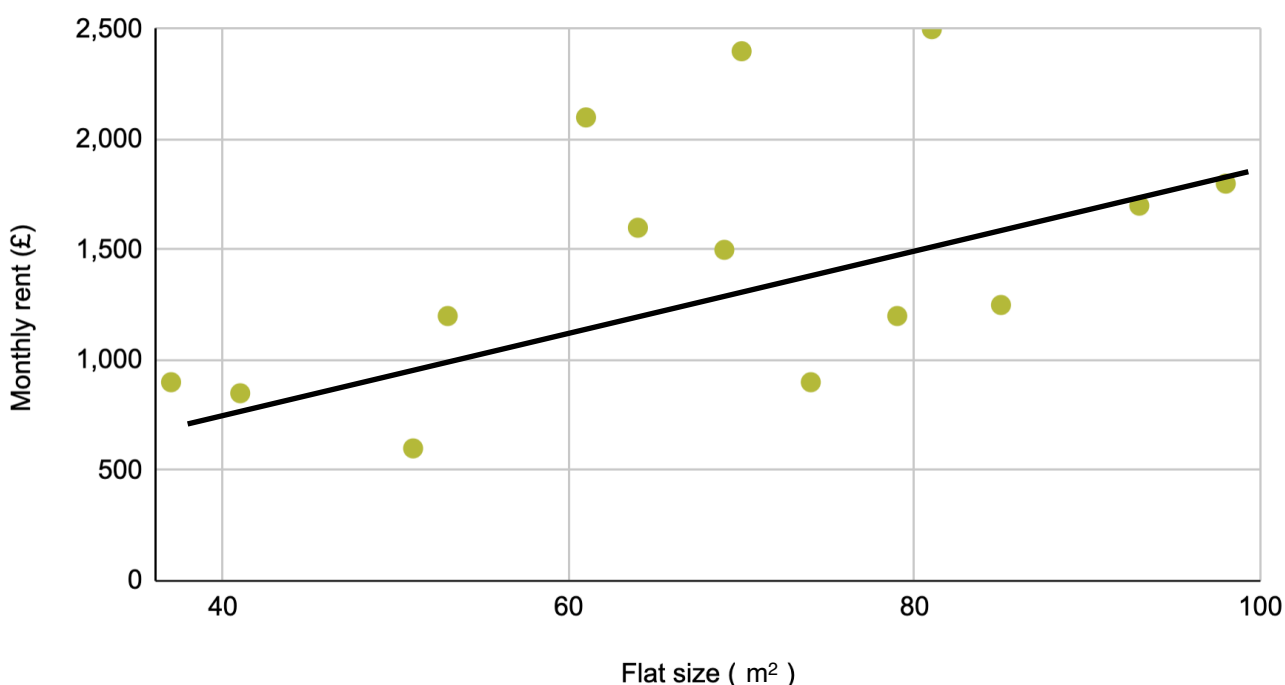


## 30. Statistics

Using scatter graphs to assess cost of living pressures.

You are completing an internship with your local council. During the internship, you have been researching the impact of the increased cost of living on people in your area. You have been presented with the results of various surveys that your department has carried out and have now been asked to analyse the data.

### Monthly rent (£) vs. Flat size ( m<sup>2</sup> )



The above graph shows the monthly rent of different sized flats. The data was taken by randomly selecting flats in various UK cities.

1. What type of correlation does the graph show?

A strong positive correlation between rent price and size of flat.

2. Describe the relationship between monthly rent and flat size.

As flat size increases, so does price.

3. Draw a line of best fit on the graph and use it to estimate the following data points:

a. The monthly rent of a 57m<sup>2</sup> flat.

£1,100 - 1,400 (answers may vary based on position of student's line of best fit)

b. The size of a flat with rent of £800 per month.

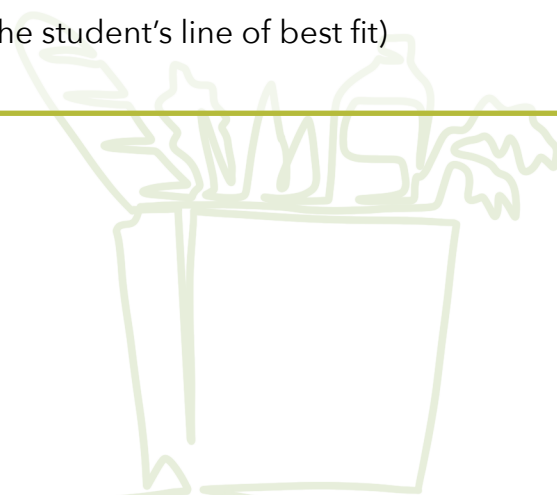
50 - 55m<sup>2</sup> (answers may vary based on the student's line of best fit)

c. The size of a flat with rent of £1,100 per month.

