PHYSICS 2204
UNIT 1: KINEMATICS
WORKSHEET #4: GRAPHING DATA

STUDENT NAME:_____

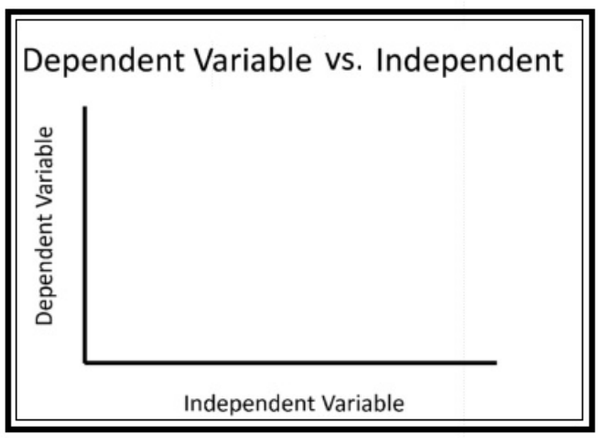
Step 1: ***Identify dependent variable and independent variable***

INDEPENDENT VARIABLE (CAUSE)

- Also referred to as the manipulated variable because the experimenter chooses the values (Often in nice, even intervals)
- Always plotted on the x-axis (ex. time)

DEPENDENT VARIABLE (EFFECT)

- Also referred to as the responding variable because it is the value that is measured by the experimenter.
- Always plotted on the y-axis (ex. Distance)



Step #2: ***Prepare the Grid for your Graph***

- On graph paper, construct a grid for your graph. The horizontal bottom edge is the x-axis and the vertical edge on the left is called the y-axis.

- Be sure to use the majority of your sheet of paper- DO NOT try to fit the graph into one corner of the paper!

Step #3: ***Put a title on the graph***

- Titles of graphs are usually "Y versus X" or Dependent Variable versus Independent Variable. For example. A graph will be given the title "distance versus Time." (NOT ditance divided by time, or distance minus time.)

Step #4 : **Choose the Axes**

- Recall that the independent variable is plotted on the x-axis and the dependent variable is plotted on the y-axis.

- Putting numbers on the x and y-axes is something that everybody always remembers to do (after all, how could you graph without showing the numbers?). However, people frequently forget to put a label on the axis that describes what those numbers are, and even more frequently forget to say what those units are.

Step #5: **Determine the Range of Values**

- For each variable in the table, find the difference between the largest value and the smallest value- this is the range.
-

Step #6: ***Choose a Scale for Each Axis***

- The scale you choose depends on the range of values, and the amount of space you have.

- Each line on the grid usually increases by equal divisions, such as 1, 2, 5, 10, etc. and leaves a little extra space to avoid “crowdedness”

Step #7: ***Plot the Points***

- Now, go ahead and place your data points on the graph. Make them big enough to be seen, but not big enough to look like you were eating pizza while making your graph.

Step #8: ***Draw a Line of Best Fit through Your Data Points.***

- If possible, draw a straight line through your data which lies closest to the most points- DO NOT connect the dots.

- This line which passes through the majority of the points on a graph is called the line of best fit.

- A line of best fit does not have to pass through the origin or be linear

Step #9: ***Calculate the slope of each graph***

- Slope refers to the steepness of the line. It represents a mathematical relationship between the variables, and can be calculated by:

$$Slope = \frac{y_2 - y_1}{x_2 - x_1}$$

- Include units with slope

Example: A Running Moose

The Table below was recorded for a moose running in a forest after seeing Mr Fifield on the first day of hunting. Use the following data to:

i) Create a graph
ii) Draw a line of best fit
iii) Calculate the slope (Where possible...lol)

