Name of skill: Line graphs
Category of skill: Graphical

Advantages:

- Show absolute changes in data.
- Can be simple (one line) or compound (many lines) graph depending on how many lines are plotted.
- Key and colour coding can be used for greater visual effectiveness.
- Can show 2 sets of data with scales on both vertical axes.

Describe how to construct…

- Simple = easy, single series of data, e.g. infant mortality over time.
- Comparative = compare, i.e. more than two data sets, e.g. infant mortality and life expectancy over time.
- Compound = several different components, e.g. life expectancy, infant mortality, GDP etc.
- Divergent = can include both positive and negative values.

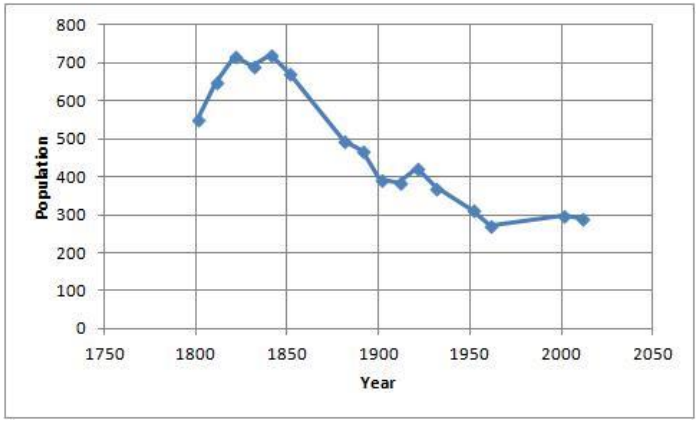
Good practice (should always include..)

- Title stating what the graph shows.
- X and Y axis labels.
- Correct units of measurement.
- An appropriate scale.
- Points connected with a pencil and ruler.

Disadvantages:

- Too many lines can lead to difficult interpretation.
- Awkward scales can distort the visual effectiveness.
- Data manipulation needed for compound line graphs – slows down interpretation.

Example of skill:



Improvements/alternatives:

- Could add values to the data to make it easier to read. Grid lines added to the back also make data retrieval easier.

Justify (why use this technique?):

When wanting to investigate the relationship between two or more variables.
Look for positive, negative or no correlation.

How does this improve my geographical understanding?

Are there trends/patterns shown over time? Whether yes or no, geographical understanding would be improved by explaining them/justifying the patterns which emerge.
Any anomalous results would need to be explained, this would mean further investigations which develops geographical understanding (provide examples based on specific data you are discussing).

Name of skill: Bar graphs
Category of skill: Graphical

Advantages:

- Show relationships between 2 or more variables.
- Show proportions.
- Visually attractive.
- Bars used combinations of qualitative and quantitative variables.
- Can show positive and negative values.
- Simple to construct and understand.

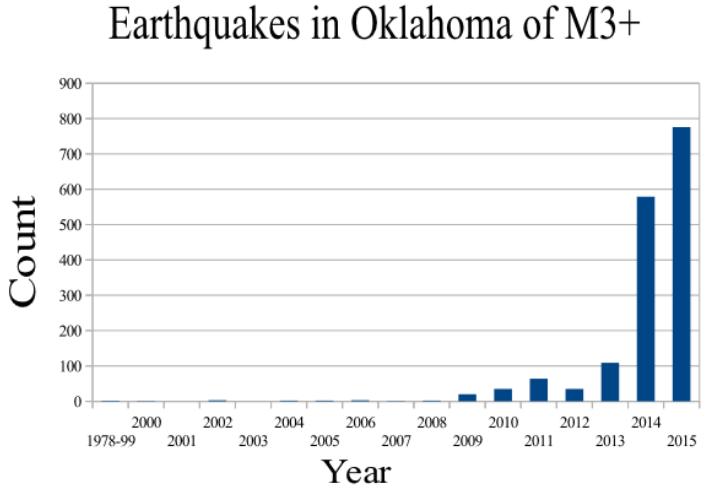
Disadvantages:

- Plotting too many bars makes it appear cluttered- less easy to interpret.
- If wide range of data impact lost as it is difficult to read accurately.
- Become more complicated if uneven class intervals.
- Using too many or too few classes can mask important patterns in the data.

Describe how to construct…

- Simple - shows one piece of data.
- Comparative - bars drawn next to each other.
- Compound - different versions as cumulative totals.
- Divergent - negative values incorporated.

Example of skill:



Improvements/alternatives:

- Could convert data into % to make data manipulation/comparison easier.

Good practice (should always include...)

