

AJK Board 1st Year

Statistics Notes

All Chapters

FULL Question Answers - every short and long question answered in full, with MCQs and answer keys

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Worked numbers are illustrative examples only.

Chapter 1: Introduction

Statistics is the study of collecting, organising, presenting, analysing and interpreting numerical information so that decisions can be made on evidence rather than guesswork. Descriptive statistics summarises data that has already been collected, while inferential statistics uses a sample to draw careful conclusions about a larger group. The subject is useful because it turns raw figures into clear patterns, but it also has limits: poor data, biased collection or careless interpretation can lead to wrong conclusions. Data may be primary, collected first-hand, or secondary, taken from an already published source. Variables may be qualitative, describing a quality, or quantitative, describing a measurable quantity, and they may be discrete, taking separate values, or continuous, taking any value in a range. Accuracy, measurement errors, significant digits, scientific notation, rounding and summation notation are the basic tools that keep statistical work honest and readable.

Short Questions with Full Answers

1. What is statistics in simple words?

Statistics is the science of collecting, organising, presenting and interpreting numerical data. It helps us see patterns in large amounts of information instead of looking at every single figure separately. For example, the average marks of a class tell us more at a glance than a long list of individual marks. In short, statistics turns data into useful, understandable knowledge.

2. What is the difference between descriptive and inferential statistics?

Descriptive statistics describes data that has already been collected, using tables, graphs, averages and percentages. Inferential statistics goes one step further and uses a sample to estimate or test something about a whole population. For example, describing the marks of one class is descriptive, while using those marks to guess the performance of all first-year students is inferential. Both parts work together, but only the second part involves generalising beyond the data in hand.

3. What is the difference between primary and secondary data?

Primary data is collected directly by the researcher for a particular purpose, such as through a questionnaire or an interview. Secondary data already exists and is taken from books, reports, websites or official records. Primary data is usually more relevant to the exact question but takes more time and money to collect. Secondary data is quicker and cheaper, but it may not match the question exactly and must be checked for reliability.

4. What is the difference between a qualitative and a quantitative variable?

A qualitative variable describes a quality or category, such as blood group, gender or favourite subject, and it cannot be measured with numbers. A quantitative variable describes a quantity that can be counted or measured, such as height, weight or marks. Quantitative data can be used in arithmetic, while qualitative data is usually counted by category. Knowing the difference matters because different types of data need different tables and graphs.

5. Why are significant digits and rounding important in statistics?

Significant digits show how precise a measurement really is, so they prevent a result from looking more accurate than the data allows. Rounding makes long decimals easy to read and compare, provided the same rule is used throughout the work. For example, writing 3.142 as 3.14 is sensible when the original data was only measured to two decimal places. Careless rounding, however, can change totals, so rounding should

normally be done at the end of a calculation.

Long Questions with Full Answers

1. Explain the functions and importance of statistics, with examples, and also state its limitations.

Introduction: Statistics is not just about numbers; it is a method for making sense of information and for making decisions. **Explanation:** Its main functions are to simplify complex data, to compare groups, to find relationships and to help in planning and forecasting. For example, a school uses average marks to compare classes, a government uses population data to plan hospitals and schools, and a business uses sales figures to decide how much stock to order. **Importance:** Without statistics, decisions would depend on impressions and guesswork, while with statistics they can be checked, compared and explained to others. **Limitations:** Statistics has real limits. It studies groups, not single cases, so it cannot describe one student fully. Its results are only as good as the data, so biased or incomplete data gives misleading results. It can also be misused when figures are shown without context. **Conclusion:** Statistics is therefore a powerful tool, but it must be used carefully, with honest data and sensible interpretation.

