13. Statistics

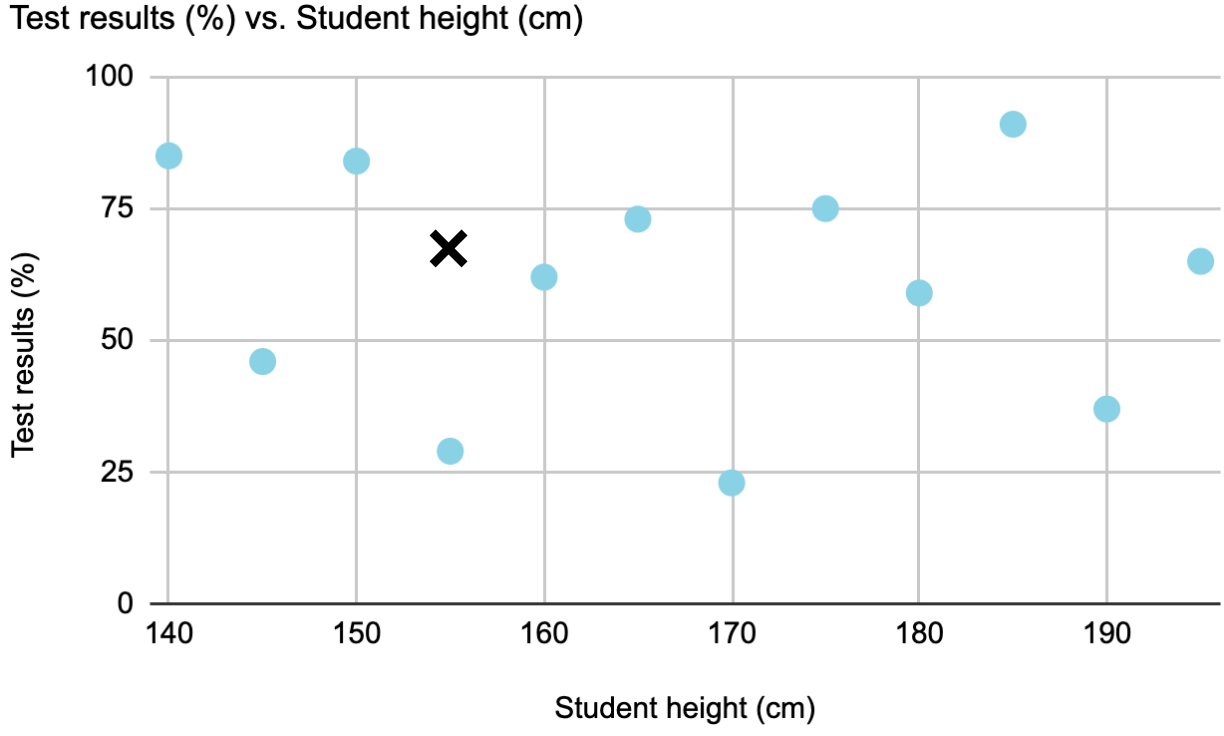
Using and interpreting scatter graphs

Interpreting statistics is an important skill that helps us to understand information and critically evaluate the statistics that we are presented with.

Many people confuse correlation with causation, which can easily lead to misunderstandings. There is almost certainly a correlation between the rise of pizza consumption and rising sea levels but does this mean that pizza is causing global warming? Not necessarily.

In the real world, there are limitless potential variables that can influence results. For example, a study that investigates the impact of sleep on physical health but does not control for the diets or exercise routines of the study participants may draw unexpected conclusions.

1. A teacher recorded the height of each of her students and their recent maths test results.



a. Describe the correlation between height and maths ability.

