

Lesson Plan

Grade 9 Academic Math

Lesson: 15

Unit: Linear Relations

Topic: Prerequisite Skills

📋 homework check: none

📋 note: Prerequisite Skills

The construction of a scatter plot is one of the most important skills in grade 9 academic math. We must know how to label, scale, and title the graph correctly.

In order to analyze data, mathematicians use scatter plots. Scatter plots are graphs that compare two different variables. Each scatter plot must have a descriptive title, a constant scale for each axis, as well as a descriptive title for each axis that includes units. The relationship between these two variables is described using correlation – the tendency of the data to form one straight line. The closer the data points are to the line you have drawn, the stronger the correlation.

📋 handout: Scatter Plots Assignment

- handout the Scatter Plots Assignment (teacher copy on acetate)
- create scatter plot together, careful to show correct titles, labels, and units
- read through worksheet (page one of assignment) together, answering questions that students might have
- do examples for strong positive correlation, weak negative correlation, and no correlation together (write in answers under each corresponding graph)
- continue reading sheet together, again answering question for students

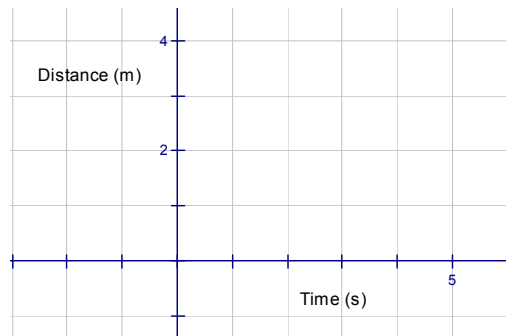
📋 assignment: Scatter Plots Assignment

- students to complete the remainder of the assignment individually
- due tomorrow at beginning of class

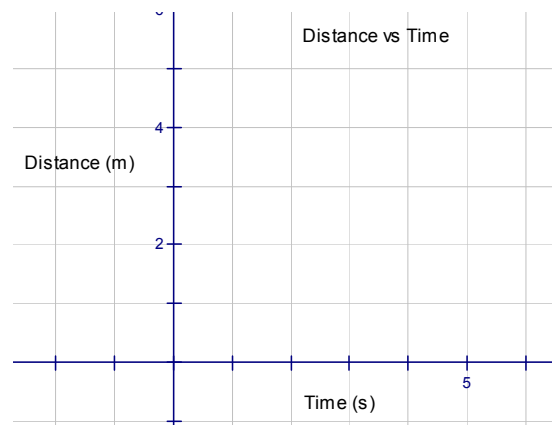
Notes on Graphing

Graphs are used to show trends and relationships when a lot of information is given. There are many different types of graphs including a bar graph, a histogram, a circle graph and a scatter plot.

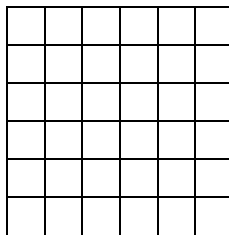
No matter which type of graph you are asked to make, the appearance must be neat. Both axes must be labeled (including units).



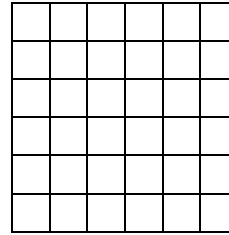
Titles must appear centred at the top of the graph and must be appropriate to the data shown.



Scales must be planned and appropriately extended so as not to appear over crowded.



Good scale with good extensions.



