Sampling techniques

2023年6月13日 19:23

Pilot survey

- This is a survey carried out in the area before the actual investigation
- The purpose of the survey
  - To test the methodology
  - To identify problems with the methodology
  - To look for improvements that can be made
  - To check the sample size

Types of data

- Primary
  - First hand data, collected by the person who is using it
- Secondary
  - Data collected by someone else (census, past investigations, internet, newspapers, books)
- Qualitative data
  - Non-numerical data
  - e.g. from asking open questions when using questionnaires or images for example field sketches or photographs
- Quantitative data
  - Numbers, numerical data
  - e.g. measurements using equipment

Primary vs. secondary data

	Primary data	**Secondary data**
Advantages	• It is up to date (current) • You know how the data has been collected i.e. what technique and so you know how reliable and accurate the data is • It only includes data that is relevant to your coursework (more specific) • It only covers your study area	• You can study changes over time e.g. how population has changed over a number of years • It can be quicker and cheaper, especially if the data is on the internet • You can study a larger area • It may include data that you cannot obtain personally • It may be collected by experts who have more accurate equipment to collect data and be more experienced
Disadvantages	• The data may include some personal bias • Data collection can be time consuming • It can be expensive to travel to places to collect data • It is hard to study changes over time • Some data might be unavailable or too dangerous to collect • Only possible to cover a small area • You may not have the equipment needed to collect the data because it is too expensive	• It may be out of date, especially if it has been printed in a book. • There might more information than you need • The information may include a larger area than your study area • You may not know how the data was collected and who collected the data so you do not know how reliable or accurate the data is

Sampling

- A sample = a section or part of the entire study area or study population.

- Sampling = save time, energy, money, labour/man power
- It is impossible to look at the whole population or whole area due to limited time + budget

Sampling strategies

- Systematic Sampling
  - This is when you collect data in a regular pattern
  - e.g. you may ask a questionnaire to every 10th person that passes you, or you might only record the land use every 50 metres or every 5th building. When recording changes in river depth, beach profile or changes in vegetation you may only take a sample every 5 metres.
- Random Sampling
  - This is when every area or person in your study area has an equal chance of being selected or asked
  - e.g. Random sampling can be done by rolling a dice and using the number to determine how far you will walk between sites (e.g. how many minute). You could also use a random number table or a random number generator on a calculator. The numbers could be used as a grid reference to find a point on a map.
- Pragmatic (opportunity) sampling
  - Sometimes the location selected by the systematic, random or stratified sample is located in an inaccessible or dangerous place to take data e.g. a waterfall on a river
  - Then a pragmatic sample is taken where the student chooses the closest possible location to the sample site which is accessible or safe to survey
- Stratified sampling
  - If you have some secondary data that gives you prior knowledge of the area or population you are sampling
  - Choose specific people or sites to make sure that there is a representative sample
  - e.g. if you know the population of the area has 25% over 60, then when you are selecting your sample of people to interview 25% of them should be over 60

Systematic vs. random sampling

	Advantages	**Disadvantages**
Systematic Sampling	• You will get better coverage of an area or sample group • Even though you pick the interval e.g. take a sample every 50m, once it is picked, there is no bias in who gets selected. • It is very simple to understand and carry out.	• Because you are selecting the interval, there is some bias • Chance of being unrepresentative
Random Sampling	• Every person or location/place has an equal chance of being selected • It is an unbiased sample • It is quick and simple	• Because it is totally random, results may not be representative e.g. the random numbers may select sample sites in one section of the area and miss out an important section • When using random numbers tables, it is possible to select the same location twice when the number is generated twice (have to count the sample twice)

Data collection techniques in physical geography

2024年4月4日 11:28

Profile of the river (gradient of the river flow)

- Put a ranging pole at your starting point and a second ranging pole where the gradient changes or a set interval apart e.g. 10 m
- Make sure the ranging poles are vertical
- Use a clinometer to look from one point on the first pole to the same point on the second (50cm from the top)
- Read the angle in degrees and record your results

