AChor/MPM1D **Name: _____**
Date: _____

Worksheet 6-3: Lines of Best Fit

A scatter plot is a graph that shows the relationship between two sets of numeric data.

The points in a scatter plot often show a general pattern, or trend. From the pattern or trend, you can describe a relationship, if one exists.

A scatter plot of the relationship between two variables shows:

- positive correlation when the scatter plot pattern slopes up and to the right.
  (The two quantities increase together.)
- negative correlation when the pattern slopes down and to the right.
  (As one quantity increases, the other decreases.)

Degree of Correlation:

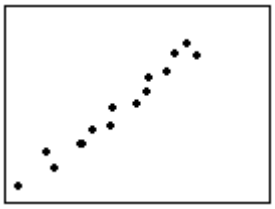
* **If the points nearly form a line, then the correlation is strong.**
* **If the points are dispersed more widely, but still form a rough line, then the correlation is weak.**
* **If the points are dispersed slightly but roughly form a line, the correlation is moderate.**
* **If the points are dispersed widely and do not form any line at all, then there is no correlation.**

1. Match the following degrees of correlation to their respective graphs.

Strong Positive **Strong Negative** **Weak Positive**

Moderate Negative **Weak Negative** **None** (No Correlation)

_____



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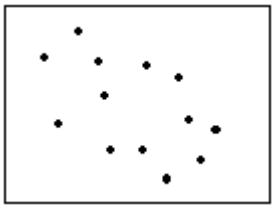

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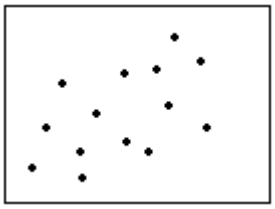

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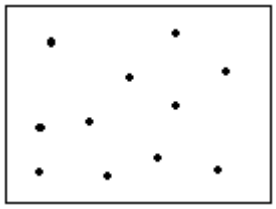

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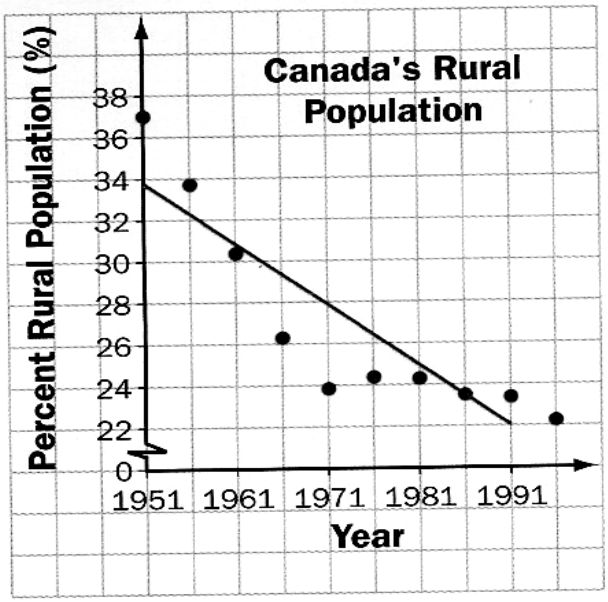
The Line of Best Fit

- The line of best fit is the line that approximates the trend for the data in a scatter plot.
- The line of best fit shows the pattern and direction of the points on a scatter plot.

How to draw the line of best fit?
The line of best fit is the line that passes through as many points as possible, with the remaining points grouped equally above and below the line, and spread out along the line rather than concentrated at one end.

The following scatter plot shows Canada's rural population as a percent of the total population in different years. The line shown on the graph is the line of best fit.



The line of best fit can be used to make predictions or estimates for values not actually recorded and plotted.

Why can't we determine the exact value of missing data using the line of best fit?