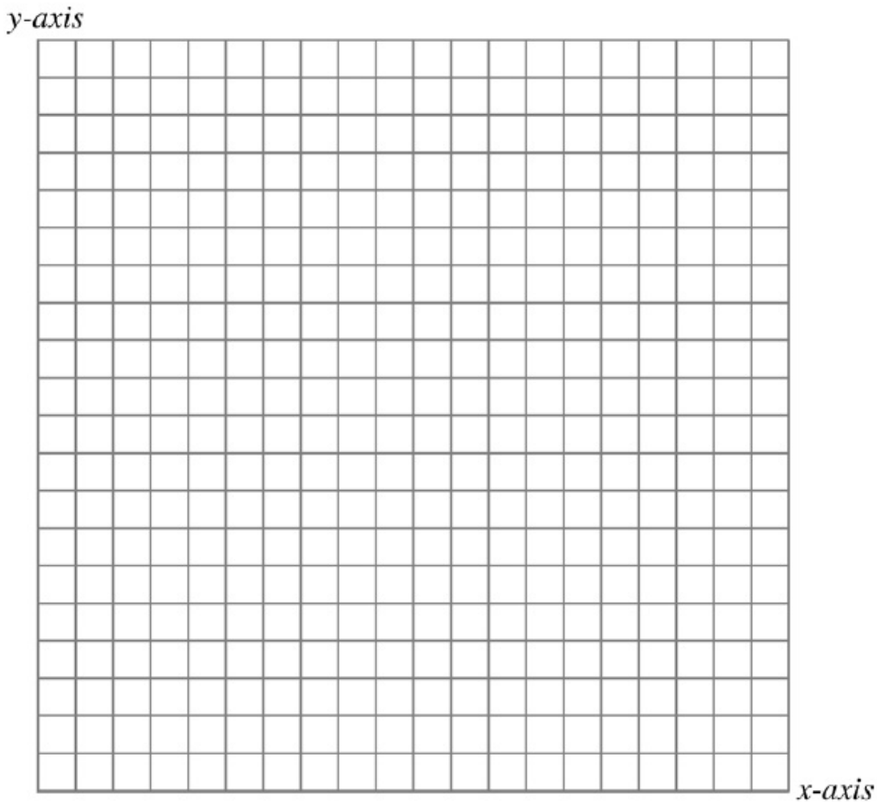
Time(s)	Distance(m)
0.0	0
1.0	16
2.0	34
3.0	42
4.0	63
5.0	74
6.0	82

Part #1: What is the independent variable and dependent variable:

Independent Variable:_____

Dependent Variable: _____

Part #2: Using steps 1 to 8 listed above, create a graph.



Part #3: Calculate the slope of the line. The slope must have a magnitude and unit.

Part #4: What does the slope of distance versus time represent?

PART A: WRITTEN RESPONSE

1. Seven data pairs are listed in the table below. For each data pair, identify the independent and dependent variable. Then, rewrite the data pair according to the headings in the next two columns of the table The first two data pairs are done for you.

	Data pair (not necessarily in order)		**Independent (x-axis)**	**Dependent (y-axis)**
a.	Temperature	Hours of heating	Hours of heating	Temperature
b.	Stopping distance	Speed of a car	Speed of a car	Stopping distance
c.	Stream flow rate	Amount of rainfall		
d.	Time	Distance travel		
e.	Tree age	Average tree height		
f.	Speed of car	Time		

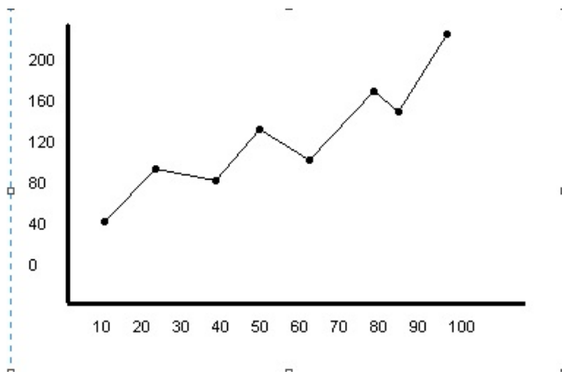
2. The lowest and highest values for a variable are listed in the table below. Use these values to find the data range for each variable. The first two are done for you. [3]

Lowest value	Highest value	Range
0	28	28
10	87	77
0	4.2	
-5	23	
100	1250	

3. Using the variable range and the number of lines, calculate the scale for an axis. The scale is the quantity represented per line on the graph. Often the calculated scale is not an easy-to-use value. To make the calculated scale easy-to-use, round the value and write this number in the column with the heading "Adjusted scale." The first two are done for you. [4]

Variable range	Number of lines	Range ÷ Number of lines	Calculated scale	Adjusted scale
13	24	13 ÷ 24 =	0.54	1
83	43	83 ÷ 43 =	1.93	2
31	35			
100	33			
300	20			
900	15			