2. Explain collection of data, variables and measurement errors in detail.

Introduction: Good statistical work begins before any calculation, with careful collection of data and clear understanding of what is being measured. **Explanation:** Data is collected by direct observation, interviews, questionnaires or from published sources, and the method chosen affects cost, speed and accuracy. A variable is a characteristic that changes from one item to another, such as marks or height, while a constant does not change. Variables may be discrete, like the number of students, or continuous, like height, and they may be qualitative or quantitative. Measurement errors arise when a reading differs from the true value: compensatory errors partly cancel each other, while biased errors push results consistently in one direction, for example when a faulty scale always adds extra weight. Accuracy improves when instruments are checked, samples are chosen fairly and readings are repeated. **Example:** If a teacher records marks carelessly, the class average will be wrong even if the averaging itself is correct. **Conclusion:** Careful collection, clear variables and attention to errors are therefore the foundation of every reliable statistical result.

MCQs with Answer Key

- Statistics is mainly used to study: A) A) One person only B) B) Groups and patterns in data C) C) Guessing without data D) D) Drawing pictures only Answer: B
- Descriptive statistics is concerned with: A) A) Predicting the future B) B) Summarising data already collected C) C) Collecting no data D) D) Testing a new drug Answer: B
- Primary data is: A) A) Data copied from a book B) B) Data collected first-hand for a purpose C) C) Data from ten years ago D) D) Data with no source Answer: B
- Height in centimetres is an example of a: A) A) Qualitative variable B) B) Constant C) C) Quantitative continuous variable D) D) Category only Answer: C
- A biased error is one that: A) A) Cancels itself out B) B) Pushes results consistently in one direction C) C) Never affects results D) D) Occurs only in graphs Answer: B

Chapter 2: Presentation of Data

Raw data is hard to understand, so it is first classified, then tabulated and then shown in graphs or diagrams. Classification groups data by a common feature, such as class, marks range or gender. Tabulation puts the classified data into rows and columns with a clear title, headings and total, so that comparisons are easy. A frequency distribution shows how many items fall into each class, and class limits state the lowest and highest values in a class, while class boundaries remove gaps between classes for continuous data. Bar charts, pie charts and histograms present the same information visually: a bar chart compares categories, a pie chart shows shares of a whole, and a histogram shows the shape of a frequency distribution. A good presentation is clear, correctly labelled and honest, with no scale trick that exaggerates a small difference.

Short Questions with Full Answers

1. Why do we classify data before presenting it?

Classification groups similar items together, so a long, confusing list becomes a small set of meaningful groups. It makes comparison possible, for example between marks ranges or between classes. Without classification, patterns such as which marks range is most common would be hard to see. In short, classification is the first step from raw data to understanding.

2. What is tabulation and why is a good table important?

Tabulation is the systematic arrangement of data in rows and columns. A good table has a clear title, proper column headings, units where needed and a total row or column. It saves space, makes comparison easy and lets a reader find any figure quickly. A badly made table, with missing headings or unclear totals, can confuse even correct data, so care in tabulation is part of good statistics.

3. What is a frequency distribution?

A frequency distribution shows how often each value, or each class of values, occurs in a set of data. For example, it can show how many students scored in each marks range. It is usually made by tallying the data into classes and counting the tallies. This turns raw marks into a clear picture of where most values lie and where they are rare.

4. What is the difference between class limits and class boundaries?

Class limits are the smallest and largest values that belong to a class, such as 10 to 19. Class boundaries are the real limits used for continuous data, halfway between one class and the next, such as 9.5 to 19.5. Boundaries remove the gap between classes so that a histogram has no empty space. Limits are what we write in a table, while boundaries are what we use when drawing a continuous graph.

5. When should a pie chart be used instead of a bar chart?

A pie chart should be used when the aim is to show how a whole is divided into parts, such as the share of students in each subject group. A bar chart is better when the aim is to compare separate categories, especially when there are many of them. A pie chart becomes hard to read with too many small slices, so it works best with a few clear parts. The choice therefore depends on the question the graph must answer.

Long Questions with Full Answers

1. Explain classification, tabulation and frequency distribution, with an example.

Introduction: Data must be organised before it can be interpreted, and classification, tabulation and frequency distribution are the three main steps in that organisation. Explanation: Classification means grouping data by

a common characteristic, such as marks range, age group or subject. Tabulation means arranging those groups in a table with rows, columns, headings and totals, so that the information can be read at a glance. A frequency distribution goes further by counting how many items fall in each group and showing those counts side by side. Example: Suppose 20 students have marks from 0 to 100. Grouping them into ranges 0-19, 20-39, 40-59, 60-79 and 80-100, counting how many fall in each range, and putting those counts in a table gives a frequency distribution. From that table we can see at once which range is most common. Conclusion: Together, these three steps turn a messy list into a clear, comparable and trustworthy summary.

2. Explain class limits, class boundaries and the main types of diagrams, with their uses.

Introduction: A frequency table is useful, but its classes and diagrams must be understood correctly, otherwise the picture can mislead. Explanation: Class limits are the stated lowest and highest values of a class, while class boundaries are the true dividing points halfway between classes, used for continuous data. For diagrams, a bar chart uses separate bars to compare categories, a pie chart uses slices of a circle to show shares of a whole, and a histogram uses joined bars to show the shape of a continuous frequency distribution. Example: To compare the number of students in five classes, a bar chart is clearest. To show what fraction of a budget goes to books, transport and food, a pie chart is better. To show how marks are spread across ranges, a histogram is best. Conclusion: Choosing the right class definition and the right diagram is therefore as important as getting the numbers right.

MCQs with Answer Key

1. Classification means: A) A) Deleting data B) B) Grouping data by a common feature C) C) Drawing a graph D) D) Finding the average Answer: B
2. A good table must have: A) A) No title B) B) Clear title, headings and totals C) C) Only colours D) D) No rows Answer: B
3. In a frequency distribution, frequency means: A) A) The largest value B) B) How often a value or class occurs C) C) The average D) D) The total of all values Answer: B
4. Class boundaries are used mainly for: A) A) Discrete bar charts B) B) Continuous data and histograms C) C) Pie charts only D) D) No graph Answer: B
5. A pie chart is best for showing: A) A) Shares of a whole B) B) Long time trends C) C) Exact averages D) D) Raw lists Answer: A

Chapter 3: Measures of Central Tendency

The mean, median and mode are three ways of finding a typical or central value in a set of data. The mean is found by adding all values and dividing by how many there are, and it uses every value, which makes it sensitive to very large or very small values. The median is the middle value when data is arranged in order, so it is less affected by extreme values and is useful when a few values are unusual. The mode is the value that occurs most often, and it is the only average that works well for purely categorical data. No single average is always best: the mean suits symmetrical numerical data, the median suits skewed data, and the mode suits the most common category. A careful student reports the average that fits the data and explains why it was chosen.

Short Questions with Full Answers

1. What is the mean and when is it useful?

The mean is the sum of all values divided by the number of values. It is useful because it uses every value in the data and gives a single representative figure. For example, the mean marks of a class summarise the whole class in one number. It is less suitable when one or two extreme values pull it far from most values, because then it no longer represents the typical student well.

2. What is the median and why is it sometimes better than the mean?

The median is the middle value when data is arranged in ascending or descending order. It is sometimes better than the mean because extreme values do not change it much. For example, if most families earn a modest income but one family earns a very large income, the mean rises sharply while the median stays close to the typical family. The median is therefore a safer typical value for skewed data.

3. What is the mode?

The mode is the value or category that occurs most frequently in a set of data. It is simple to understand and it is the only measure of central tendency that can be used for purely qualitative data, such as favourite colour. A set of data may have one mode, more than one mode, or no mode at all. Its weakness is that it may ignore most of the data and focus only on the most common value.

4. How do you find the median for an even number of values?

When there is an even number of values, there is no single middle value, so the median is the mean of the two middle values after arranging the data in order. For example, for the values 10, 20, 30 and 40, the two middle values are 20 and 30, and their mean is 25, which is the median. This rule keeps the median in the centre of the data even when the count is even.

5. Why might the mean and median differ in the same data?

The mean and median differ when the data is not symmetrical, because the mean is pulled towards extreme values while the median stays in the middle. In income data, for example, a few very high incomes raise the mean above the median. When the two averages are close, the data is fairly symmetrical, and when they are far apart, the distribution is skewed. Comparing them is therefore a useful way to judge the shape of the data.

Long Questions with Full Answers

1. Explain the mean, median and mode, with an example, and say when each should be used.

Introduction: Averages are used to describe a whole set of data with one typical value, but different averages answer different questions. Explanation: The mean adds all values and divides by their count, so it uses

every value but is sensitive to extremes. The median is the middle value in ordered data, so it stays typical even when a few values are very large or very small. The mode is the most frequent value, and it is useful for categories where adding values makes no sense. Example: For the marks 40, 50, 50, 60 and 100, the mean is 60, the median is 50 and the mode is 50. Here the median and mode describe the typical student better, because one very high mark of 100 pulls the mean upwards. Conclusion: The best average depends on the data: use the mean for symmetrical numerical data, the median for skewed data, and the mode for the most common category.

2. Explain how the mean is affected by extreme values, with a worked illustrative example.

Introduction: One weakness of the mean is that it gives equal importance to every value, including values that are far from the rest. Explanation: A single very large value can raise the mean a lot, while a single very small value can lower it a lot, even though most values have not changed. This happens because the mean is calculated from the total, so any change in the total changes the mean. Example, illustrative only: Five workers earn 20, 22, 24, 26 and 28 units a day, giving a mean of 24. If one worker is replaced by someone earning 100 units, the values become 20, 22, 24, 26 and 100, and the mean rises to 38.4, even though four of the five workers are unchanged. The median, by contrast, stays at 24. Conclusion: Extreme values must therefore be noticed and explained, and the median should be reported alongside the mean when the data is skewed.

MCQs with Answer Key

1. The mean is calculated by: A) A) Taking the middle value B) B) Sum divided by number of values C) C) Taking the most frequent value D) D) Subtracting smallest from largest Answer: B
2. The median is: A) A) The largest value B) B) The middle value in ordered data C) C) The total D) D) The range Answer: B
3. The mode is: A) A) The average of all values B) B) The most frequent value C) C) The middle value only D) D) The smallest value Answer: B
4. The mean is most affected by: A) A) The mode B) B) Extreme values C) C) The number of categories D) D) The title of the table Answer: B
5. For categorical data, the suitable average is: A) A) Mean B) B) Median C) C) Mode D) D) Range Answer: C

Chapter 4: Measures of Dispersion

An average alone does not tell the whole story, because two sets of data can have the same average but very different spreads. Dispersion measures how far values spread around their centre. The range is the simplest measure, found by subtracting the smallest value from the largest, but it uses only two values and is easily affected by extremes. Variance and standard deviation use every value: variance is the average of squared differences from the mean, and standard deviation is its square root, which brings the measure back to the original units. A small standard deviation means values are close together, while a large one means they are widely spread. Together, an average and a measure of dispersion give a much fuller picture than either one alone.

Short Questions with Full Answers

1. What is dispersion in statistics?

Dispersion describes how spread out the values in a set of data are around their centre. Two classes can have the same average marks but very different spreads, one with most students near the average and another with marks from very low to very high. Dispersion measures make that difference visible. Without a measure of dispersion, an average can therefore be misleading.

2. What is the range and what is its weakness?

The range is the difference between the largest and smallest values in a set of data. It is quick to calculate and easy to understand, which makes it useful for a first look at the spread. Its weakness is that it uses only two values, so one extreme value can make the range very large even when all other values are close together. For that reason, the range is best used alongside other measures.

3. What is variance in simple words?

Variance measures the average squared distance of values from their mean. Squaring the differences removes negative signs, so values below and above the mean do not cancel each other out. A larger variance means values are more spread out, while a smaller variance means they are closer to the mean. Variance is useful in calculations, but its units are squared, which makes it harder to interpret directly.

4. What is standard deviation and why is it preferred to variance?

Standard deviation is the square root of variance, so it is measured in the same units as the original data. For example, if marks are in marks, standard deviation is also in marks, which makes it easy to understand. A small standard deviation means most values are close to the mean, while a large one means they are widely spread. It is preferred to variance for interpretation, even though variance is often used in further calculations.