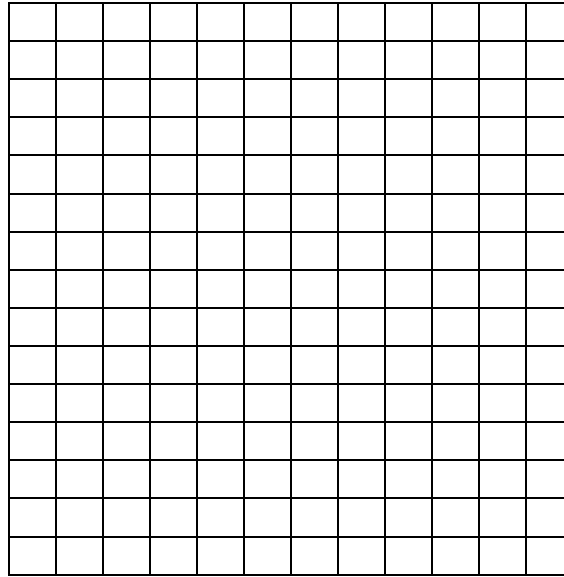
Poor scale with bad extensions.

A legend must be included in order to show different trends or relationships.

Scatter Plots

A scatter plot is a graph that describes the relationship between two variables. A scatter plot can be drawn by placing the first column on the X axis and the second column on the Y axis. For example,

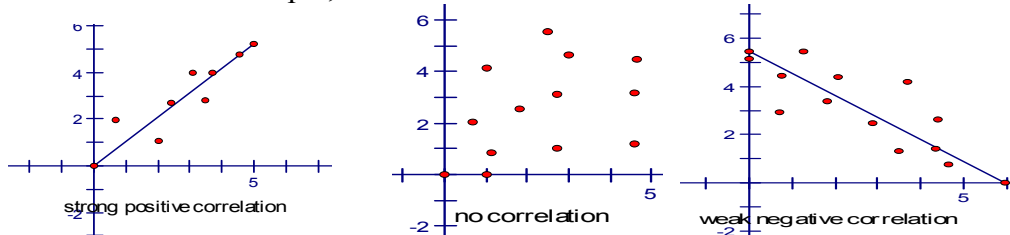
Foot Length (cm)	Height (cm)
8	52
12	78
18	117
12	78
11	71
23	149
28	182
26	169
32	208
9	58
30	195
29	189
23	150



The title of a scatter plot can generically be described as Y vs. X in any given situation. This relationship shows that as foot length increases, height also increases. Therefore, the relationship is positive. (If one variable increases while the other decreases, the relationship is negative.)

We can draw a line of best fit to represent this relationship. A line of best fit is one straight line that best represents the trend in the data. To draw a line of best fit, the line must go through as many points as possible, leaving approximately the same number of data points both above and below the line, while still showing the trend represented by the data. The best way to understand the trend is to lay your ruler over the lowest and highest points to see the direction of change.

This line starts low on the left and rises up to the right. Therefore, this relationship has a positive correlation. (If the line starts high on the left and decreases down to the right, the relationship has a negative correlation.) If the data is scattered all over, the relationship has no correlation. For example,



To decide whether a relationship is strong or weak, we look to see if the data points are close to the line of best fit or far away. The data points on this line are fairly close to the line of best fit therefore, the correlation is also strong.

This relationship can also be approximated with an equation by looking at how many foot lengths are needed to make the height. In this case, if we multiply foot length by 6.5, we can approximate the height, therefore, $6.5 \times \text{foot length} \doteq \text{height}$.

Therefore, the relationship between foot length and height can be described as a strong positive correlation where $6.5 \times \text{foot length} \doteq \text{height}$.

Once the line of best fit is drawn, we can use it to interpolate or extrapolate (make predications from the data). In order to interpolate or extrapolate, we read the corresponding values for the independent (horizontal axis) and dependent (vertical axis).