4. Identify four problems with the graph below: [4]



(i) _____

_____

(i) _____

_____

(iii) _____

_____

(iv) _____

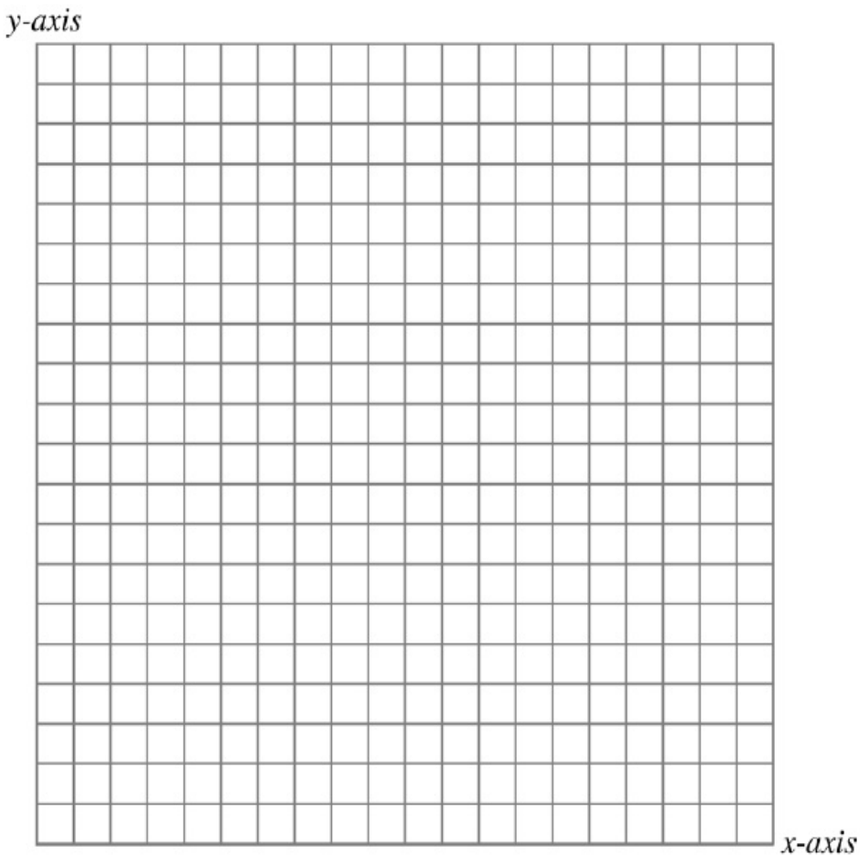
_____

5. For each of the following

-Graph each of set of data (Remember to label all axes and to include a title)
-Draw a line of best fit
-Calculate Slope

(A)

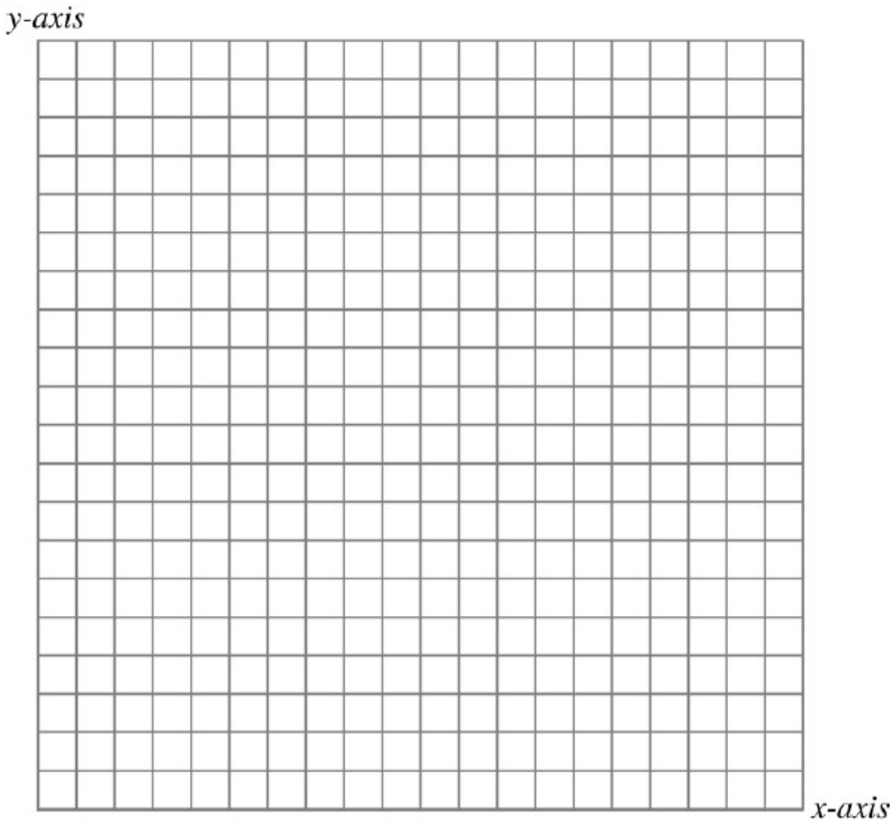
time (s)	0	1	2	3	4	5
distance (m)	0	2	3	5	6	7



Slope:

(B)

