Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Physics 11

**Hooke’s Law Lab**

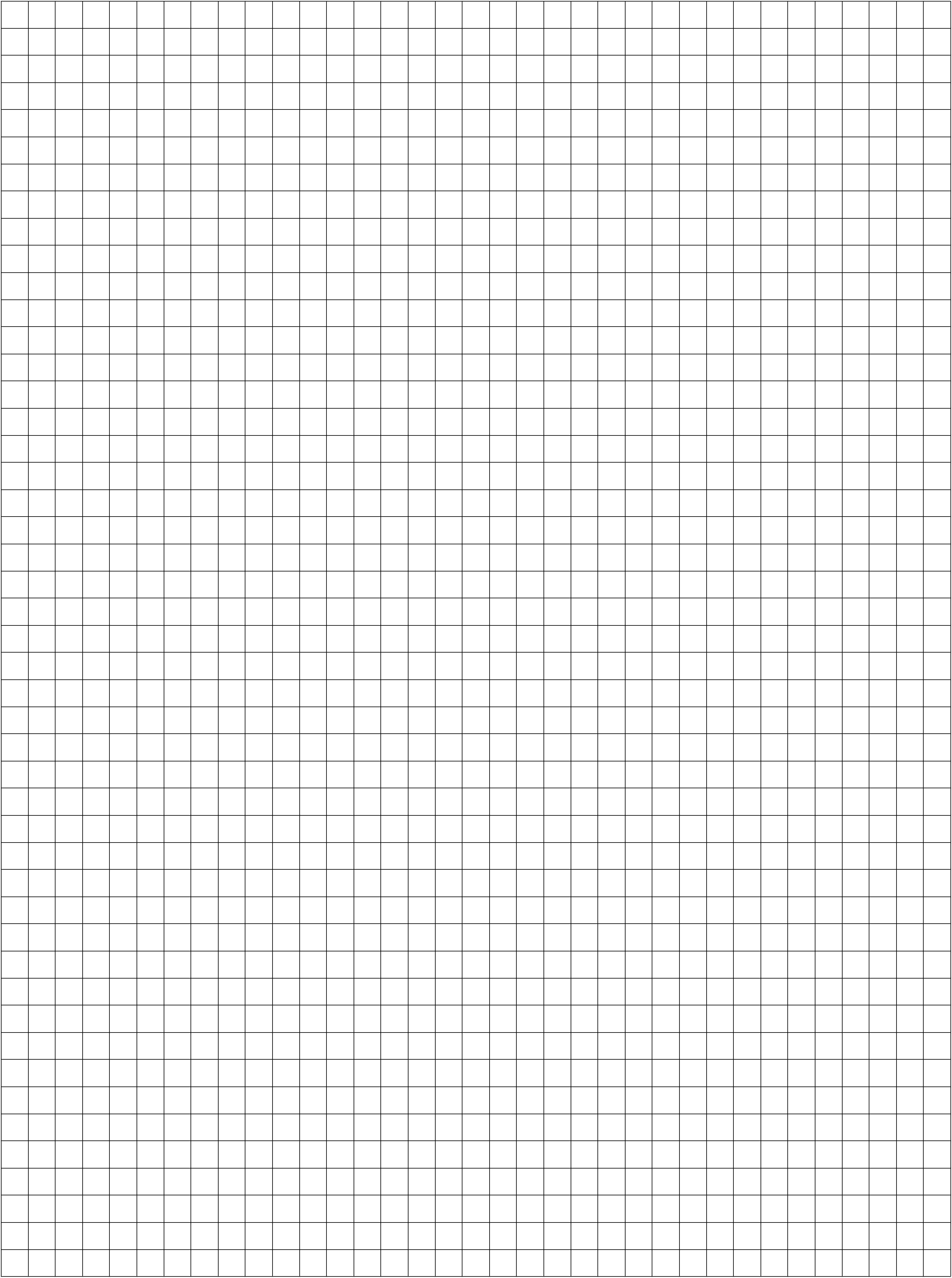
**Purpose:** Determine the relationship between the stretch in an elastic band and the amount of elastic force it’s applying.

**Procedure:**

* Below, draw an FBD for an object hanging motionless from an elastic band.   
    
    
    
    
    
    
    
    
    
    
    
    
    
    
    
    
    
    
    
    
    
    
    
    
    
    
    
    
  If the mass of the object is 3 kg, calculate the magnitude of the elastic force that acts on it.  
    
  Magnitude of the elastic force: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Hang an elastic band from the wall.
* Put 1.5 m of masking tape vertically down the wall behind the elastic.
* Add weights to the band in 100 g increments. After adding each weight, mark on the tape the position of the bottom of the ***elastic*** (not the bottom of the masses).
* Keep going until the elastic breaks.
* Fill in your data in the table on the back side of this page.

|  |  |  |
| --- | --- | --- |
| **Total Mass** | **Elastic Force (See your FBD to help you find this)** | **Displacement of Elastic (Measured from Start Position)** |
| 100 g |  |  |
| 200 g |  |  |
| 300 g |  |  |
| 400 g |  |  |
| 500 g |  |  |
| 600 g |  |  |
| 700 g |  |  |
| 800 g |  |  |
| 900 g |  |  |
| 1000 g |  |  |
| 1100 g |  |  |
| 1200 g |  |  |
| 1300 g |  |  |
| 1400 g |  |  |
| 1500 g |  |  |
| 1600 g |  |  |
| 1700 g |  |  |
| 1800 g |  |  |
| 1900 g |  |  |
| 2000 g |  |  |

**Graphing:** Use the graph paper below to plot your data. Put elastic force on the y-axis and displacement on the x-axis. You can turn the page sideways if that fits your data better.



**Data Analysis and Questions:**

1. Draw a line-of-best-fit through your data ***using a ruler***. If your data doesn’t fit on a line very well, try using two different lines: one for the first part, and one for the second part.
2. Below, write the equation of your line (if you have two lines, just do the first one). For a reminder on how to do this and the format to use, see your notes from section 1.3.
3. What units does the slope of your line have? Using a sentence or two, describe what these units mean (don’t just write out the full name).
4. If you used a thicker elastic band, do you think the slope would be bigger, smaller, or the same? Why? Be precise with your answer.
5. Using the equation for your line of best fit, how much do you think the elastic band would stretch if we hung a 350 g mass from it? Show all your work.