Width of river

- Place ranging poles at either side of river bank and measure the distance between them in meters using a tape measure
- You must make sure the tape measure is perpendicular to the bank
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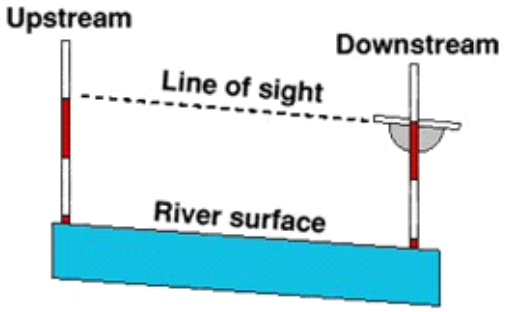

Depth of river

- Use tape measure to measure the river width at right angles to the river bank
- Use a metre ruler to measure the depth at five intervals across the river
- Make sure the meter ruler is vertical
- Calculate the mean of the river depth in meters

Cross section of river

- Measured in m^2
- Cross sectional area = width × depth
- Make sure the measurements are both in meters.

Velocity of river

- Measure 10m along a river using a tape measure
- Use a stop watch to time how long a float (e.g. an orange or cork) takes to travel the distance of 10 metres
- Divide the distance in metre by the number of seconds to calculate the velocity in m/s
- Repeating at least 3 times at different sites across the river and calculate the mean velocity
- You could use a flowmeter but they are expensive

Pebble size and shape

- This indicates the amount of erosion (attrition) which is happening
- Select 10 pebbles at regular intervals across the river bed
    - e.g. place a tape measure across the river and place a ranging pole in the river at regular intervals, selecting the stone underneath the pole.
- Measure the longest axis (side) in cm using callipers and record the results
- Visually estimate the roundness comparing with the Powers roundness chart (Measured 1-6 with 1 being very angular and 6 being well rounded)

Measuring the rate of infiltration

- Rate of infiltration = the speed water soaks into the soil, measured in mm per minute
- Lay out a transect using a tape measure.
- At equal distances along the transect insert the infiltrometer tube or metal ring into the ground so that half the tube is in the soil
- Pour 100mm of water into the tube by using the measurement on the infiltrometer or a wooden ruler inside the metal ring
- Measure the height of the water every minute and record the data in mm per minute
- Use a stop watch to time the speed of infiltration

Soil moisture content

- Measuring the amount of water in the soil which is measured as a % of soil weight
- Take a soil sample for each site along the transect
- Put the sample into a small bag
- At college, put the soil sample into a small dish and weigh it
- Put the soil sample into an oven and heat at 250℃ for 30 minutes
- Take it out of the oven and weigh it again
- Soil moisture = difference between weights / original weight x 100
- You could also use a digital soil moisture reader (see photo below right) but the accurate ones can be expensive

Measuring beach / sand dune profile

- This is the angle of the beach measured in degrees
- Lay a tape measure on the beach to create a transect line starting at the sea
- Make sure it is perpendicular to the coast using a compass
- Put the ranging poles equal distance apart e.g. 5m or where there is an obvious change in slope angle
- The poles must be vertical
- Use a clinometer to measure the angle by lining up the sight from the same position on both ranging poles
- Read the angle and record it
- Move the ranging pole which is closest to the sea along the transect to the next position
- Repeat the measurement

Measuring change in vegetation type

- Along a river or across a sand dune system
- Lay a tape measure on the beach starting at the sea
- Make sure it is perpendicular to the coast using a compass
- Put the quadrat down next to the tape measure
- Estimate the % of the square which is covered with each vegetation type
- Use a plant identification card / book / internet or teacher to help you identify the different types of plants
- Repeat measurement and calculate the average for the site at regular intervals
- Record the results

Measuring longshore drift

- Measuring sediment size changes along a beach
    - This tells you direction of longshore drift
    - The smaller and rounder pebbles are usually found further along the coast because they have experienced more attrition as they are transported by waves
    - The waves will deposit the larger, heavier sediment first and transport the smaller, lighter pebbles further along the coast
    - At equal distance along the beach (every 100m) select 10 pebbles at random
    - Measure the length of the longest axis (called the A axis) using callipers
    - Compare the pebble with the Powers roundness chart to find out how rounded it is
    - Record the results
    - Estimate 100m to next site using pacing method and repeat the measurements
- Tracking the movement of pebbles

    - Paint 50 pebbles & carefully note the location where you leave them
    - Wait for a period of time (e.g. a week)
    - Locate the pebbles and measure how far they have moved and in which direction
- Measuring build-up of sand next to groynes
    - Sediment builds up on the side where the longshore drift is coming from and the other side is starved of sediment
    - Measure the height from beach to the top of the groyne on both sides of the groyne
    - Calculate the difference in height between the two sides to show the build-up of sediment trapped
    - Repeat the measurement three times at different locations along the groyne
    - Repeat the measurement on every groyne
- Use a float in the water tied to a rope
    - Throw the float into the sea
    - Measure the distance it moves along the coast and time how long it takes using a stop watch

Measuring the weather

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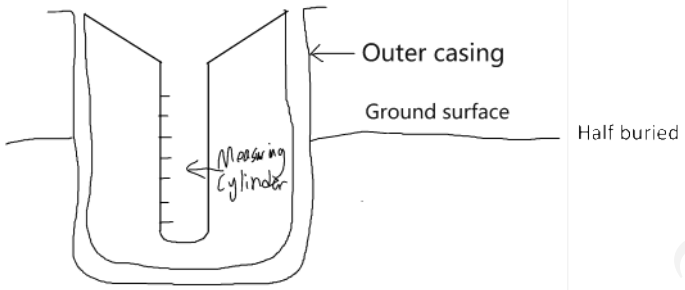
Keywords

- https://quizlet.com/cn/838128164/flash-cards/

Rain gauge - explanation

- Measure precipitation in mm
  - * Precipitation can be rain / snow / sleet / hail
- A hollow cylinder which contains a funnel and a measuring cylinder to collect the water
- Held in another outer casing
- Measuring cylinder is made of a fixed diameter so comparisons can be made between different rain gauges
- Diagram



Rain gauge - site factors

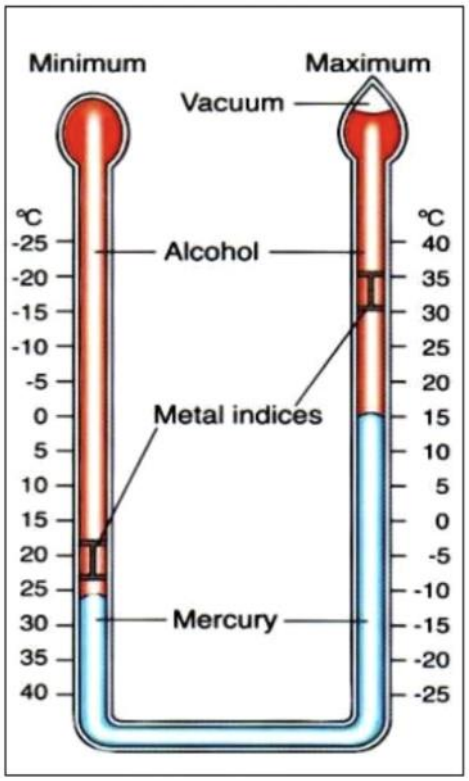
- Grass and not on hard surfaces
  - Avoid splashes entering into the gauge
- Part buried for stability
- Rim 30cm above ground surface
  - Avoid surface runoff entering
- No trees or roof overhanging
  - Avoid shelter and too little rain entering
- Away from buildings, trees, or other objects
  - Avoid drips entering the gauge

Rain gauge - taking reading

- At the same time of day at 9 a.m., every 24 hours
- Take out the funnel + measuring cylinder
- Read the amount of water in the measuring cylinder in mm, read at the bottom of the meniscus
- Melt any snow / hail before taking reading
- Pour away the water
- Reset the instrument