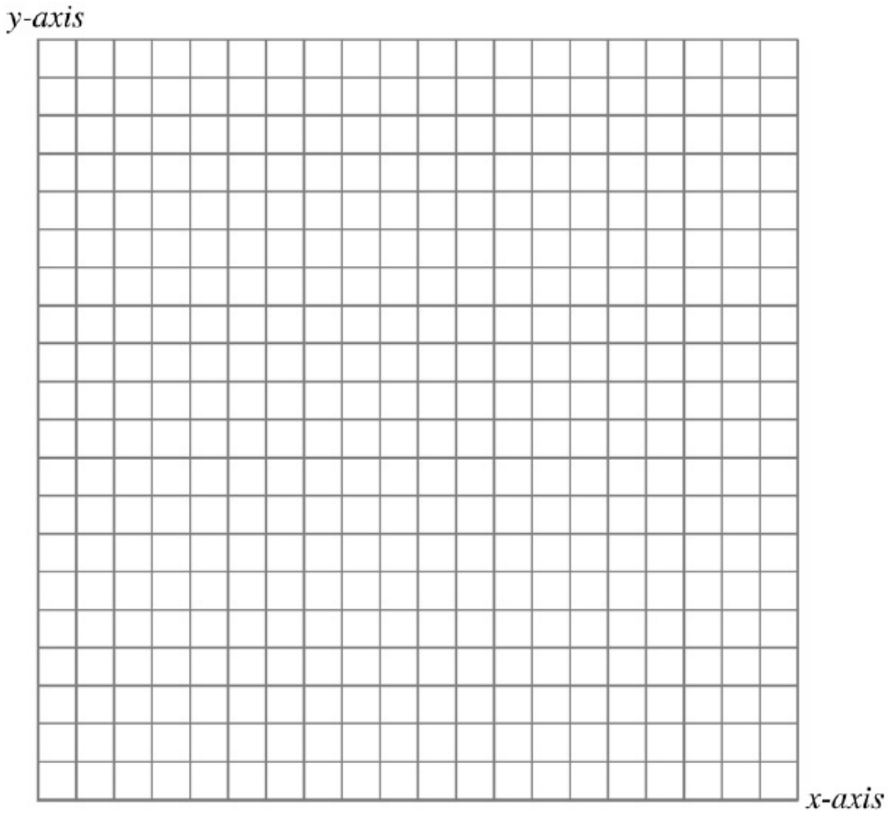
time (s)	0	30	60	90	120	150
speed (m/s)	0	3	5	7	10	12



Slope:

(C)

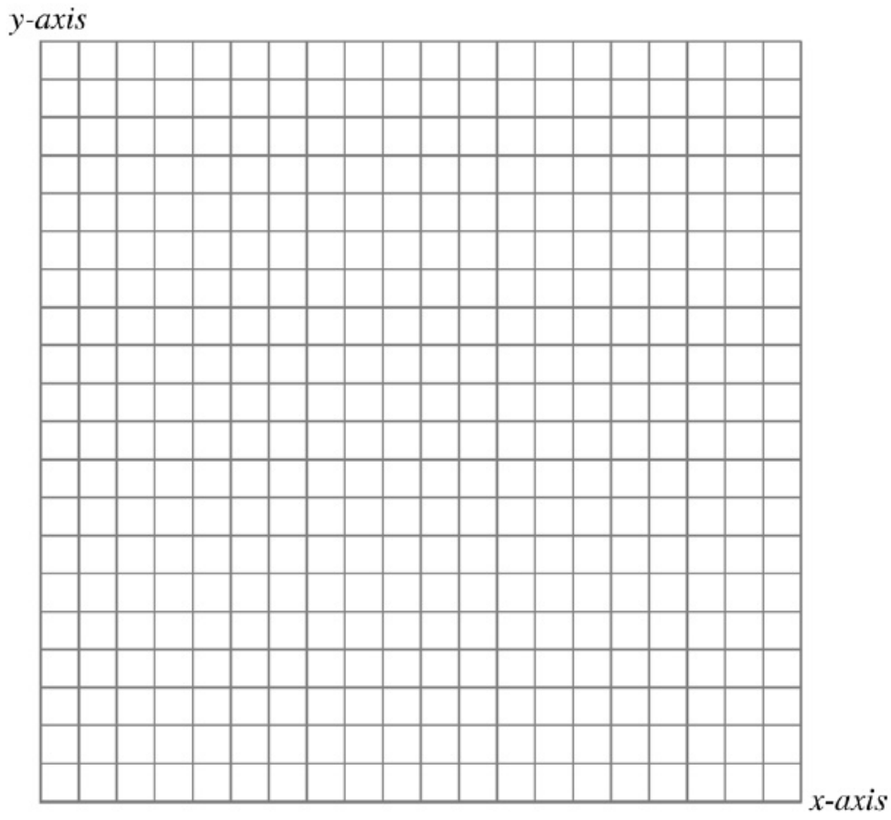
t(s)	0	10	20	30	40
d(m))	0	0.5	1	1.5	2



Slope:

(D)

t(s)	0	5	10	15	20
v(m/s)	0	10	80	270	640



Slope: