

Student Name

Mathematics Stage 5 Core

DATA ANALYSIS B

Book 1 Identify and describe numerical
datasets involving 2 variables

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OVERVIEW

SYLLABUS CONTENT

MA5-DAT-C-02 displays and interprets datasets involving bivariate data

Identify and describe numerical datasets involving 2 variables

- Distinguish between situations involving 1-variable and 2-variable (bivariate) data and explain when each is needed
- Explain the difference between variables that have an association and variables that have a causal relationship
- Identify and describe the independent variable and dependent variable in relationships with possible cause and effect

BIVARIATE DATA

- **Univariate data** counts the frequency of a single variable.
- **Bivariate data** explores relationships between two variables.
- The **independent variable** often causes changes in the **dependent variable**.

Example Identify independent and dependent variables.

Mr Ding wants to investigate whether there is a relationship between mathematics test scores and hours spent on Tik Tok a day. Identify the independent and dependent variables.

Independent: **Hours on Tik Tok.**

The independent variable is what we think might affect the other variable.

Dependent: **Mathematics test scores.**

We're examining how it might be affected by the independent variable

Identify the independent and dependent variables in each context.

a Cathy wants to investigate if there is a relationship between a person's age and their height.

Independent variable:

Dependent variable:

I: age, D: height

b Mika wants to investigate how the amount of sugar in a person's diet affects the size of their waistline.

Independent variable:

Dependent variable:

I: sugar, W: waistline

c Jelena is looking into the relationship between an NBL player's average points scored and their height.

Independent variable:

Dependent variable:

I: height, D: points

d Jeremy is investigating how fuel consumption is affected by the size of a car.

Independent variable:

Dependent variable:

I: size of car, D: fuel consumption

e Hugo is looking into the relationship between a student's height and the time taken to run 100 m.

Independent variable:

Dependent variable:

I: height, D: time

f Shirley is examining the relationship between exam marks and hours spent watching TV shows.

Independent variable:

Dependent variable:

I: hours on TV, D: exam marks

CORRELATION DOES NOT EQUAL CAUSATION

- **Correlation** is when two things change together in a pattern. If one thing goes up and the other usually goes up too (or down), they're correlated. It's like they're connected.
- Strong **correlation** between variables doesn't prove **causation** without randomised controlled trials (the type of experiments you do in science).
- Example: High social media use might link to shorter attention spans, but we can't say it causes them. People with shorter attention spans might just use social media more.
- Proving causation requires the **scientific method**.

Example Explain that correlation does not equal causation.

People in the United States spend more money during the colder months.
Does cold weather cause more spending?

Not likely. A better explanation is that the holiday season (Christmas and New Year's) is during the colder months, and that is what causes more spending.

When ice cream sales increase, shark attacks also increase.

Does this mean ice cream sales cause shark attacks?

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No, a more likely explanation is that hot weather causes more ice cream sales and more beach goers, which leads to more shark attacks.

- 1 Each pair of variables has a correlation. Which ones are likely to have a causal relationship?
- A. Temperature and ice cream sales
 - B. Ice cream sales and number of sunburns reported
 - C. Reading skills of children and shoe size
 - D. Number of books in a home and family income
 - E. Number of cashiers and average checkout time in a supermarket
 - F. Number of patients in a hospital emergency room and waiting time
 - G. Number of computers and number of TVs in a home
 - H. Loan interest rate and size of monthly repayments
 - I. Driving speed of a vehicle and time taken to arrive home
 - J. Maths test mark and English test mark
 - K. Number of storks and birth rate in a region
 - L. Proportion of smokers in a population and incidence of lung cancer

A, E, F, H, I, L