- Title stating what the graph shows.
- X and Y axis labels.
- Correct units of measurement.
- An appropriate scale.
- A key for comparative and compound bar charts.

Justify (why use this technique?):

When looking at quantities of particular variables, and how they change over time or space.

How does this improve my geographical understanding?

Are there trends/patterns shown over time? Whether yes or no, geographical understanding would be improved by explaining them/justifying the patterns which emerge.
Any anomalous results would need to be explained, this would mean further investigations which develops geographical understanding (provide examples based on specific data you are discussing).

Name of skill: Scattergraphs
Category of skill: Graphical

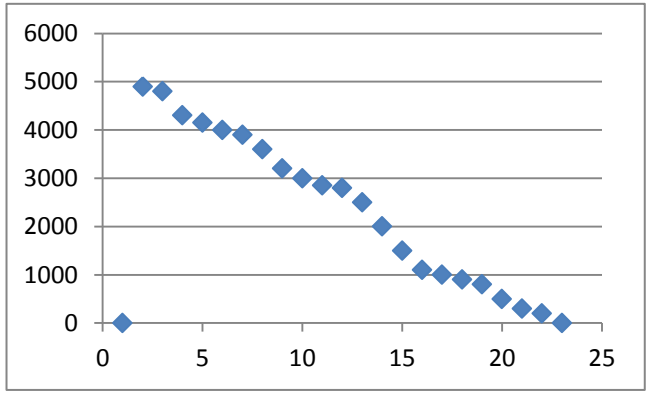
Describe how to construct…

- Create an appropriate scale for the X and Y axis. Add a label showing what each axis represents. Don't forget the units of measurement. Plot the data like co-ordinates. Add a line of best fit with roughly half the number of points on each side. Add a title stating what the scatter graph shows.
- What is the example missing?

Advantages:

- Used when data available for many locations.
- Shows residuals (anomalies).
- Trends indicated by best fit line and relationships easily identified between 2 data sets.
- Can identify patterns and trends.

Example of skill:



Justify (why use this technique?):

- Used to represent and compare two sets of data.
- When looking to investigate the type of a relationship between two variables (positive or negative) and the strength of this relationship, i.e. weak or strong.
- Also used as a starting point for a statistical test.

Disadvantages:

- Correlation can emerge even when a relationship is only coincidental (further investigation is needed).
- Only allows for relationship between 2 variables to be displayed.
- Too much data can be difficult to read.

Improvements/alternatives:

Add values onto points when plotting, also grid lines at the back make data retrieval more straightforward.
Could overlay a scatter graph onto a bar chart to look at multiple variables.

How does this improve my geographical understanding?

Line of best fit can highlight relationships between to variables which can lead to further investigation, e.g. Spearman's rank to try and establish if the relationship exists. If yes/no, why? Explaining develops improved geographical understanding. Identifying residuals (anomalies) lying away from the line of best fit can enable you to make further geographical investigation into other influencing factors (provide examples based on data you are discussing).

Name of skill: Pie Charts
Category of skill: Graphical

Describe how to construct…

Divide the category total by the total of all categories then multiply by 360 – this will give you the degrees on the circle. Start at 12 o'clock and work your way around clockwise. Sometimes helps to draw the largest section first and work your way in order decreasing in size (but does not need to be done like this as the example below shows, as drawn in age order).

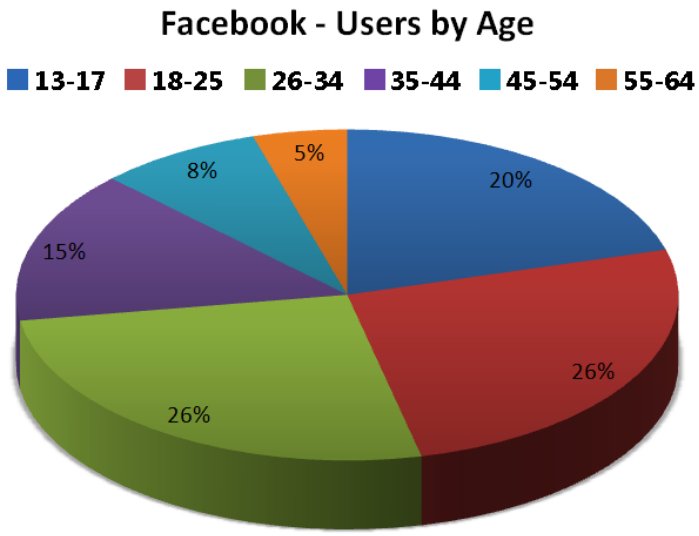
Justify (why use this technique?):

When comparing quantities/percentages of data. Useful when you have 6 or fewer categories to compare.