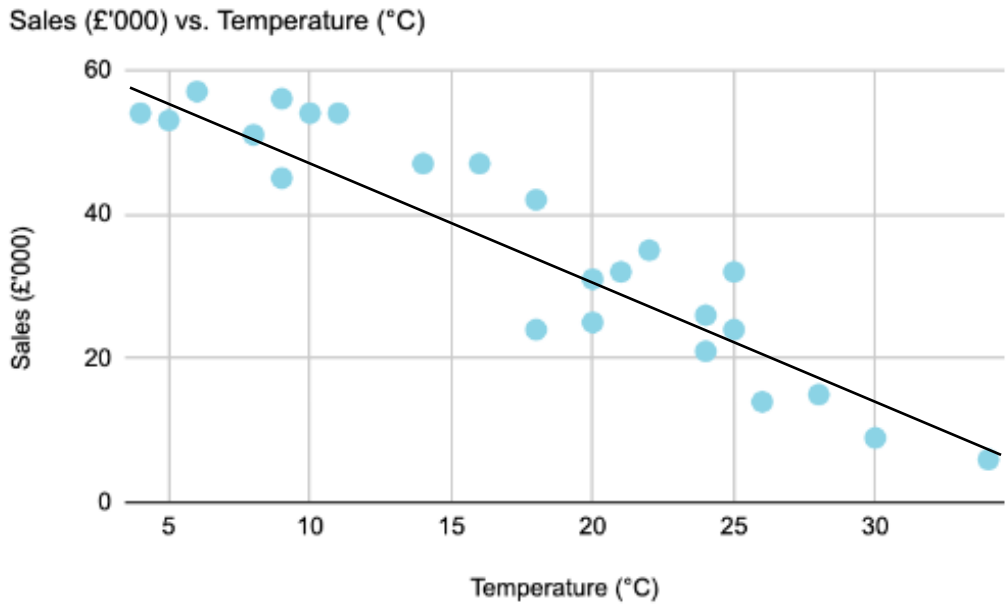
There is no correlation.

b. A student who was absent on the day of the test has just caught up and scored 65%. The student is 155cm tall. Plot this data point on the graph.

c. Rowan, who is 175cm tall, is new to the class and is due to take the maths test this afternoon. Ben predicts that Rowan will score 75% on the test. Comment on Ben's prediction.

Ben's prediction is not justified as the graph shows no correlation between height and maths ability.

2. A large online store that sells specialist sports clothing recorded the following daily sales data throughout the year.



a. Describe the correlation between temperature and sales for the online store.

A strong negative correlation: the lower the temperature, the higher the amount of sales.

b. What can you deduce about the clothes that the shop might sell based on the graph?

As sales increase during lower temperatures, the shop is likely to sell winter sports clothing such as ski wear.

c. Draw an approximate line of best fit on the graph.

d. If the store records £15,000 of sales in a day, what time of the year do you think it might be and why?

Summer because the temperature would likely be in the mid to high 20s.

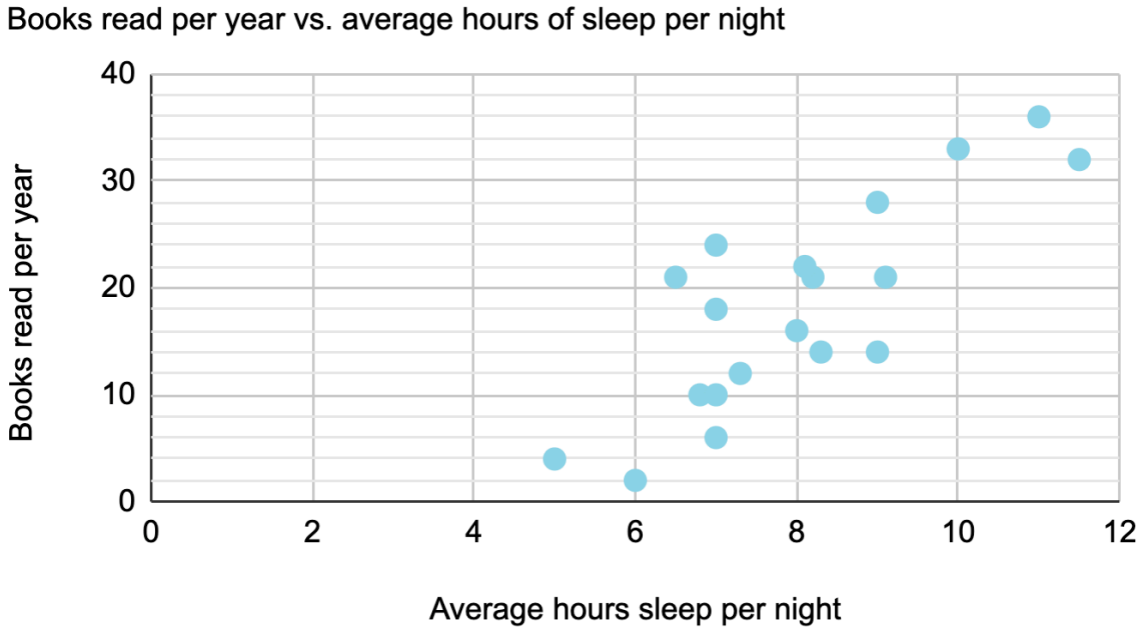
e. If the weather forecast predicts it will be 12.5 degrees Celsius tomorrow, what do you expect the store's sales revenue to be tomorrow?