5. How do mean and standard deviation work together?

The mean gives the centre of the data and the standard deviation gives the spread around that centre, so together they summarise both location and variation. For example, two classes with the same mean marks may have different standard deviations, showing that one class is more consistent than the other. Reporting only the mean would hide that difference. A complete summary therefore needs both a central value and a measure of dispersion.

Long Questions with Full Answers

1. Explain range, variance and standard deviation, with an illustrative example.

Introduction: To understand a set of data fully, we need to know not only its centre but also how far its values

spread around that centre. Explanation: The range is the simplest measure, calculated as the largest value minus the smallest value, but it depends on only two values. Variance improves on this by using every value: it averages the squared differences of values from the mean. Standard deviation is the square root of variance, which returns the measure to the original units and makes it easier to interpret. Example, illustrative only: For the values 10, 12, 14, 16 and 18, the mean is 14 and the range is 8. The squared differences from the mean are 16, 4, 0, 4 and 16, giving a variance of 8 and a standard deviation of about 2.83. This tells us that values are typically about 2.83 units away from the mean. Conclusion: Range gives a quick idea, variance is useful for calculation, and standard deviation is the most interpretable measure of spread.

2. Why is standard deviation a better measure of spread than range?

Introduction: Range and standard deviation both measure spread, but they do so in very different ways, and that difference matters in practice. Explanation: Range uses only the smallest and largest values, so it ignores everything in between and changes sharply if one extreme value appears. Standard deviation uses every value and measures how far, on average, values lie from the mean, so it reflects the whole set of data. Example: Two classes can have the same range but very different standard deviations, if in one class most marks are near the mean and in the other they are spread widely. A teacher who only looked at range would think the classes were equally spread, which would be wrong. Conclusion: Standard deviation is therefore a more reliable and informative measure of dispersion, even though range remains useful for a quick first check.

MCQs with Answer Key

1. Dispersion measures: A) A) The centre only B) B) How spread out values are C) C) The total D) D) The most frequent value Answer: B
2. Range is: A) A) Mean minus median B) B) Largest minus smallest C) C) Sum divided by count D) D) Most frequent value Answer: B
3. Variance is based on: A) A) Squared differences from the mean B) B) Only the largest value C) C) The mode D) D) The median only Answer: A
4. Standard deviation is: A) A) Variance squared B) B) Square root of variance C) C) Range divided by two D) D) Mean plus mode Answer: B
5. A small standard deviation means values are: A) A) Widely spread B) B) Close to the mean C) C) All zero D) D) Not numerical Answer: B

Chapter 5: Probability

Probability measures how likely an event is, on a scale from 0 to 1, where 0 means impossible and 1 means certain. An experiment is an action with an uncertain result, an outcome is one possible result, and the sample space is the set of all possible outcomes. The probability of an event is the number of favourable outcomes divided by the total number of equally likely outcomes, when that classical definition applies. Events may be independent, when one does not affect the other, or dependent, when the first affects the second. The addition rule deals with either of two events happening, while the multiplication rule deals with both happening. Probability is the foundation of inferential statistics, because it lets us judge whether a result is likely to have happened by chance.

Short Questions with Full Answers

1. What is probability in simple words?

Probability is a number between 0 and 1 that measures how likely an event is to happen. A probability of 0 means the event cannot happen, a probability of 1 means it is certain, and a probability of 0.5 means it is equally likely to happen or not. For example, the probability of getting heads with a fair coin is 0.5. Probability therefore turns uncertainty into a number that can be compared and calculated.

2. What are experiment, outcome and sample space?

An experiment is an action whose result is uncertain, such as tossing a coin or rolling a die. An outcome is one possible result of that experiment, such as heads or the number 4. The sample space is the set of all possible outcomes, such as heads and tails for a coin, or 1 to 6 for a die. These three ideas are the starting point for every probability calculation.