Advantages:

- Visually effective.
- Shows relative contribution of each segment to the whole (100%).
- Easy to read and understand.

Example of skill:



Improvements/alternatives:

Could incorporate a second element by making the pie chart proportional to a quantity.

Disadvantages:

- Less than 3 segments look simplistic.
- If many segments a similar size; it is hard to interpret.
- Difficult to assess %.
- Difficult to make comparisons between pie charts where there are lots of segments.

How does this improve my geographical understanding?

Are there trends/patterns shown over time? Whether yes or no, geographical understanding would be improved by explaining them/justifying the patterns which emerge.
Any anomalous results would need to be explained, this would mean further investigations which develops geographical understanding.

Good practice (should always include…..)

- A title.
- A key.
- % are helpful.

Name of skill: Triangular graph
Category of skill: Graphical

Describe how to construct…

Need three variables to compare and each piece of data must be converted into %, lines are drawn at angles of 60°. The three component values, when read, should total 100%. Repeat this for all of your other data sets.

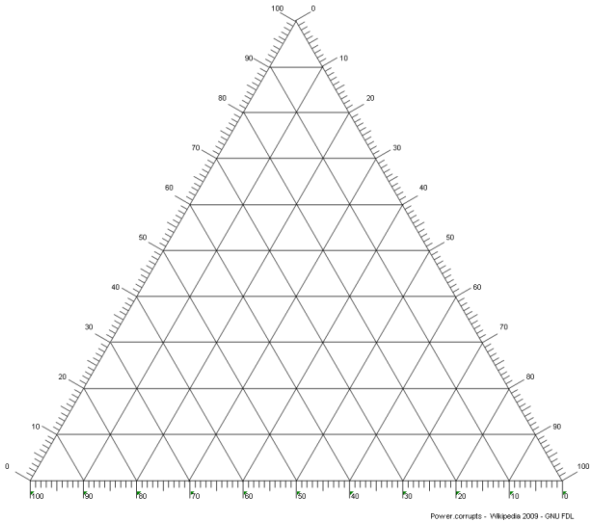
Good practice (should always include..)

- All data converted into % (so scale is easy, goes up in tens).
- A title.
- Labels on A, B and C axes.

Advantages:

- Very useful if three components are to be compared.
- Varying proportions can be seen indicating the relative importance of each.
- Dominant variable can be seen.
- After plotting , clusters emerge enabling classification/ identifying trends.

Example of skill:



Justify (why use this technique?):

When investigating data that has three components, e.g. occupation in the primary, secondary or tertiary sector.
The position of the dot indicates the dominance of each of the three components making patterns easy to identify.

Disadvantages:

- Hard to interpret.
- Limited range of data can be used.
- Must be a whole number which can be broken down into 3 components expressed as percentages.
- Cannot be used for absolute data.

Improvements/alternatives:

Have the data table as a key to confirm you have read the correct statistics.

How does this improve my geographical understanding?

Are there trends/patterns shown over time? Whether yes or no, geographical understanding would be improved by explaining them/justifying the patterns which emerge.
Any anomalous results would need to be explained, this would mean further investigations which develops geographical understanding (provide examples based on specific data you are discussing).

Name of skill: Logarithmic graphs
Category of skill: Graphical

Describe how to construct…

A logarithmic graph is drawn in the same way as an arithmetic line graph except that the scales are divided into a number of cycles, each representing a tenfold increase in the range of values. The first cycle ranges from 0.1 to 1, the second will extend from 1 to 10 and the third from 10 to 100 and so on. Logarithmic graphs can be good for showing rates of change, the steeper the line, the faster the rate. They also allow a wider range of data to be displayed.
There are 2 types of logarithmic graph paper:

- Logarithmic – where both the x and the y axis have logarithmic scales
- Semi-logarithmic – where the y axis has a log scale but the x axis has a normal scale. This is particularly useful if you are displaying data with a large range of values and you are interested in change over time.