60 - 65m<sup>2</sup> (answers may vary based on the student's line of best fit)

d. The monthly rent of a 85m<sup>2</sup> flat.

£1,500 - £1,800 (answers may vary based on the student's line of best fit)



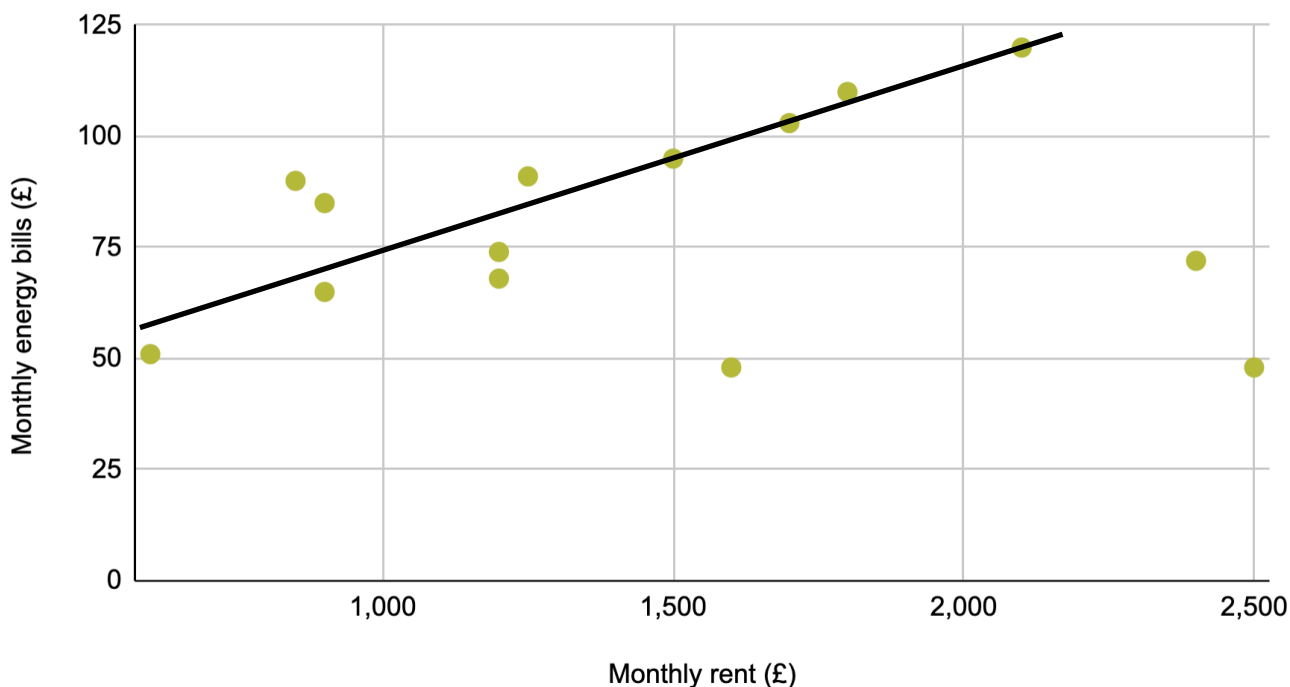
4. A classmate draws the following conclusion: "The size of the flat determines its monthly rent. If the flat is bigger, the rent will be higher." To what extent do you agree with your classmate?

The graph shows a relatively proportional relationship between flat size and rent however not all cases show that a bigger flat means higher rent. Critically, correlation does not mean causation.

5. What other factors other than flat size might impact a flat's monthly rent?

Factors such as location, access to parking, proximity to good schools or places of work, and how the flat looks will likely affect the price of the flat.

### Monthly energy bills (£) vs. Monthly rent (£)



The above graph shows the results from a survey in your city that asked people how much they pay in rent each month and how much their monthly heating bills are.

6. What type of correlation does this graph show?

A weak positive correlation between rent price and energy bills.

7. Describe the relationship between monthly rent and the amount spent on energy bills. What do you think the cause of this relationship might be?

As monthly rent increases, energy bills tend to increase. Properties with higher rents may be larger and therefore could require more energy to heat and may have more electrical appliances in use.

8. Draw a line of best fit on the graph. Using your line of best fit, estimate the following data points:

a. Monthly heating bills in a flat that costs £2,250/month to rent.

£110 - 125 (answers may vary based on the student's line of best fit)

b. Monthly rent of a home with heating bills of £60/month.