3. How is the probability of a simple event calculated?

When all outcomes are equally likely, the probability of an event is the number of outcomes favourable to that event divided by the total number of possible outcomes. For example, the probability of rolling a 4 with a fair die is 1 out of 6, because only one outcome is favourable out of six possible outcomes. This rule works only when outcomes are equally likely and the sample space is known. In real life, probabilities are often estimated from past data instead.

4. What is the difference between independent and dependent events?

Independent events are events where one event does not affect the probability of the other, such as two separate coin tosses. Dependent events are events where the first event changes the probability of the second, such as drawing two cards without replacement, because the first card is no longer in the pack. This difference matters because the multiplication rule is applied differently in the two cases. Forgetting it is a common source of errors in probability.

5. What do the addition and multiplication rules do?

The addition rule is used when we want the probability of one event or another happening, and it requires care not to count outcomes twice when events overlap. The multiplication rule is used when we want the probability of two events both happening, one after the other. For example, the probability of getting heads twice in a row is found by multiplication, while the probability of rolling a 2 or a 3 is found by addition. Knowing which question is being asked is the key to choosing the right rule.

Long Questions with Full Answers

1. Explain probability, sample space and the basic rules, with examples.

Introduction: Probability gives us a precise way to talk about uncertainty, which is essential in science, business and everyday decisions. Explanation: Probability ranges from 0, meaning impossible, to 1, meaning certain. An experiment has an uncertain result, each possible result is an outcome, and all outcomes together form the sample space. For equally likely outcomes, probability is favourable outcomes divided by total outcomes. The addition rule finds the probability of one event or another, while the multiplication rule finds the probability of both events happening. Example: For a fair die, the sample space is 1, 2, 3, 4, 5 and 6. The probability of an even number is 3 out of 6, or 0.5, because three outcomes are favourable. The probability of two heads in two coin tosses is 0.5 times 0.5, or 0.25. Conclusion: With these ideas and rules, many uncertain situations can be described, compared and calculated instead of guessed.

2. Explain independent and dependent events, with examples, and why the difference matters.

Introduction: In probability, whether events affect each other changes the calculation, so the distinction between independent and dependent events is fundamental. Explanation: Events are independent when the result of one does not change the probability of the other, as in repeated tosses of a fair coin. Events are dependent when the first result changes the conditions for the second, as in drawing cards without replacement, because the pack is smaller and its composition has changed. Example: The probability of heads on a second toss is still 0.5 after heads on the first toss, because the coin has no memory. By contrast, if the first card drawn is an ace and it is not replaced, the probability of a second ace falls, because only three aces remain out of 51 cards. Conclusion: Treating dependent events as independent, or the reverse, gives wrong probabilities, so the relationship between events must always be checked first.

MCQs with Answer Key

1. Probability ranges from: A) A) -1 to 1 B) B) 0 to 1 C) C) 0 to 100 only D) D) 1 to 10 Answer: B
2. Sample space means: A) A) One outcome B) B) Set of all possible outcomes C) C) The average D) D) The largest value Answer: B
3. Probability of heads with a fair coin is: A) A) 0 B) B) 0.25 C) C) 0.5 D) D) 1 Answer: C
4. Two coin tosses are: A) A) Dependent B) B) Independent C) C) Impossible D) D) Certain Answer: B
5. Drawing cards without replacement gives: A) A) Independent events B) B) Dependent events C) C) No probability D) D) Certain events Answer: B

Chapter 6: Index Numbers and Sampling

An index number is a single figure that shows how a quantity, such as price or production, has changed compared with a base period, which is usually set to 100. A simple price index compares one item over time, while a weighted index gives more importance to items that matter more, such as items bought in larger quantities. Index numbers are widely used to measure inflation, to compare living costs and to adjust wages and incomes over time. Sampling is the method of studying a part of a population in order to learn about the whole, because studying everyone is often too costly or too slow. A random sample, where every member has a known chance of being chosen, is more likely to represent the population fairly than a biased or convenient sample. Good sampling, like good index construction, depends on clear definitions, fair selection and honest reporting of limits.