Six's thermometer / maximum-minimum thermometer - explanation

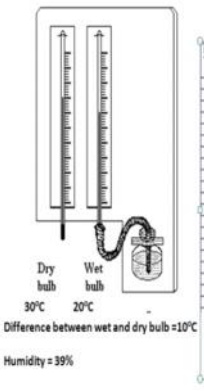
- Records the maximum + minimum temperatures in a 24 hour period
- Highest temperature
  - As temperatures rise, the mercury in the maximum thermometer expands
    - Pushes up the metal pin
  - When temperatures cool, the mercury contracts but the metal pin is left in place to record the highest temperature
- Lowest temperature
  - When the temperature falls, the alcohol contracts in the minimum thermometer
    - Pulls the metal pin upwards with mercury
  - When the temperature rises, the alcohol expands but it flows pass the metal pin leaving it in place to record the lowest temperature
- Diagram

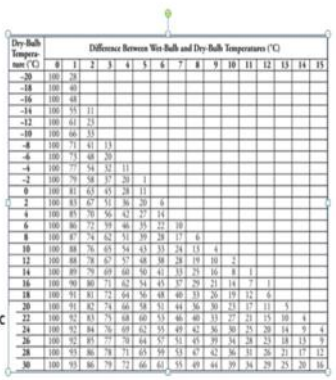
- 

Six's thermometer - reading

- At the same time of day at 9 a.m., every 24 hours
- Read from the bottom of the pins (*reversed scale for minimum temperature)
- The level of the mercury records current air temperature
- Pins are reset using a magnet

Hygrometer / wet and dry bulb thermometer

- Measure relative humidity as a percentage
- Have two thermometers that contain mercury to measure temperature
- Dry bulb is a normal mercury thermometer which measures actual air temperature
- Wet bulb is a normal thermometer but the bulb is covered with a muslin connected to a reservoir of water
- When water evaporates from the cloth latent heat is used so the air is cooled and the temperature on the wet bulb thermometer will be a few degrees lower than air temperature
- When air is humid, it is already saturated with water vapour and less evaporation will be able to take place
    - Less temperature drop on the wet bulb
- The smaller the difference between the dry + wet bulb temperature, the greater the humidity
- A conversion table is used to calculate the humidity using the dry bulb temperature and the difference between the two temperatures
- Diagram
- 



Barometer

- Measure atmospheric pressure in millibars (mb), average is 1013 mb
- An aneroid barometer has a chamber containing a vacuum

    - As air pressure changes, the chamber contracts & expands
- This movement is recorded by the needle on the front of the barometer
- The second needle is moved manually to record the current atmospheric pressure
    - Used to show the change in pressure over the next 24 hour period

Barometer - reading

- The pressure is recorded every 24 hours at the same time at 9 a.m.
- Open Stevenson's screen to get the barometer
- Take reading in millibars by looking at the black arrow
- Reset the instrument by moving the gold arrow in line with the black arrow to record current pressure

High / low air pressure effect

- High air pressure
    - Clouds cannot be formed
    - No precipitation
- Low air pressure
    - Clouds are formed
    - Precipitation / storms occurs

Anemometer

- Measure wind speed in m/s
- Light rotating cups are blown around by the wind
    - The faster the wind, the faster the cups move
- The revolutions are counted & converted into metres per second/ km per hour or knots

Anemometer - site factors

- Located on top of building for accurate measurement
- Placed away from shelter of buildings or trees which may reduce wind speed

