

Mathematics

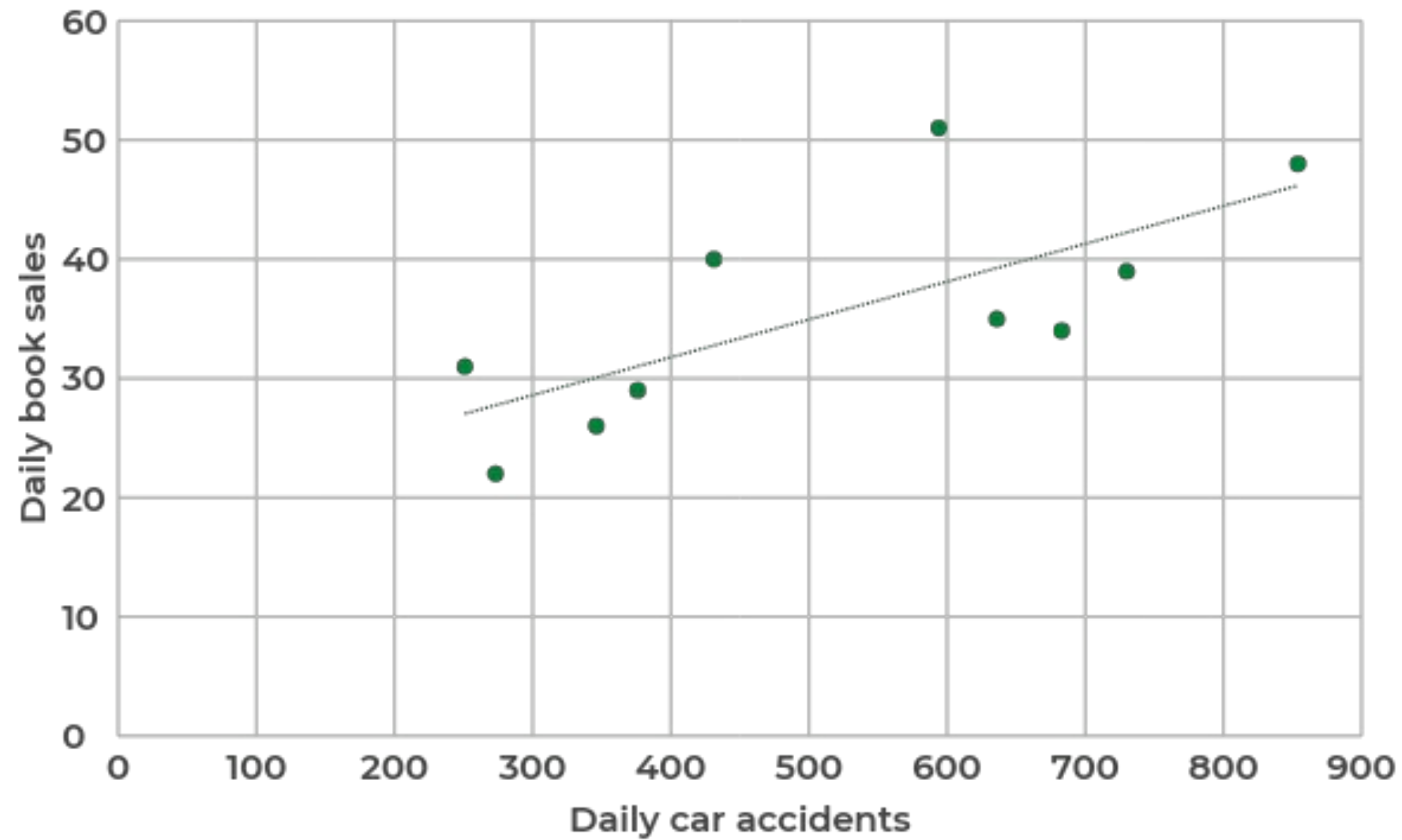
# Correlation and Causation

Mr Millar



# Try this

Do you agree with Zaki's statement? Why? Why not?



This graph shows that book sales cause car accidents



# Connect

## Correlation doesn't necessarily infer causation!

What explains the below correlations?

There is a positive correlation between lung cancer and smoking

There is a negative correlation between temperature and heating bills

There is a positive correlation between ice creams sold and number of barbeques



# Independent task

1. Decide if you think these variables are correlated. Explain any causation.

- Your last maths test score.
- How far you can run.