£1,000 - 1,250 (answers may vary based on the student's line of best fit)

c. Monthly heating bills in a flat that costs £1,750/month to rent.

£100 - £110 (answers may vary based on the student's line of best fit)

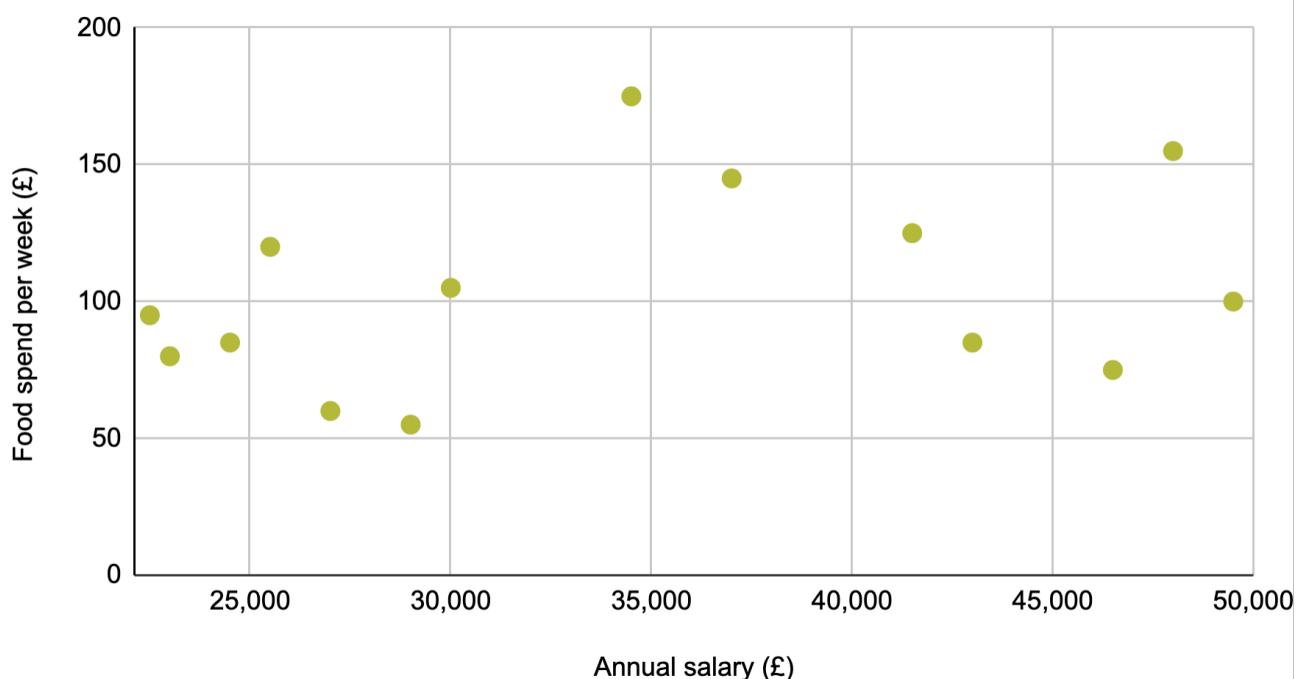
d. Monthly rent of a home with heating bills of £110/month.

£1,750 - £2,000 (answers may vary based on the student's line of best fit)

9. What factors could influence the amount that a household spends on energy bills?

Any sensible answers. Examples include: the number of electrical appliances in the house and how often they are used, whether the household has a gas or electric boiler, and whether the home is well-insulated and therefore cheap to heat (and vice-versa).

### Food spend per week (£) vs. Annual salary (£)



People were surveyed on their way out of a local supermarket. Every tenth person who left the supermarket was asked to share how much they spend on food each week (including eating out and their food shops) and what their annual salary is. The results are plotted on the graph.

10. What type of correlation does the data show?

No correlation.

11. What sampling method was used?

Systematic sampling.

12. What biases could there be in this data given the method of data collection?

Depending on the supermarket chosen, customers may be of a similar demographic. They also presumably all live within a reasonable distance of the supermarket, which would also suggest demographic similarities. They are shopping in person rather than online, which may also not be fully representative.

13. If you were planning this piece of research, what would you hypothesise the relationship between food spend and salary is?

Any sensible answer is accepted. For example, the more you earn the more you are likely to spend on food.

14. Suggest three other methods of sampling that you could use to conduct this research and recommend the method that you feel is best suited to produce a reliable conclusion?

Simple random sampling, stratified sampling, and cluster sampling.

Any sensible answer is accepted. For example, stratified sampling would work well as it aims to eliminate bias and would help to collect and compare spending patterns across many different demographics.