Wind vane / weather vane

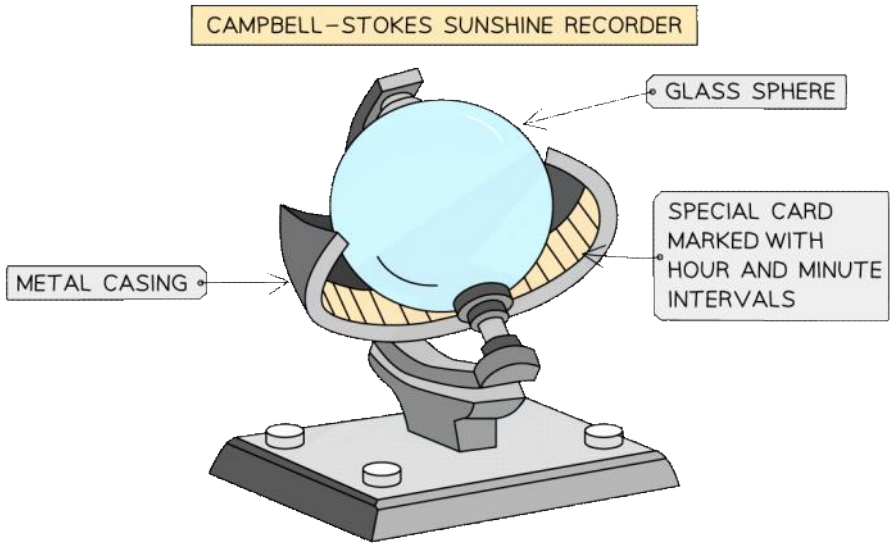
- Measure wind direction
- An arrow rotates freely above four fixed pointers which show the four compass points so direction can be worked out
- Arrow can be blown around by wind
- The arrow points in the direction the wind is coming from which is the name of the wind direction

Wind vane site factors

- Located on top of buildings or in open space
- Placed away from the shelter of buildings or trees

Sunshine recorder

- Record hours of sunshine
- A glass ball with a piece of paper located behind it
    - The paper is marked in minutes + hours
- When the sun shines, the rays pass through the glass ball and burn the paper recording the time of sunshine
- If the clouds block the sun, the paper is not burned
- The position of the sun moves overhead & it burns a line in the paper.

- 

Sunshine recorder - reading

- At the same time of day at 9 a.m., every 24 hours
- The paper is removed + work out the length of the burn
- The length of the burn indicates the hours + minutes of sunshine
- The paper is replaced to reset the instrument

Sunshine recorder - site factors

- Located in open space away from the shade of trees or buildings
- The ball is facing the sun i.e. facing south in northern hemisphere
- Often on top of the Stevenson's screen

Cloud cover

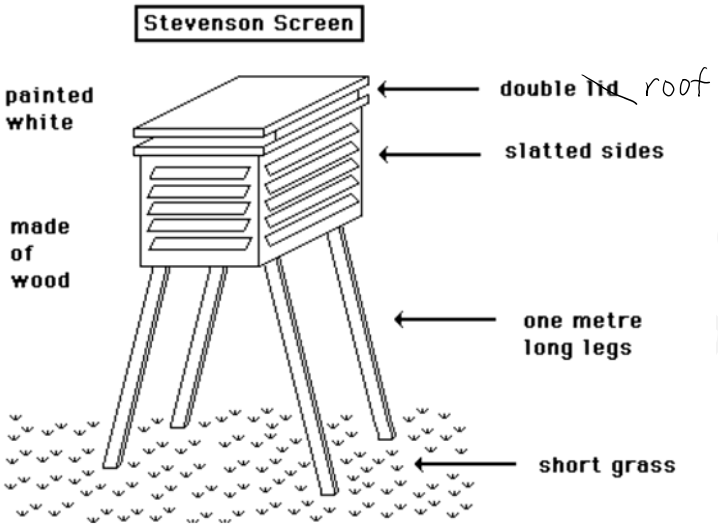
- Estimated by eye
- Measured in Oktas (no = 0 Oktas, full = 8 Oktas)
  - e.g. If half the sky is cloud covered, this is 4 Oktas.
- If the sky cannot be seen because of pollution, smoke or fog it is called obscured

Cloud types

- Cumulus
  - Cauliflower shaped
  - Flat bases
  - Fluffy, billowing
  - Range of altitudes
  - White, fair weather
- Stratus
  - Continuous layers
  - Covers most of the sky
  - White → grey
- Stratocumulus
  - Layer and heaped low level clouds
- Cirrus
  - Horsetail shape
  - High altitude, thin, wispy
  - Made of ice crystals
  - Fair weather
- Nimbus
  - Raincloud
- Alto
  - High