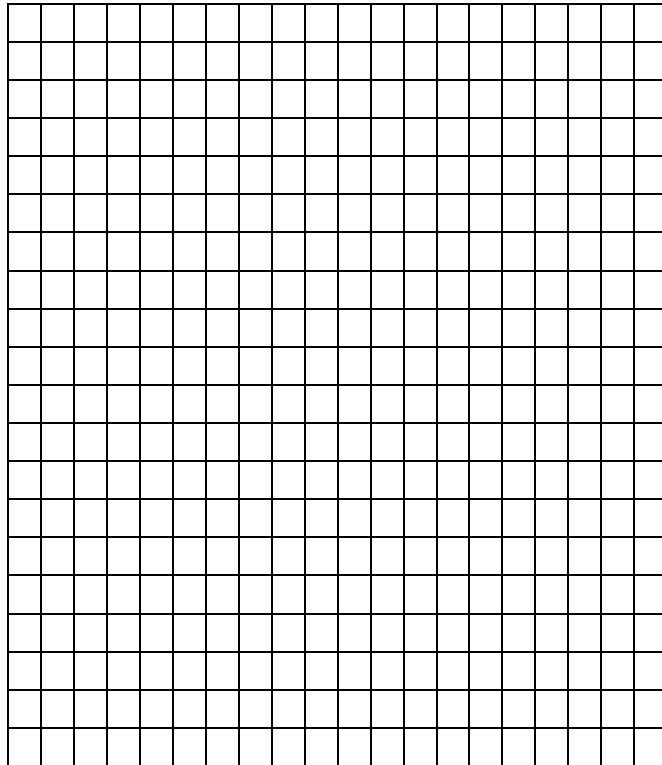
For example, from the scatter plot of Height vs. Foot Length, find out how tall someone is if their foot length measures 22cm? foot length if the person is 120cm tall?

Assignment: Complete the following assignment using the information in today's lesson. All work should be done in the spaces provided. Marks are allotted in brackets with each question. Be sure to pay attention to the due date posted by your teacher.

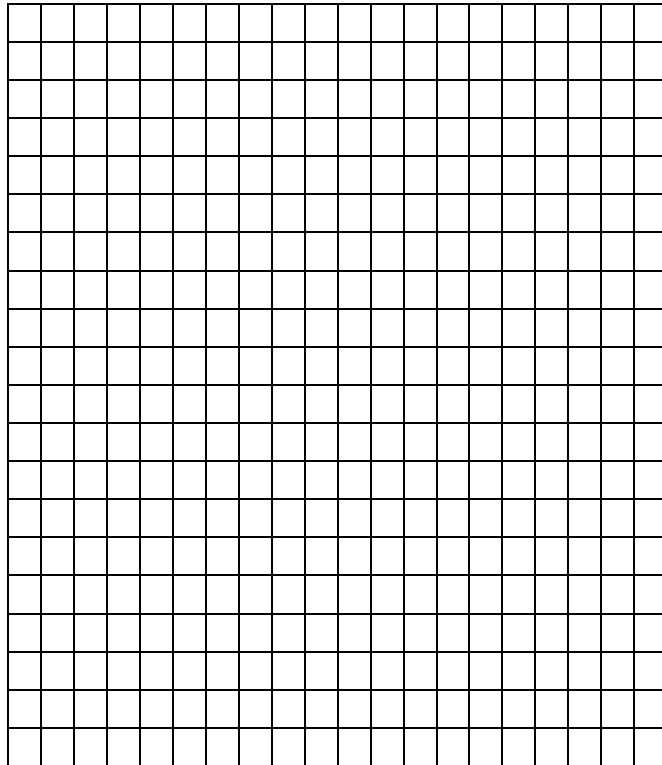
The following data was collected from grade 9 students:

Hand Span (cm)	Forearm (cm)	Arm Span (cm)	Foot Length (cm)	Stride Length (cm)	Height (cm)
16	16	144	15	48	144
15	14	135	14	45	135
17	18	153	18	51	153
18	18	162	17	54	160
21	22	189	21	62	190
22	22	198	22	65	200
15	15	138	16	44	140
17	17	150	16	52	145
22	23	196	22	64	200
23	21	208	23	69	206
25	24	225	25	74	220
24	23	223	24	72	225
19	19	171	19	57	170
24	24	216	23	74	216
15	15	140	16	45	140