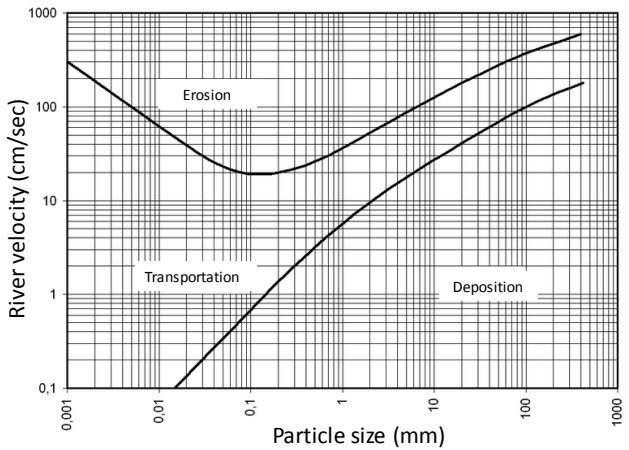
Advantages:

- For data with a very large range of values.
- Useful for showing rate of change, a steeper line suggests a faster rate of change.
- More than one data set can be plotted for comparison.

Justify (why use this technique?):

When investigating either a large area, e.g. distance downstream of an entire river and/or where the spread of data is very large.

Example of skill:



How does this improve my geographical understanding?

Are there trends/patterns shown over time/location? Whether yes or no, geographical understanding would be improved by explaining them/ justifying the patterns/similarities/ differences which emerge.
Any anomalous results would need to be explained, this would mean further investigations which develops geographical understanding (provide examples based on specific data you are discussing).

Disadvantages:

- Easy to make errors plotting.
- Zero cannot be plotted.
- Negative and positive values cannot be displayed on the same graph.

Name of skill: Dispersion diagrams
Category of skill: Graphical

Advantages:

- Visually effective to investigate spread of data set.
- The data range is easily identifiable.
- Clustering can be seen clearly.
- Box/Whisker plots can be added to further analyse data, which increases geographical understanding.

Disadvantages:

- Comparison of data sets is only possible where both have been plotted using the same scale.
- Doesn't show a causative relationship as only one variable plotted.
- No key used, so doesn't allow for investigation of data over time/space.
- Box/whisker removes identification of extreme events as interquartile range is used.

Formulae:

Median = $\frac{n + 1}{2}$

UQ = $\frac{n + 1}{4}$

LQ = $\frac{n + 1}{4} \times 3$

IQR = UQ - LQ

N = number of items in the data

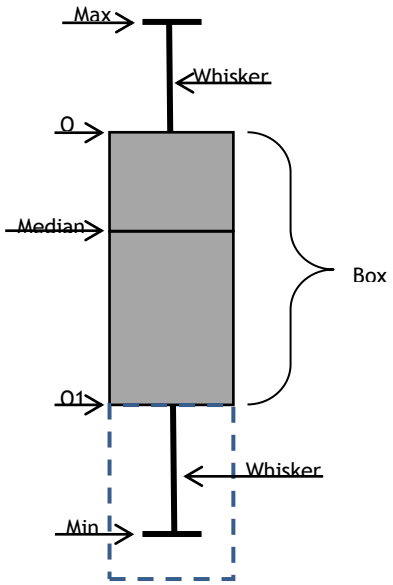
Describe how to construct…

Step 1: Draw the graph – it should have a narrow base and a long vertical axis covering all of the values in the data set. You do not have to start at zero for the y axis, but if you want to compare dispersion diagrams you have to use the same scale

Step 2: The x axis should be labelled with the name of the data set. The y-axis should cover the full range of values for the data set and be labelled accordingly. Also add an appropriate table

Step 3: Plot all values. Where values are equal, plot these adjacent to each other. It may also be useful to write the actual numbers on the graph. This depends on the accuracy that is required and the amount of data you are displaying.

Example of skill:



Adding a box and whisker plot:

Step 1 : Start to add the box and whisker plots by calculating the median for the data set. The **median** is the mid-point of the data. You put all the values in rank order and select the middle value.

Step 2: You now need to calculate the Interquartile range (IQR). This will describe the range of the data but will take away any extreme values. Use the formula in the box to calculate the upper quartile (UQ) and the lower quartile (LQ). Now find these values on your dispersion diagram and draw a horizontal line for each. You calculate the interquartile range my taking away the LQ from the UQ

Step 3: Complete the 'box' by drawing on the appropriate vertical lines (joining the LQ and the UQ). Also add a thin vertical line through to the highest and lowest values and complete the 'whiskers' by drawing on a horizontal line through the highest and lowest values.

Justify (why use this technique?):

Dispersion diagrams allow you to investigate visually the spread of a set of data. The **range** of data becomes visually apparent.

How does this improve my geographical understanding?

Only one data set so no variable which would try to explain the results, so further investigation would be needed which would therefore increase geographical understanding. Using box-whisker to analyse the spread of data allows investigation into differences identified and therefore increases geographical understanding. Any anomalous results would need to be explained, this would mean further investigations which develops geographical understanding (provide examples based on specific data you are discussing).