Approximately £45,000. Students will have some variation in their answers depending on the positioning of their line of best fit.

3. A research group is studying the relationship between reading and sleep. Participants in the study recorded the below data over the course of a year.

a. Plot the following data as a scatter graph.

Average hours sleep per night	11.5	9	8	5	7.3	6.8	9	8.2	7	6.5	9.1	10	11	6	7	7	8.3	7	8.1
Books read per year	32	28	16	4	12	10	14	21	24	21	21	33	36	2	6	10	14	18	22



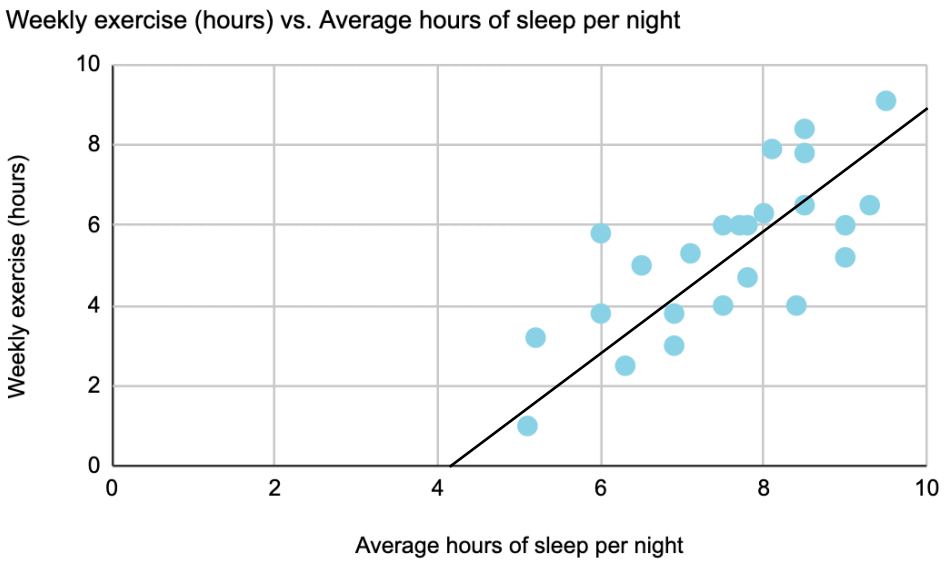
b. Describe the relationship between how many books per year someone reads and how many hours sleep they typically get.

There is a positive correlation, people who read more books get more sleep than those who read fewer books.

c. A researcher concludes that reading clearly made participants sleep more, and so reading should be suggested as a treatment for those who struggle to sleep. Comment on the validity of this researcher's statement.

Although there is a correlation between reading and sleep, this does not prove causation so this is not a conclusion that this researcher can draw.

4. A class recorded their weekly activities as part of an assignment.



a. Describe the correlation between sleep and exercise for the class.

There is a positive correlation. Students who exercise more also tend to sleep more.

b. Draw an approximate line of best fit on the graph.

c. For students who sleep on average 7.5 hours per night, how many hours of exercise would you expect they do?

Approximately 5.5 hours of exercise.

d. Explain whether your line of best fit be appropriate to estimate how much sleep a professional athlete gets who trains for 30 hours a week?

The line of best fit cannot be used in this situation as the athlete would be an outlier in this particular data set.