_____

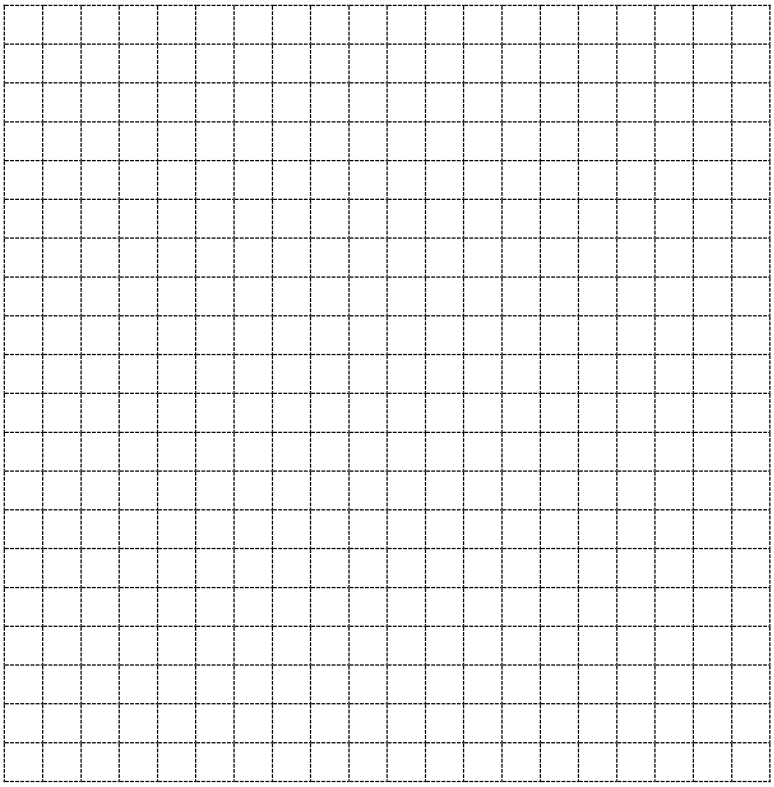
Interpolation: When you interpolate, you estimate values within the range of given data.

2. Estimate Canada's rural population as a percent of the total population in year 1964. _____

Extrapolation: When you extrapolate, you extend a line to estimate values outside the range of given data.

3. Estimate Canada's rural population as a percent of the total population in year 1946. _____

4. The following table shows the areas and greatest depths of various seas.



Area (Millions of km²)	**Greatest Depth** (m)
1.25	3000
0.40	2350
2.50	4800
0.60	600
1.00	3750
1.90	7500
1.60	4400
1.50	3250
2.40	5500
2.25	5000

Note:
Pick a scale that can show all the points clearly without having them too close or too far apart from one other.
(The scales for the two axes can be different depending on the given values.

(a) Draw a scatter plot for the given data. ****Label the title and the axes of the graph****

(b) Describe the relationship between the areas and the greatest depths of seas. **Explain.**

(c) Describe the correlation of the relationship. **Explain.**

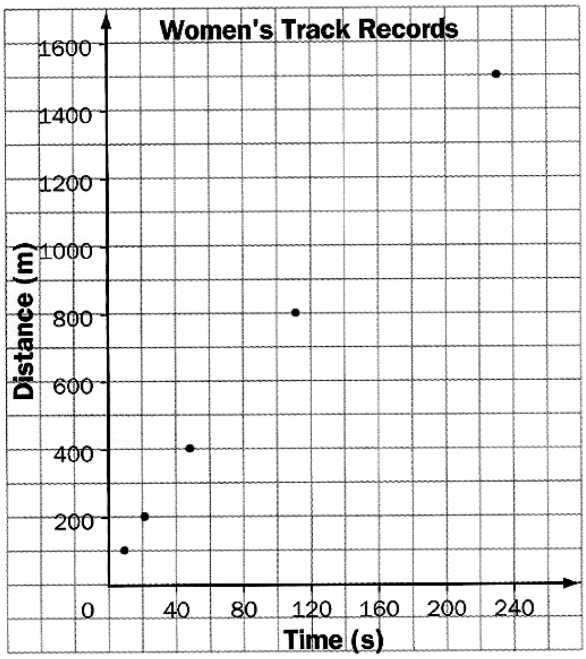
(d) Draw the line of best fit for the given data.

(e) Interpolate to estimate the greatest depth of a sea with an area of about 750 000 km². _____

(f) Extrapolate to estimate the greatest depth of a sea with an area of about 3 000 000 km². _____

(g) Extrapolate to estimate the area of a sea with a greatest depth of about 8000 m. _____

5. The scatter plot shows the world records that stood in five women's track events one year.



(a) Describe the relationship of the given data. **Explain.**

(b) Describe the correlation of the relationship. **Explain.**

(c) Draw the line of best fit for the given data.