- Cumulonimbus
  - Heaped rainclouds linked with thunderstorms & heavy rain
  - Large altitudinal range
  - Tall, grey coloured
- Nimbostratus
  - Heavy layer of cloud which is dark
  - Brings continuous rain / drizzle

Stevenson's screen

- Contains
  - Six's thermometer
  - Hygrometer
  - Barometer
- It protects them from direct heat radiation + precipitation
- It allows shade temperatures to be recorded
- It has standardised characteristics so that weather recordings around the world can be compared.
- 

Stevenson's screen - characteristics

- Wooden box to reduce absorption of sun's heat
- Painted white to reflect the sun's radiation
- Double roof to create air layer in roof (allow air in)
- Slatted sides to let the air circulate, slanted downwards to prevent direct sunlight getting in
- Hinged door opens downward for easy access to instruments
- 125cm high legs: standardised around the world to allow comparison, avoid measuring ground temperature

Stevenson's screen - site factors

- In open space & away from obstacles e.g. buildings or trees
  - Reduce influence of heat from buildings or shade from trees
- On short grass to reduce impact of heat from ground
  - Not on concrete or tarmac which absorbs heat
- On legs 1.25m long
  - To measure air and not ground temperature
  - Standardise height for reliable comparison between weather stations
- Door facing away from direct sunshine (facing north in northern hemisphere)
  - Avoid direct sunlight when door is opened.
- In a protected area of the school e.g. fenced off
  - Avoid tampering by humans or harm from animals

Data collection techniques in human geography

2024年4月4日 11:27

Topics that could be tested

- urban land use pattern
- investigating characteristics of the CBD
- Settlement hierarchy
- Settlement function or sphere of influence
- Impact of a new development on the environment e.g. a new factory, housing estate, hotel, road, shop, renewable energy farm e.g. wind or solar or an HEP station
- Impact and solution to traffic congestion
- Comparing the impact of tourism on two different resorts/ beaches

Land use survey

- Records the size of the buildings and what each building is used for
- Useful for finding out the location of the CBD, the function of the settlement, the types of shops/services (low order or high order) and its position in the settlement hierarchy
- Method
    - walk along a transect across the settlement following a main road
    - mark the land use of the ground floor of the building on a blank map
    - classify the different land uses / shops into different categories e.g. retail, residential, industry OR convenience/comparison
    - Repeat the method on a different road to compare the land uses in different parts of the settlements
- To find the CBD you could count the number of floors of each buildings as you walk along the transect
    - Calculate the average building height in each section of the settlement and record the average per section
    - The CBD is usually found where the tallest buildings are located.

Pedestrian & traffic counts

- Different small groups of 2 or 3 students stand at different locations around the town
- Use a stop watch or timer on the phone to time 10 minutes accurately
- Accurately count the number of pedestrians / cars passing in both directions
- Design a data recording sheet and record the count using the tally method
- Cautions
    - Do not block the pavement
    - Decide beforehand the exact start and finish time of the survey
    - All groups complete the survey at the same time
        - e.g. synchronise watches to make sure all groups start and finish the count at the same time
- The reliability of the data is improved by
    - having more sample sites
    - taking the count at different times of the day
    - taking the count on different days of the week including both week day and weekend

Bi polar Environmental quality survey (EQS)

- Used for students to grade how attractive the environment is in terms of levels of pollution, building quality, amount of vegetation
- It is often scored from 1 to 5 with 1 meaning a negative environmental characteristic and 5 being a positive characteristic
- Process
    - Design a data recording sheet
    - Use agreed standards

    - Look at the area and decide the score
    - Have a practice survey
    - Have a few students completing the survey and then take an average of the scores
    - All survey done at the same time
- The problem with this method
    - It is subjective because the researcher selects the value so the results are not always accurate

Noise survey

- Use an app on your phone to measure the noise for 1 minute
- Making sure that the students do not make any noise during this time
- Make a note of the highest level of noise in decibels

Questionnaires

- Ask a sample number of people their opinions using a prepared set of questions
- Done in pairs: one ask one record
- Cautions
    - Most questions should be closed (giving people options to choose) because this data is easier to analyse by constructing graphs
    - Age ranges should not overlap e.g. it could be <15, 15-35 then 36-50,>60

