A level Geography

Introduction and planning

Methods and data collection

Geographical enquiry

Evaluation and planning

Geographical data

Methods and data collection

Introduction

The independent investigation

Geographical data

Introduction

The independent investigation is worth 20% of the overall marks in A Level Geography.

This guide will help you through the process of planning, collecting and presenting data, analysis and evaluation.

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A level Geography

The independent investigation

Collecting quantitative data

The things that you are interested in measuring are called variables. There are two types:

1. Independent variables: things that are changed or controlled by other things. It is independent of other variables.
2. Dependent variable: things have an effect on something else, it is dependent of other variables. A dependent variable cannot exist as an independent variable.

There are 6 measurement scales for variables:

1. Nominal: categorical that are not numerical such as male/female.
2. Ordinal: variables order does matter, but the intervals are not the same, e.g. 1st, 2nd, and 3rd.
3. Interval: variables where order has meaning, but there is no zero point. For example: temperature in °C does not (since 0°C does not mean no temperature).
4. Ratio: variables where order has meaning, but there is a zero point. For example: temperature in °C is a ratio scale, but temperature in °K is an interval scale.
5. Qualitative: data that records qualities (e.g. opinions, attitudes and beliefs).
6. Quantitative: data that records quantities (such as old photos) and data collected by other methods such as pebble measurements, questionnaire and interviews.

Data collected by someone other than you is called secondary data. This can come from a variety of sources:

1. Census results and records of rainfall), historical data
2. Government offices and other governmental bodies
3. Data collected by someone other than you such as pebble measurements, questionnaire and interviews.

Data presentation

You must be able to choose the most effective data presentation technique:

- Pie chart: nominal or ordinal data. Area of circle represents proportion of the total.
- Line graph: ratio data. Each data point is connected by a line to show the trend over time.
- Bar chart: shows non-numerical data such as the number of males and females.

Enquiry considerations

Be rigorous: This means being thorough and following the instructions. Have you taken enough samples to make the results representative? Did you perform a validity test? Did you have a control group? Did you randomise your sample? Did you use a randomisation test?

Be critical: How did you deal with non-response? How did you deal with missing data? How did you deal with non-representative samples?

Be consistent: How did you deal with non-representative samples? How did you deal with missing data? How did you deal with non-response?
Introduction and planning

Collecting quantitative data

The things that you are interested in measuring are called variables. There are two types:

- Independent variables (cause): things you think may affect something else.
- Dependent variables (effect): things that you think may be affected by other things.

Variables can be divided into categories:

- A categorical variable is also called a nominal variable. It assigns things to different groups: e.g. green, brown, black, yellow.
- An ordinal variable is another type of categorical variable. It allows ranking: e.g. 1st, 2nd, 3rd.

A variable may be numerical, where actual numbers are important, or it may be non-numerical, e.g. use of cars versus public transport.

Variables that are not numerical, but allow a measurement where there are no gaps between values, are called ratio data. Bar area shows ratios between data values.

Data presentation

Bar chart
- used for categorical data, e.g. where there are discrete categories (such as yes/no). Can be extended to show frequency or percentage.

Pie chart
- used for categorical data, e.g. where there are discrete categories (such as yes/no). Can be extended to show frequency or percentage.

Histogram
- used for numerical data, e.g. where there are gaps between data values.

Scattergram
- used for numerical data, e.g. where there are gaps between data values.

Geographical enquiry

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Introduction

A level Geography

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Data presentation

Measures of central tendency

- Normal distribution
  - The symmetrical bell-shaped curve
  - Measurements plotted on a frequency histogram
  - The mean is in the middle, with equal frequencies on either side

- Skewed distribution
  - The tail is longer on one side
  - Mean, median, and mode are different

- Outliers
  - Extreme values that do not fit the pattern

Measures of dispersion

- Variance
  - The average of the squared differences from the mean
  - Variability increases the larger the variance

- Standard deviation
  - The square root of the variance
  - Measures variability around the mean

- Measures of dispersion
  - For variables with a nominal scale: Median
  - For variables with an ordinal scale: 25th and 75th percentiles

