   _____

Test

5. Set the white screen vertically, and then turn out the lights in the room.
6. Hold the flashlight on top of the light sensor so both are pointing at the screen.
7. Turn on the light sensor and open the SparkVue app
   a. Start a new experiment and **Build New Experiment**
   b. Tap the Bluetooth icon and select your light sensor
   c. Select the layout that gives you two equal sized spaces



   d. On the left space select the grid to make a table
      i. Tap the Select Measurement on the left
         1. Tap the User-entered on the right
         2. Tap Create Data Set
            a. Name it Distance
            b. Unit name is cm
            c. Tap OK
      ii. Tap the Select Measurement on the right
         1. Tap White which is under Spot Light Sensor
      iii. On the bottom left, tap the circle watch icon to change the sampling option
         1. Sampling Mode: Manual
         2. Tap OK
      iv. Fill in the distances we will use. 5, 10, 15, 20, 25, 30 cm.
   e. On the right space select the first graph icon
      i. On the left, tap Select Measurement and choose White
      ii. On the bottom, tap Time (s) and select Distance from the User-entered area
8. Turn on the flashlight and lay it on the desk so that it is pointing away from everyone else's experiments.
9. Set the light sensor 5 cm away from the flashlight so that the black tube is pointed directly at the light.
10. Tap start. Wait a couple seconds for the sensor to settle down, then tap the checkmark to record the 5 cm data.
11. Move the sensor to 10 cm away and wait a couple seconds for the sensor to settle down, then tap the checkmark.
12. Repeat for the rest of the distances. You should have a complete table and a graph. Copy these onto this sheet.

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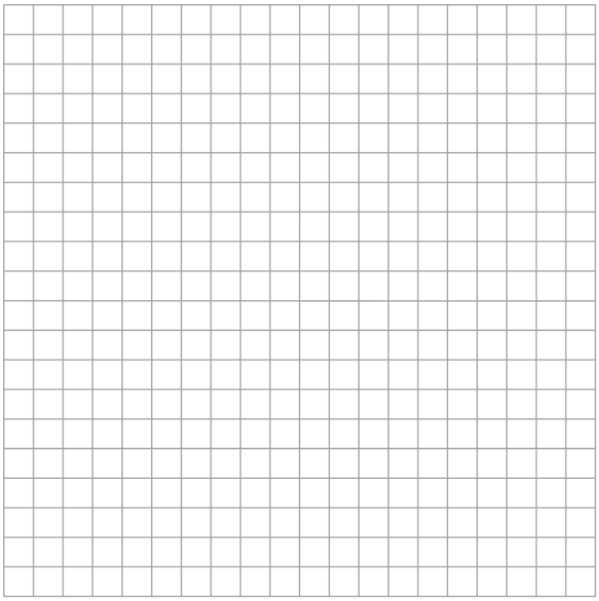
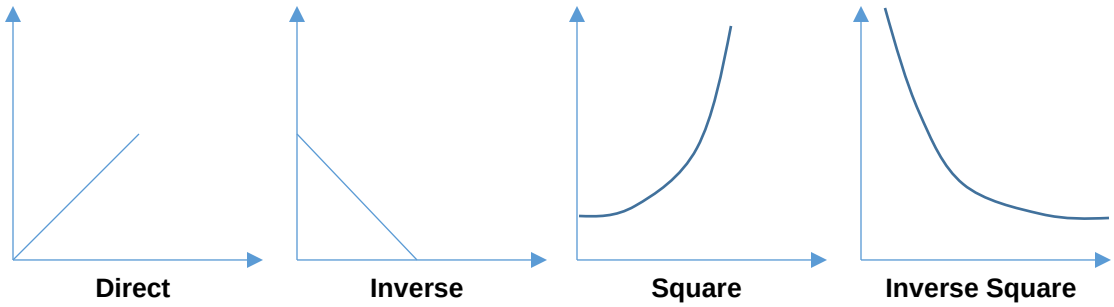
Distance from surface	**5 cm**	**10 cm**	**15 cm**	**20 cm**	**25 cm**	**30 cm**
Intensity						



Conclusion

13. The shape of the graph represents a _____ (direct, inverse, square, inverse square) relationship between the distance and intensity.



14. Make a curve fit to match your answer to step 13.
    a. Tap the graph icon under the graph to get the graph options.
    b. Tap the icon that looks like a curve through a scatter plot.
    c. Choose the correct type of fit and write down the equation. _____
15. How far away would you have to be to get four times the intensity as at 30 cm? _____
16. When you were at 40 cm, was the intensity half the intensity as at 20 cm? _____, If not, what fraction was it? _____
17. When you were at 30 cm, was the intensity one-third the intensity as at 10 cm? _____, If not, what fraction was it? _____