Ethical data collection for questionnaires

- Introduce yourself politely
- Explain the reason for the questionnaire
- Accept that some people do not want to take part in the survey
- Only TWO students : one to ask questions and one to record answers. Do not crowd around the person
- People can stop answering the questions at any point
- There are no names on the survey so the answers are confidential
- Do not ask personal questions e.g. where do you live
- Thank them at the end for their time

Problems with questionnaires

- questions need to be closed questions otherwise it is difficult to analyse data
- people may misunderstand the question so the data may be inaccurate
- questions cannot be too personal
- need to ask a lot of people to get a reliable sample
- sample could be biased/ elderly people often more willing to answer questions so they are over represented in a sample
- may get different results at different times of the day / week

Health and safety considerations

2024年4月4日 11:31

Health and safety considerations

- Check the weather forecast and prepare for the weather
    - wet and cold weather need warm jumper, hats + gloves with a waterproof jackets
    - hot weather need sun hats, sun glasses, sunblock and bottle of water
- Have appropriate footwear e.g. boots with ankle support
- Carry insect repellent
- Carry all medicines e.g. inhaler if needed. Notify teacher of any medical conditions
- Carry a first aid kit
- Stay in groups and do not collect data alone
- Have a map to avoid getting lost
- Only do questionnaires in groups and at safe locations in public view
- Have teacher contact numbers and carry mobile phones
- For coasts: be aware of high tide timing by checking the tide timetables
- For rivers: be aware if there is a chance of flooding
- Countryside: do not approach wild animals e.g. ponies/ cattle

Answering questions

2023年6月14日 23:41

TOPIC 1: AIMS AND HYPOTHESES

1. Read through the aims carefully. Take note of **WHERE** the investigation is taking place and **WHEN** because this might affect the results.

2. Read through the **two hypotheses**. As you are looking at the data always be thinking back to the hypotheses and whether the data supports the hypotheses or not.

TOPIC 3: DATA PRESENTATION TECHNIQUES

BE VERY CAREFUL and **DO NOT MISS OUT** THESE QUESTIONS INVOLVE **FINISHING GRAPHS/DIAGRAMS**. They are **EASY TO MISS** BECAUSE THERE ARE **NO LINES**. MISSING THEM OUT WILL **LOSE SILLY MARKS**!

Always complete the graphs and maps using **EXACTLY** the same style as they have used e.g. same shading.

Make sure you use a **pencil** to complete the graph and map so that you can erase any mistakes. Also use a **RULER** to that your answer is neat and accurate.

TOPIC 4: DATA ANALYSIS AND MAKING CONCLUSIONS

TESTING THE HYPOTHESIS + MAKING CONCLUSIONS:

If you are asked whether or not the hypothesis has been proved or asked to make a conclusion, you must do the following:

- **If the question says "does the data support the hypothesis" you need to make a clear statement e.g. the data does support the hypothesis, OR the data does not support the hypothesis OR the data partially supports the hypothesis.**
- **Refer to figures that have been shown in results. You should be stating TWO sets of PAIRED data.**
- **State any exceptions/ anomalies in the data.**
- **USE NUMBERS**

TOPIC 5 : EVALUATION + SUGGESTING IMPROVEMENTS

You could be asked to criticise the methods which the students have used. Think about the following:

Problems with accuracy: these are connected to issues with the researchers (students) and how skilful they are at collecting the data or the effectiveness of the equipment. Surveys done by different people giving different results is a problem with the accuracy.

> **Make suggestions for improvement like:**
> Use more sophisticated equipment e.g. digital OR practise the techniques in a pilot survey OR standardise the measurements beforehand so all students agree on how to collect the data

Problems with reliability and possible bias: these are connected to issues with the sampling and how the time of year, day or place where the data is collected does not represent the whole population. If the data collection was repeated, the results would not be the same.

> **Make suggestions for improvement like:**
>
> Collect data at different times of the day **OR** on different days of the year **OR** use more data collection locations **OR** collect data in different places which better represent the whole population