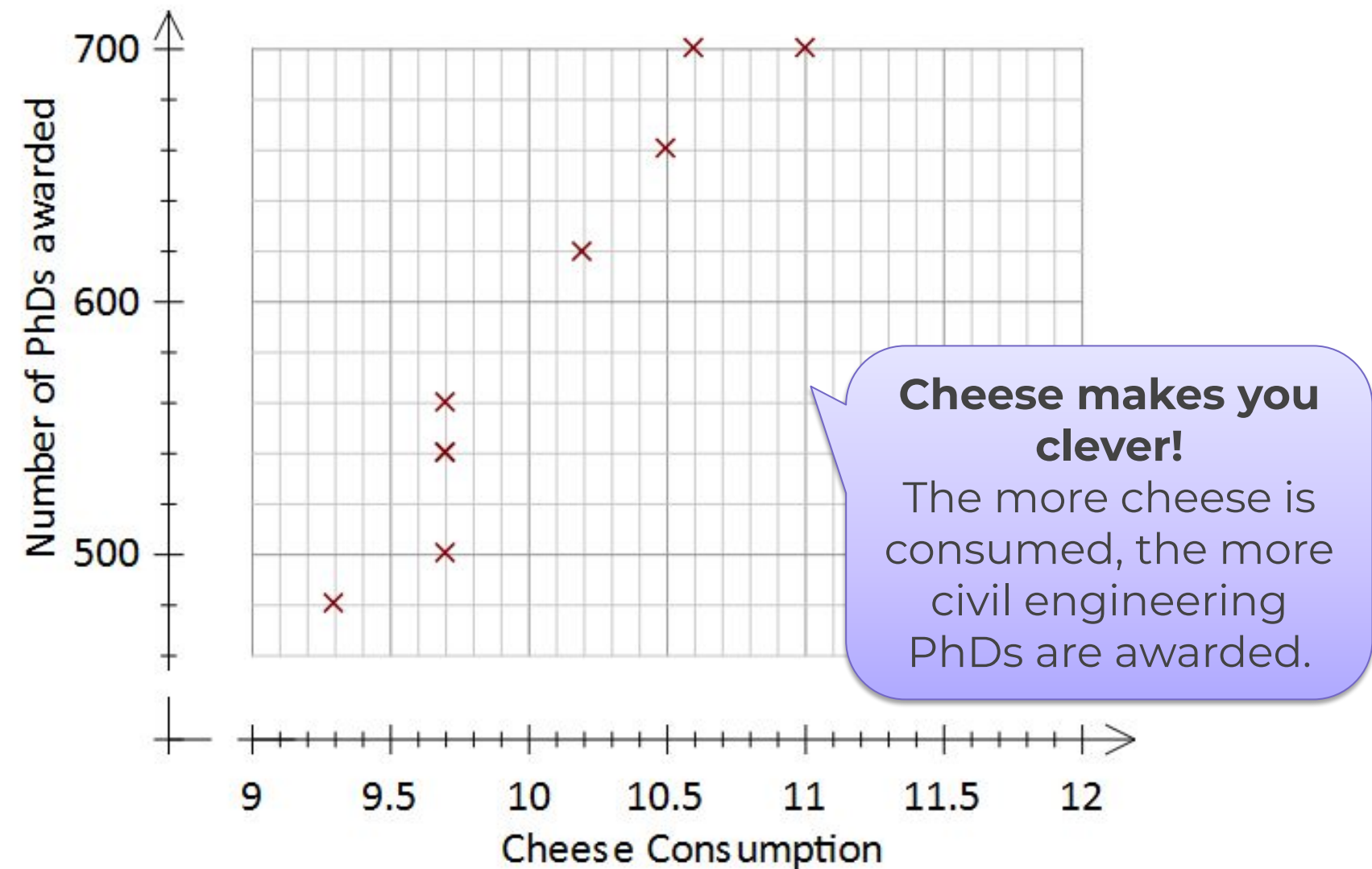
- Height of secondary students.
- Age of secondary students

- The age of a car.
- The price of a car.

- Number of ice creams sold
- Air temperature.

- The distance you live from school.
- The time it takes you to get to school.

