
MATHEMATICS APPLICATIONS
YEAR 12 UNIT 3

TEST 1
BIVARIATE DATA and SEQUENCES

2023



PART A
CALCULATOR FREE

TIME: 30 mins

MARKS: 31 marks

STUDENT'S NAME: _____

CIRCLE YOUR
TEACHER'S NAME: Mr Ismail Mrs Kalotay Ms Mack

 Mrs Smirke Mrs Scoles Ms Tsen

Mrs Scoles
TUTOR GROUP

Questions 1-3 are MULTIPLE CHOICE. Circle the correct answer.

[3 marks]

Question 1

In a scientific experiment, the explanatory variable was the amount of sleep (in hours) a new mother got per night during the first month following the birth of her baby.

The response variable would most likely have been:

- A the blood pressure of the baby
- B the amount of time (in hrs) spent by the mother reading
- C the mother's reaction time (in seconds) to a certain stimulus
- D the level of alertness of the baby

Question 2

Alen works as a personal trainer at the local gym. He wishes to analyse the relationship between the number of weekly training sessions and the weekly weight loss of his clients.

Which one of the following statements is correct?

- A When graphed, the number of weekly training sessions should be shown on the vertical axis as it is the response variable
- B When graphed, the weekly weight loss should be shown on the vertical axis as it is the explanatory variable
- C When graphed, the weekly weight loss should be shown on the horizontal axis as it is the response variable
- D When graphed, the number of weekly training sessions should be shown on the horizontal axis as it is the explanatory variable

Question 3

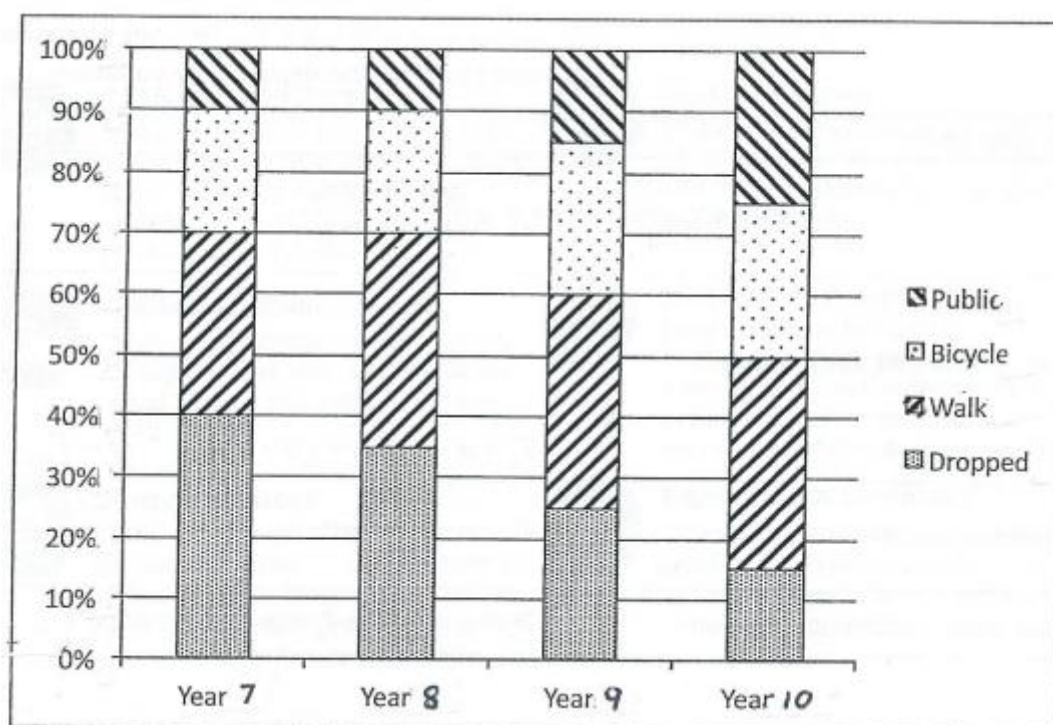
A pediatrician (doctor who provides medical care for children) investigated the relationship between the amount of time children aged two to five spend outdoors and the annual number of visits to his clinic. Which one of the following statements is not true?

- A It is impossible to identify the explanatory variable in this case
- B The annual number of visits to the pediatric clinic is the response variable
- C When graphed the amount of time spent outdoors should be shown on the horizontal axis
- D The annual number of visits to the pediatric clinic should be shown on the vertical axis

Question 4

[4 marks]

The Diagram below shows
the percentage of students in the listed school year groups
and their mode of travel to school.



Using the stacked 100% column graph above comment on whether there seems to be any association(s) between the variables, explaining your reasons and describe the association(s).