- Range
  - The difference between the highest and lowest values
  - Not resistant to outliers

- Interquartile range
  - The difference between the 25th and 75th percentiles
  - More resistant to outliers

- Standard deviation
  - Measures variability around the mean
  - For normally distributed data

- Mean
  - The sum of the values divided by the number of measurements
  - Measures central tendency

- Median
  - The middle value when the data are ordered
  - More resistant to outliers

- Mode
  - The most frequent value
  - Can be used for qualitative data

Analyzing quantitative data

- Spearman’s Rank Correlation Test
  - Used for variables with a nominal scale
  - Measures the strength of the association between two variables
  - Correlation coefficient: -1 to 1

- Analysis of variance (ANOVA)
  - Used to compare means across multiple groups
  - F-statistic: ratio of between-group to within-group variance

- t-test
  - Used to compare two means
  - t-value: difference between means divided by standard error

- Linear regression
  - Models the relationship between a dependent variable and one or more independent variables

- Multiple regression
  - Extends linear regression to multiple independent variables

Describing your results

- Write a comprehensive description of the trends, patterns, and relationships in your results

Conclusions and evaluation

- Describing your results
  - Write a sentence that describes the trends, patterns, and relationships in your results

- Conclusions
  - Summarize the findings and their implications
  - Highlight the significance of the results

- Evaluation
  - Critical thinking: Are your conclusions supported by the evidence?

- Concluding statement
  - Summarize the main findings and their implications

- Evaluation considerations
  - Include a critical analysis of your results
  - Consider the limitations and validity of your study

- Conclusions and evaluation
  - Summarize the main findings and their implications
  - Highlight the significance of the results

Evaluating your methods

- Tree value
  - The value that would be obtained in an ideal measurement

- True value
  - The value that you would obtain if all the factors influencing the measurement were eliminated

- Error
  - The difference between the true value and the measured value

- Evaluation considerations
  - Consider the limitations and validity of your methods

- Conclusions
  - Summarize the main findings and their implications
  - Highlight the significance of the results

Evaluating your conclusions

- True value
  - The value that would be obtained in an ideal measurement

- Error
  - The difference between the true value and the measured value

- Evaluation considerations
  - Consider the limitations and validity of your conclusions

- Conclusions
  - Summarize the main findings and their implications
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Field Studies Council (FSC) is an environmental education charity providing informative and enjoyable experiences for children and young people, enabling them to develop confidence, skills and knowledge. We know that this is important for the development of young people and their future careers. Please contact: Head Office, Preston Montford, Shrewsbury, SY4 1HW Tel: 01743 743886 info@fsc.org.uk www.fsc.org.uk

Interested in geography and want to do more? FSC provides lots of ways for you to learn more, get involved, and have fun with teacher and adult group activities. There are a number of courses and summer camps which can help you to choose the best option for you. You can find out more about these opportunities by visiting our website at www.fsc.org.uk/education/research-centre-uk
if the data are normally distributed, use the

covers the middle 50% of the data.

is the part of the range that

Range

typical of people

Measures of dispersion

Dispersion

The speed of data around the average, usually expressed as the mean ± standard deviation.

Degrees of freedom

n = number of pairs of measurements

D = difference between ranks

m = number of replicates

f = number of replicates

R2

Σ

n = number of replicates (so n1 is of first data set)

D = difference between ranks

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R2

Σ

n = number of pairs of measurements

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R2

Data presentation

Normalize distribution

The symmetrical bell-shaped graph of data points when the data are normally distributed, with all ranges plotted on a frequency histogram. The mean is in the middle, with equal numbers of high and low values either side of it.

Mean

All of the measurements together divided by the number of measurements taken. The mean is used if the data approximate to a normal distribution, and is used in internal or external analysis.

Median

Arrange the data in order, and take the middle value in the range. It is used for data which are not normally distributed. Suitable for variables with an ordinal scale.

Mode

The value which occurs most often. Suitable for data with a nominal scale.

Measures of dispersion

Dispersion

The speed of data around the average, usually expressed as the mean ± standard deviation.

Degrees of freedom

p = 0.01

p = 0.05

n = number of replicates

D = difference between ranks

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R2

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