# Foundation Check In - 12.03c & 12.03d Analysing data: Bivariate Data

1. An experiment finds that using thicker insulation material in a loft reduces the amount of heat lost through the roof. Describe the type of correlation you might see on a graph of the results of the experiment.
2. A student thinks that people who are good at maths are also good at English. What type of correlation would support this hypothesis for a graph of maths test results against English test results for a group of students?

**For questions 3-6 use the graph below.**

1. The graph above shows weight and length of fish caught in a river survey.

Draw a line of best fit on the graph.

1. Estimate the expected weight of a fish which is 50 cm long.
2. Circle any point on the graph that may be considered an outlier.
3. The graph shows a positive correlation. Explain what this shows about the relationship between the weight and length of the fish.
4. Leon has kept a record of his best 100 m running times each year.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Age | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| Time (s) | 15.15 | 14.56 | 14.26 | 14.01 | 13.47 | 13.32 | 13.21 | 12.59 |

Does this data suggest he should be running 100 m races in less than 10 seconds by the time he is 22 years old? Explain your reasoning.

1. Gillian displays data collected from classmates, plotting their weekly pocket money against time spent playing computer games. She concludes that to get more pocket money she should spend more time playing computer games.

Is she correct? Explain your answer.

1. **For this question, use the graph used in questions 3-6.**

A rule states that any fish shorter than 70 cm must be returned to the river. An angler only has a scale to weigh the fish. How might he decide which fish to return to the lake?

1. A survey of 30 cyclists finds a strong negative correlation between “hours spent training” and “race times”. It also finds a strong positive correlation between “hours spent training” and “amount of money spent on cycling equipment”. What type of correlation might you expect to find between “race times” and “money spent on cycling equipment”?

**Extension**

Data from a survey is provided in the table.

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Height, cm | 188 | 169 | 150 | 145 | 162 | 183 | 174 | 155 | 172 | 164 | 176 | 159 |
| Shoe size | 45 | 44 | 41 | 40 | 42 | 46 | 44 | 43 | 43 | 41 | 43 | 48 |

One item of data does not appear to fit. Identify the item of data and say what might be done to ensure it does not affect conclusions drawn from an analysis of the data.

## Answers

1. Negative
2. Positive
3. kg
4. Correct point circled (60, 12.5)
5. “Longer fish weigh more” oe
6. Although a line of best fit extrapolates to 10 seconds at 22 years old there is no guarantee that he will continue to improve each year at the same rate.
7. The scatter diagram does show a correlation, but this does not imply a causal relationship (an increase in time playing computer games will not result in more pocket money).
8. Using the line of best fit, a 70 cm fish weighs around 7.5 kg, so return any fish that weigh less than 7.5 kg.
9. Negative correlation

**Extension**

Height 159 cm, shoe size 48 appears to not fit the data. Going back to the source data and checking that the data is correct is the best option where this is possible. Excluding the data item from any calculations would deal with the problem where it is not possible to check the source data.

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| **Assessment Objective** | **Qu.** | **Topic** | **R** | **A** | **G** |  | **Assessment Objective** | **Qu.** | **Topic** | **R** | **A** | **G** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| AO1 | 1 | Interpret correlation within the context of the variables |  |  |  |  | AO1 | 1 | Interpret correlation within the context of the variables |  |  |  |
| AO1 | 2 | Interpret correlation within the context of the variables |  |  |  |  | AO1 | 2 | Interpret correlation within the context of the variables |  |  |  |
| AO1 | 3 | Draw a line of best fit |  |  |  |  | AO1 | 3 | Draw a line of best fit |  |  |  |
| AO1 | 4 | Use a line of best fit to make interpolation predictions |  |  |  |  | AO1 | 4 | Use a line of best fit to make interpolation predictions |  |  |  |
| AO1 | 5 | Identify an outlier on a scatter graph |  |  |  |  | AO1 | 5 | Identify an outlier on a scatter graph |  |  |  |
| AO2 | 6 | Interpret correlation within the context of the variables |  |  |  |  | AO2 | 6 | Interpret correlation within the context of the variables |  |  |  |
| AO2 | 7 | Understand the limitations of extrapolation |  |  |  |  | AO2 | 7 | Understand the limitations of extrapolation |  |  |  |
| AO2 | 8 | Recognise that correlation does not imply causation |  |  |  |  | AO2 | 8 | Recognise that correlation does not imply causation |  |  |  |
| AO3 | 9 | Interpolate from data |  |  |  |  | AO3 | 9 | Interpolate from data |  |  |  |
| AO3 | 10 | Interpret correlation within the context of the variables |  |  |  |  | AO3 | 10 | Interpret correlation within the context of the variables |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
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