Question 5

[1 mark]

A study shows a strong correlation between house size and the life expectancy of the home owners. Suggest an underlying factor (confounding/lurking variable) that is more likely to be influencing the observed correlation.

Question 6

[2 marks]

A set of data giving the number of police traffic patrols on duty and the number of fatalities for the region was recorded and a correlation coefficient of $r = -0.8$ was found. Calculate the coefficient of determination and interpret its value in context.

Question 7

[3 marks]

The first few terms of three sequences are plotted on the graphs a), b) and c) below. Complete the table to match one of the six recursive rules to each graph.

(i) $T_{n+1} = T_n + 2, \quad T_1 = 1$

(iii) $T_{n+1} = T_n + 3, \quad T_1 = 1$

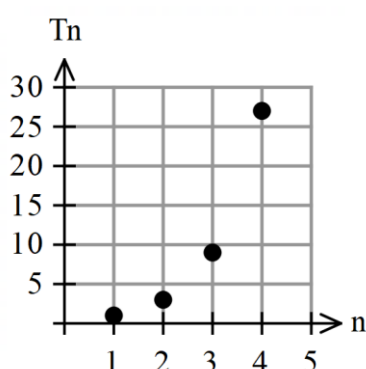
(v) $T_{n+1} = T_n - 4, \quad T_1 = 1$

(ii) $T_{n+1} = 2T_n, \quad T_1 = 1$

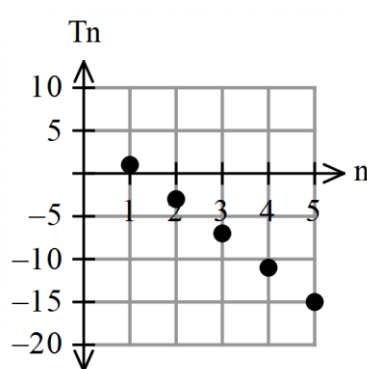
(iv) $T_{n+1} = 3T_n, \quad T_1 = 1$

(vi) $T_{n+1} = -4T_n, \quad T_1 = 1$

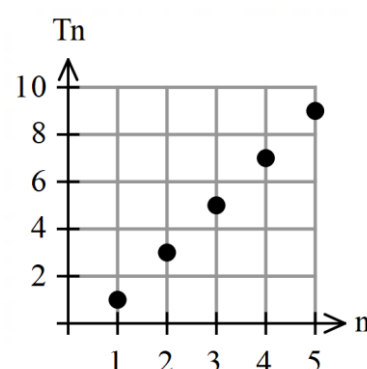
a)



b)



c)



Graph	a)	b)	c)
Recursive rule			

Question 8

[5 marks]

Determine the first four terms for the following sequences:

a) $T_n = 5T_{n-1} + 2, \quad T_1 = 1$ [2]

b) $T_{n+1} = 2T_n - 5, \quad T_3 = -10$ [3]

Question 9

[7 marks]

Given $T_2 = 6$ and $T_4 = 54$

Write the recursive rule and determine the third term for each of the following if:

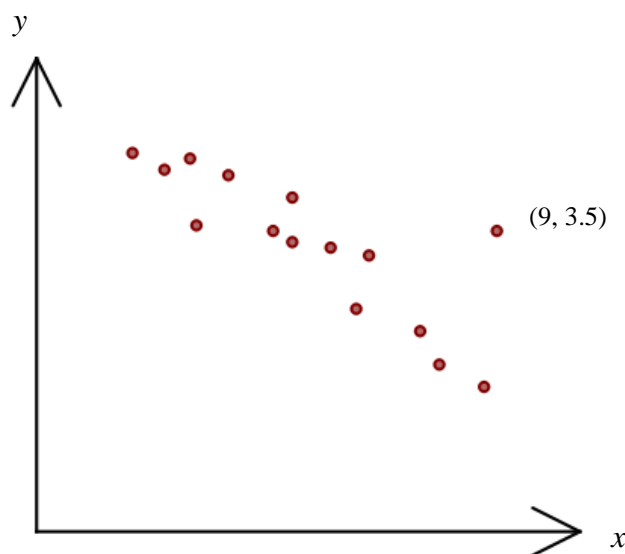
a) The given terms are from an Arithmetic sequence. [3]

b) The given terms are from a Geometric sequence. [4]

Question 10

[6 marks]

The following graph relates x and y .



The least squares regression line of y on x was fitted to the data.

The equation is given as: $\hat{y} = 11.5 - 1.2x$ and the coefficient of determination = 0.49

- a) Determine the correlation coefficient. [2]
- b) The point (9, 3.5) is referred to as an _____ [1]
- c) If the point (9, 3.5) was removed, state the effect this would have on the value of your response to part (a). Give a reason for your answer. [2]
- d) If $\bar{x} = 7$, calculate the value of \bar{y} . [1]