Scatter Graphs

03 October 2019 13:58

They show bivariate data – two types of data

Paired data

Eg Doctor height and weight BMI

Scatter graph

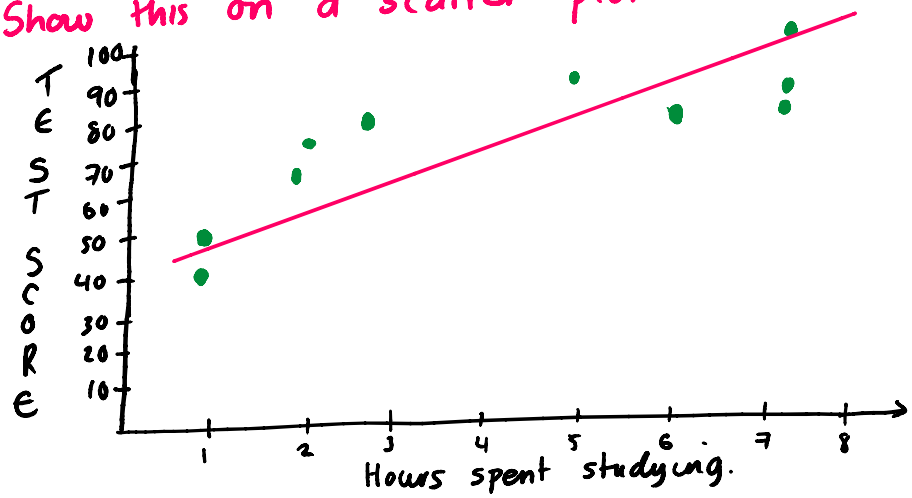
The x axis (horizontal) represents one type of data

The y axis (vertical) represents the other type of data

Eg1) A teacher recorded the no. of hours students spent studying and the marks they achieved out of 100 in a test.

Hours spent studying	3	5	2	6	7	1	2	7	1	7
Test score	80	90	75	80	90	50	65	85	40	100

Show this on a scatter plot



Moderate Correlation

Correlation : describes the strength and direction of the Linear relationship between the two types of data

The closer the scatter graph data is to a straight line, the stronger the correlation.

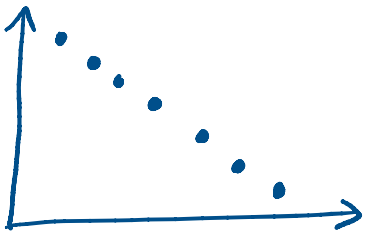
The correlation coefficient r and this ranges from $-1 \leq r \leq 1$ $\{r: -1, 0, +1\}$ decimals between

The correlation coefficient

from $-1 \leq r \leq 1$ $\{r: -1, 0, +1\}$ decimals between -1 and +1

Scatter graphs and correlation coefficient

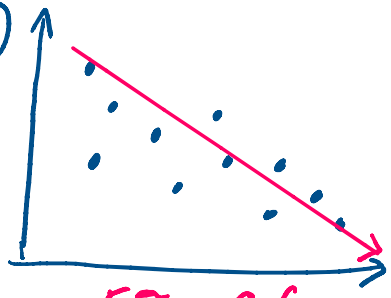
1



$r = -1$

Strong negative

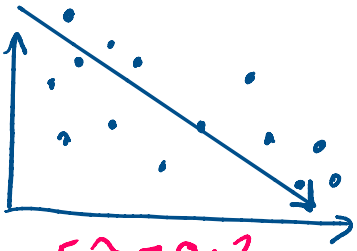
2



$r \approx -0.6$

Moderate correlation. negative

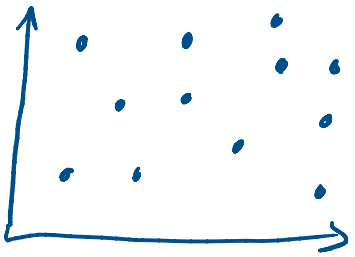
3



$r \approx -0.3$

Weak negative correlation

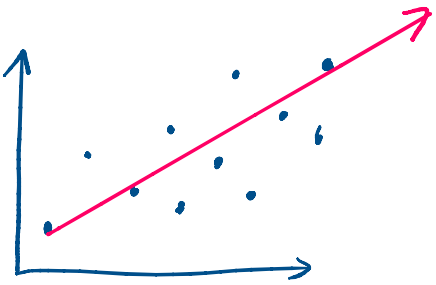
4



$r = 0$

no correlation

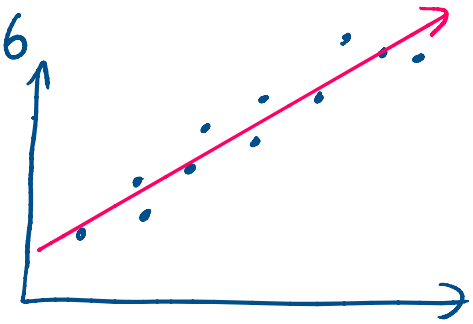
5



$r \approx .4$

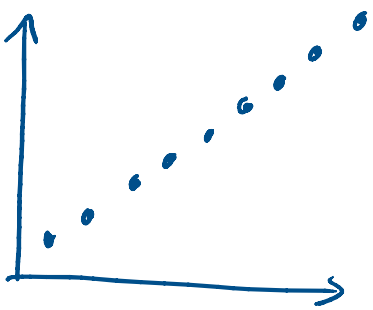
Weak correlation positive

6



$r \approx .8$

Moderate Positive correlation



$r = 1$

r = 1

Strong positive correlation.