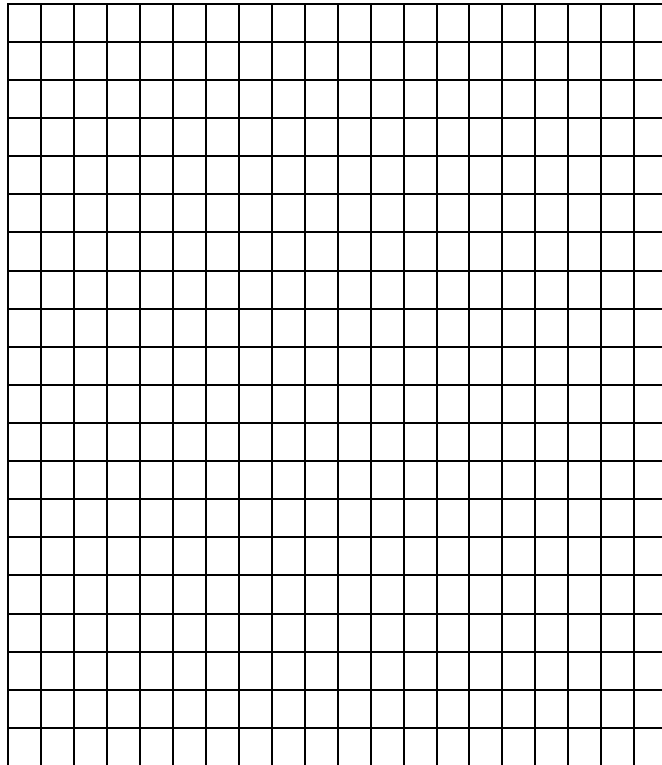
1. Draw scatter plots that show the relationships between each of the following (6 marks each):
 - a) arm span and foot length



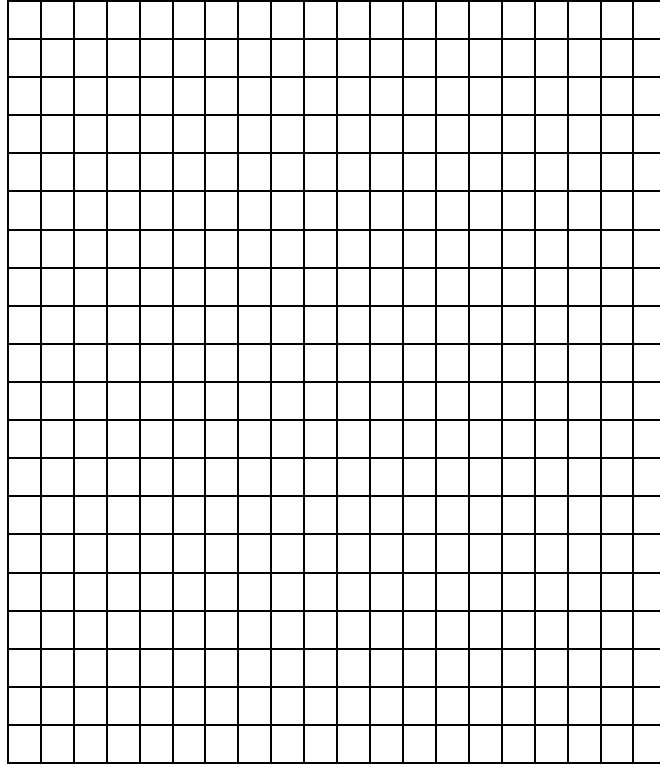
b) forearm length and stride



c) hand span and height



d) hand span and foot length



2. For each of your scatter plots, describe the relationships using words and equations. Remember that this equation is an approximation! (2 marks each)

a)

b)

c)

d)

3. Measure your hand span. Use this measurement and each of the relationships, to approximate the remaining measurements using the equation that was approximated in question #2. Show your work in the space provided. (2 marks each)

Hand Span

Forearm Length

Arm Span

Foot Length

Stride Length

Height