Short Questions with Full Answers

1. What is an index number?

An index number is a figure that shows the relative change in a quantity, such as price, compared with a base period. The base period is usually given the value 100, so an index of 120 means a rise of 20 percent from the base. Index numbers make comparison easy, because they remove the original units and show only the change. They are used for prices, production, wages and many other series.

2. What is the difference between a simple and a weighted index?

A simple index treats every item equally, which is fair only when items are equally important. A weighted index gives each item a weight according to its importance, such as how much of it is bought or produced. For example, in a price index, food usually gets a larger weight than a rarely bought luxury item. Weighted indexes therefore describe real-life changes better than simple averages of prices.

3. How are index numbers used in everyday life?

Index numbers are used to measure inflation through consumer price indexes, to compare the cost of living in different years or places, and to adjust wages, pensions and contracts for price changes. A government uses them to judge economic policy, and a business uses them to plan prices and production. Without index numbers, comparing prices across years would be confusing, because both prices and quantities change at the same time.

4. What is sampling and why is it used?

Sampling means studying a selected part of a population in order to learn about the whole population. It is used because studying everyone is often too expensive, too slow or impossible, for example in a national survey. A well-chosen sample can give results close to those of a full study, at a fraction of the cost and time. The key is that the sample must represent the population fairly, otherwise its conclusions will be misleading.

5. What makes a sample a good sample?

A good sample is representative, meaning that its important features match those of the population, and it is large enough to give stable results. Random selection helps, because it gives every member a fair chance of being chosen and reduces the researcher's bias. A sample chosen only from friends, or only from one area, is likely to be biased and should not be used to generalise. A good report also states how the sample was chosen and what its limits are.

Long Questions with Full Answers

1. Explain index numbers, with an example, and their uses.

Introduction: Comparing prices or production over time is difficult when many items change at once, and index numbers solve that problem with a single comparable figure. **Explanation:** An index number compares a current value with a base period value, with the base set to 100. A simple index compares one item, while a weighted index combines several items according to their importance. **Example, illustrative only:** If the price of an item was 50 units in the base year and 60 units now, its price index is 60 divided by 50, times 100, which equals 120. This means the price has risen by 20 percent since the base year. **Uses:** Index numbers measure inflation, compare living costs, adjust wages and help governments and businesses plan. **Conclusion:** By turning many changing prices into one clear figure, index numbers make economic change visible and comparable, provided the base period and weights are chosen honestly.

2. Explain sampling, its advantages and its risks, with an example.

Introduction: In most real studies it is impossible to examine every member of a population, so researchers study a sample and generalise with care. **Explanation:** Sampling saves time and money, allows more detailed study of the selected cases, and is sometimes the only option, as when testing destroys the product. Its main risk is bias: if the sample does not represent the population, its conclusions will be wrong, however carefully the calculations are done. Random sampling reduces this risk by giving every member a fair chance of selection. **Example:** To estimate the average marks of first-year students in a board, a researcher might randomly select students from many colleges, rather than only from one college or only from top students. The first method is likely to be representative, while the second would overstate the average. **Conclusion:** Sampling is powerful when it is random, large enough and honestly reported, but dangerous when it is convenient or biased.

MCQs with Answer Key

1. An index number with base 100 and value 120 means: A) A) A fall of 20% B) B) A rise of 20% C) C) No change D) D) A rise of 120% Answer: B
2. A weighted index gives: A) A) Equal weight to all items B) B) More weight to more important items C) C) No weight at all D) D) Weight only to prices Answer: B
3. Sampling is used mainly because: A) A) It is always perfect B) B) Studying everyone is costly or impossible C) C) It needs no data D) D) It avoids calculation Answer: B
4. Random sampling helps to: A) A) Increase bias B) B) Reduce bias and improve representation C) C) Remove all error D) D) Study only friends Answer: B
5. A biased sample is one that: A) A) Represents the population fairly B) B) Does not represent the population fairly C) C) Is very large D) D) Is random Answer: B