T&T3 13.5

T&T3 13.5.pptx

PROJECT MATHS

Text & Tests

Leaving 3 Certificate

Representing Data

chapter 13

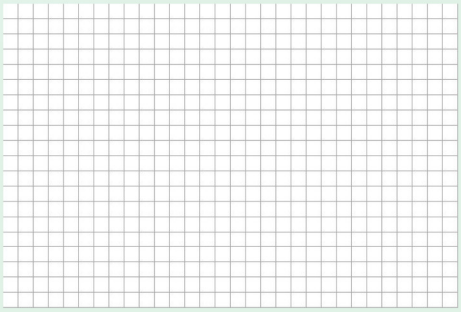
Section 13.5 Scatter graphs

Example 1

On a journey between two towns, Andrew wrote down the number of kilometres that were left on the journey. He did this every ten minutes.
The table below shows the data he recorded

Time (mins)	10	20	30	40	50	60	70	80	90	100
Kilometres to go	72	60	50	42	40	32	25	18	10	0

Draw a scatter graph to illustrate this data.



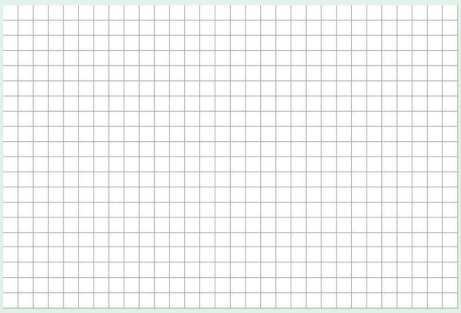
376

Example 2

The table shows the weights and heights of 12 people.

Height (cm)	150	152	155	158	158	160	163	165	170	175	178	180
Weight (kg)	57	62	63	64	58	62	65	66	65	70	66	67

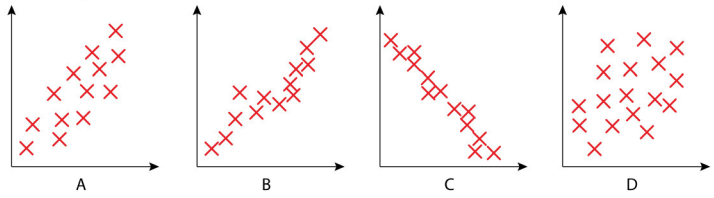
(i) Draw a scatter graph to show this data.
(ii) Describe the strength and type of correlation between these heights and weights.



378

Exercise 13.5

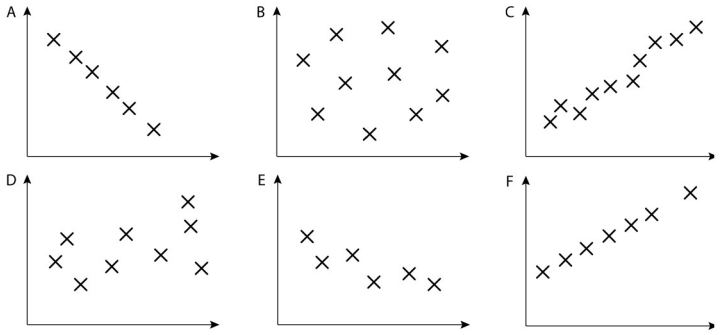
1. Four scatter graphs are shown below.



(i) Which of these graphs shows the strongest positive correlation?
(ii) Which of these graphs shows negative correlation?
(iii) Which of these graphs shows the weakest correlation?

Exercise 13.5

2. Here are sketches of six scatter graphs:



Which diagram(s) show
(i) positive correlation
(ii) negative correlation
(iii) no correlation
(iv) strong negative correlation?
Describe the correlation in graph F.

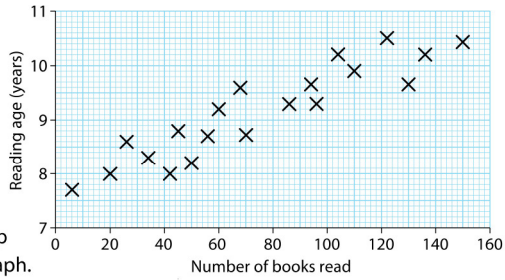
Exercise 13.5

3. This scatter graph shows the number of books read by some children and the reading ages of these children.

(i) How many children have read more than 100 books?

(ii) One of these children has read 50 books. What is the reading age of this child?

(iii) Describe the relationship shown by the scatter graph.

