Algebra
CHAPTER 4
FUNCTIONS AND LINEAR MODELING

Name _____

Period _____ Date _____

Section 4.7: Lines of Best Fit Using Point-Slope Form

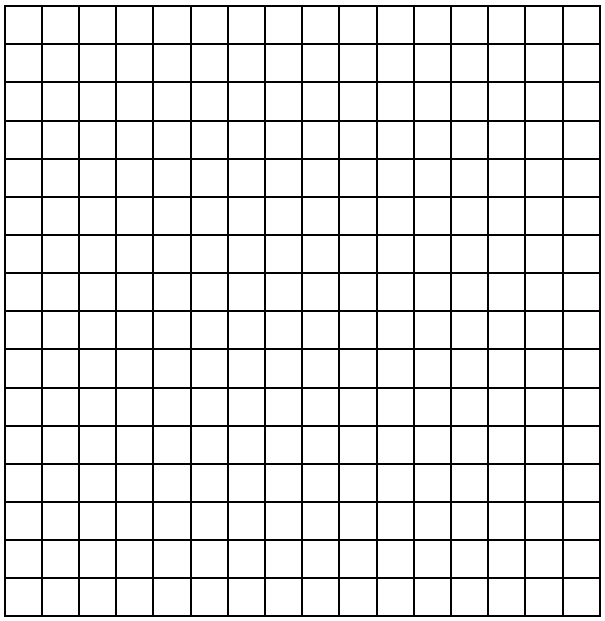
Example 1: The tread depth of a Michelin car tire was measured for different vehicles and different distances driven. The table below shows x = the distance driven in thousands of miles and y = the tread depth in millimeters.

x	y
17	5.3
41	1.2
25	4.0
4	6.8
34	2.3
22	4.1
48	0.3
36	1.9
13	5.7
30	3.3
45	1.9
9	6.0

a. Make a **scatter plot** of the data on graph paper. Label and scale your axis.

b. Use a ruler to draw the **line of best fit (trend line)**

c. Pick **two points** that fall <u>on</u> your line (probably <u>not</u> any of the original given points). Use these two points to calculate the slope ***m***.



d. Find units of measure for the slope, ***m***, also known as rate of change. Using the context of the problem, write a short sentence explaining the meaning of the slope in this problem.

e. Substitute the values of the slope and one point into the equation $y - \boldsymbol{y_1} = \boldsymbol{m}(x - \boldsymbol{x_1})$ to write the equation in **point-slope form.**

f. Write the equation of this line in **slope-intercept form**: $y = \boldsymbol{m}x + \boldsymbol{b}$. This equation gives us a **linear model** for the tire tread depth based on the distance the vehicle was driven.

g. What is the **y-intercept** of your model? Using the context of the problem, write a short sentence explaining the meaning of the y-intercept in this problem.

h. Use your linear model to **predict** the distance a car must be driven to have a remaining tire tread depth of 1 millimeter.

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Example 2: Scuba divers in Hawaii reported the pressure experienced at different depths underwater. The table below shows x = the depth measured in feet and y = pressure measured in pounds per square inch (psi.)

x	y
69	50
30	31
50	41
78	57
44	39
66	45
12	20
36	32
57	42
17	24
75	52
23	25

a. Make a **scatter plot** of the data on graph paper. Label and scale your axis.

b. Use a ruler to draw the **line of best fit (trend line)**

c. Pick **two points** that fall <u>on</u> your line. Use these two points to calculate the slope ***m***.

d. Find units of measure for the slope, ***m***. Using the context of the problem, write a short sentence explaining the meaning of the slope in this problem.

e. Write the equation of the line of best fit in **point-slope form.**

f. Write the equation of this line in **slope-intercept form**. This equation gives us a **linear model** for the underwater pressure based on the depth of the diver.

g. What is the **y-intercept** of your model? Using the context of the problem, write a short sentence explaining the meaning of the y-intercept in this problem.

h. Use your linear model to **predict** the depth of a diver experiencing a pressure of 75 psi.

Example 3: Several students at an elementary school measured the length of their right foot and their height. The table below shows x = the foot length in centimeters and y = the height also in centimeters.

x	y
24	159
22	148
19	126
23	157
20	138
24	162
28	180
25	161
17	122
24	155
26	173
22	146

a. Make a **scatter plot** of the data on graph paper. Label and scale your axis.

b. Use a ruler to draw the **line of best fit (trend line)**

c. Pick **two points** that fall <u>on</u> your line. Use these two points to calculate the slope ***m***.

d. Find units of measure for the slope, ***m***. Using the context of the problem, write a short sentence explaining the meaning of the slope in this problem.

e. Write the equation of the line of best fit in **point-slope form.**

f. Write the equation of this line in **slope-intercept form**. This equation gives us a **linear model** for the height of a student based on the length of his/her right foot.

g. What is the **y-intercept** of your model? Using the context of the problem, write a short sentence explaining the meaning of the y-intercept in this problem.

h. Use your linear model to **predict** the foot length of a student who is 1 meter tall.