(d) What was the approximate world record for the 400-m event? _____

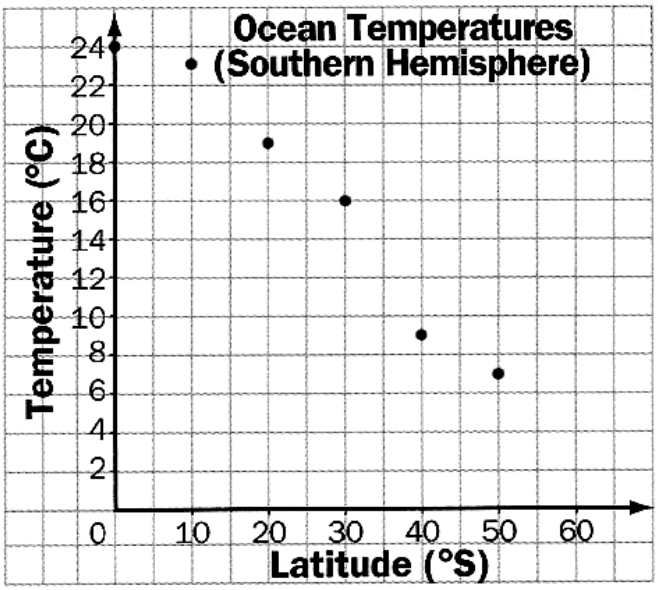
(e) If there had been a 1000-m event, what world record would you estimate for it? _____

(f) If there had been a 1600-m event, what world record would you estimate for it? _____

(g) Estimate how far a top female athlete can run in 3 minutes. _____

(h) Estimate how far a top female athlete can run in 4 minutes. _____

6. The scatter plot models how the average temperature of the ocean changes with latitude in the southern hemisphere.



(a) Describe the relationship of the given data. **Explain.**

(b) Describe the correlation of the relationship. **Explain.**

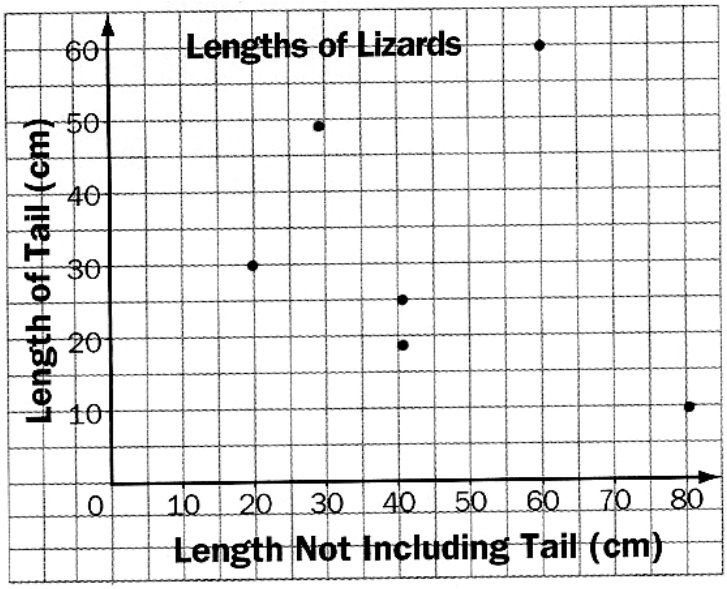
(c) Draw the line of best fit for the given data.

(d) What is the approximate latitude in the southern hemisphere for an average ocean temperature of 16ºC?

(e) Estimate the average ocean temperature at a latitude of 35ºS. _____

(f) Estimate the average ocean temperature at a latitude of 60ºS. _____

7. The scatter plot shows the lengths of lizards, not including their tails, and the lengths of their tails.



(a) Does the scatter plot suggest a relationship between the lengths of lizards and the lengths of their tails? **Explain.**

(b) Describe the correlation of the relationship. **Explain.**

(c) Is it possible to draw a line of best fit for the given data? **Explain.**

(d) Do all scatter plots show a relationship? **Explain.**

(e) Based on this scatter plot, can you draw the conclusion that there is no relationship between the lengths of all kinds of lizards and the lengths of their tails? **Explain.**