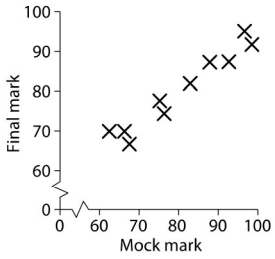


Exercise 13.5

4. The examination marks of a sample number of students in both their mock and final examinations are shown in the given scatter graph.

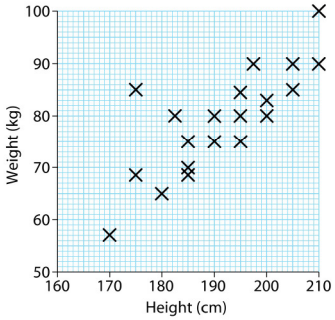
(i) Describe the correlation shown in the graph.

(ii) What can you say about the relationship between the mock and final marks of the students?



Exercise 13.5

5. This scatter diagram shows the weights, in kg, and the heights, in cm, of 20 male members of a basketball club.



(i) Write down the weight of the heaviest member.
(ii) Write down the height of the shortest member.
(iii) One member is particularly heavy for his height.
Write down the height and weight of this member.
(iv) Describe the correlation shown in this graph.

Exercise 13.5

6. Ten children are given two tests to complete. One test involves some number puzzles. The other test involves spotting mistakes in pictures.
The table shows the scores in the tests for these children.

Child	A	B	C	D	E	F	G	H	I	J
Number puzzle score	12	7	10	3	7	10	5	5	12	14
Picture puzzle score	3	12	7	16	10	5	14	12	5	1

(i) Draw a scatter graph to show this data.
(Put the number score on the horizontal axis.)
(ii) Describe the strength and type of correlation between these scores.
Does the type of correlation surprise you? Explain.

Exercise 13.5

7. Ben wants to buy a secondhand bike.
He records the age and price of the type he wants from a website.

Age (years)	6	3	2	4	6	1	4	8	2	7
Price (€)	60	180	240	120	100	280	160	40	200	50

(i) Draw a scatter graph of this information on graph paper, putting age on the horizontal axis.

(ii) What does the scatter graph tell you about the connection between the ages of these bikes and their prices?

(iii) Describe, in two words, the correlation that exists.

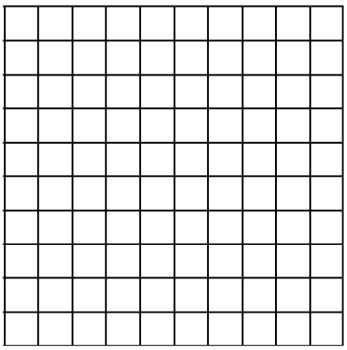
Exercise 13.5

8. The table shows the marks of 15 students taking Paper 1 and Paper 2 of a maths exam.
Both papers were marked out of 40.

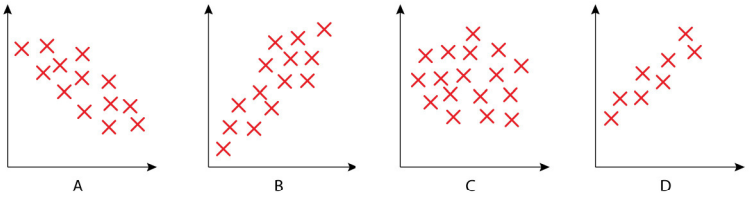
Paper 1	36	34	23	24	30	40	25	35	20	15	35	34	23	35	27
Paper 2	39	36	27	20	33	35	27	32	28	20	37	35	25	33	30

(i) Draw a scatter diagram to show this information.

(ii) Describe the correlation shown in the scatter diagram.



Exercise 13.5

9. 

Four scatter graphs are shown above. For each of the following situations, choose the most appropriate of the scatter graphs. Explain your choice in each case.

(i) Boys' heights and their shoe sizes.

(ii) Men's weights and the times taken by them to complete a crossword puzzle.

(iii) Ages of cars and their selling prices.

(iv) Marks achieved in Maths Paper 1 and Maths Paper 2.

Exercise 13.5

10. Describe the type of correlation you would expect between:

(i) the age of a boat and its secondhand selling price,

(ii) the heights of children and their ages,

(iii) the shoe sizes of children and the distances they travel to school,

(iv) time spent watching television and time spent studying,

(v) the number of cars on the road and the number of accidents.

Answers 13.5

1. (i) B (ii) C (iii) D

2. (i) C and F (ii) A and E (iii) B and D
(iv) A; Perfect positive correlation

3. (i) 6 (ii) 8.2 years
(iii) Weak positive

4. (i) Strong positive
(ii) Strong or close relationship

5. (i) 100 kg (ii) 170 cm
(iii) 175 cm, 85 kg (iv) Weak positive

6. (ii) Strong negative correlation; Yes, as you would expect positive correlation

7. (ii) Older bikes are cheaper
(iii) Strong negative

8. (ii) Strong positive correlation

9. (i) B (ii) C (iii) A (iv) D

10. (i) Strong negative (ii) Strong positive
(iii) No correlation (iv) Strong negative
(v) Strong positive