2. Do you agree or disagree with this statement? Explain why.

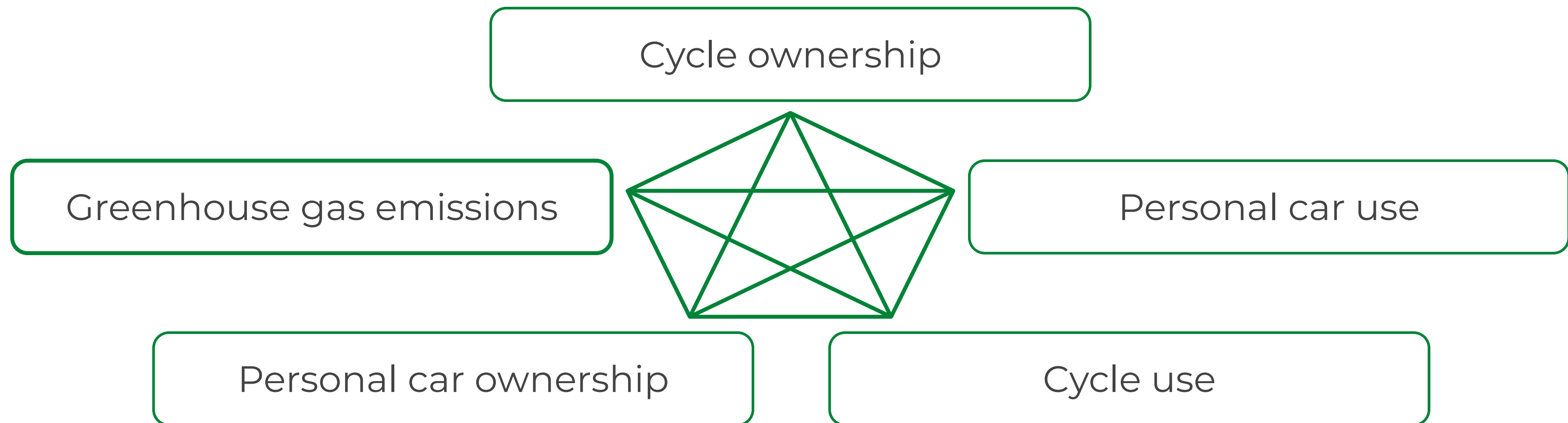


# Explore

Each variable below has been paired with the other variables.

What correlation would you expect between each pairing? Why?

Which do you think might have a causal link? Why?

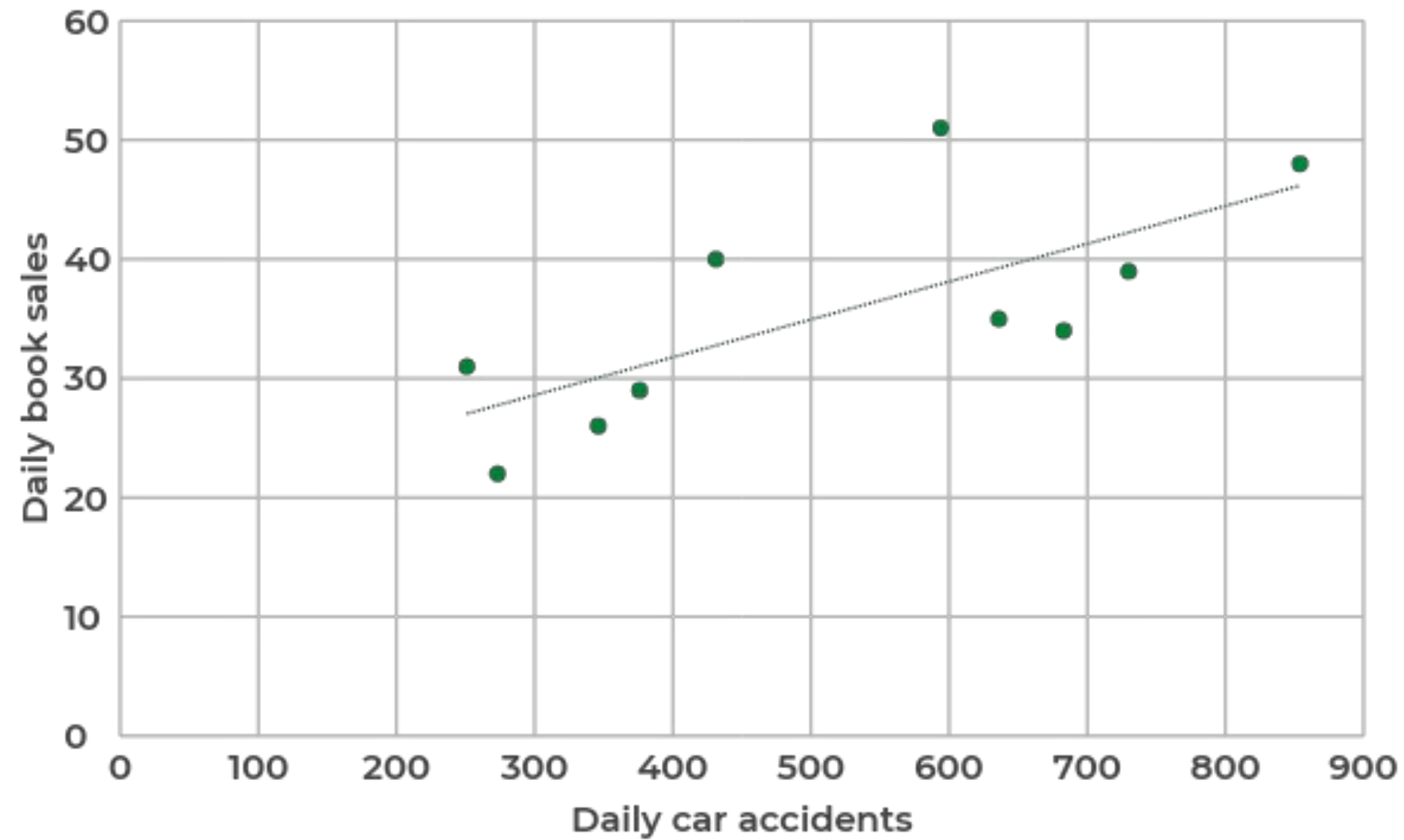


# Answers



# Try this

Do you agree with Zaki's statement? Why? Why not?



This graph shows that book sales cause car accidents



Just because there is a positive correlation, it doesn't mean that there is a causal relationship!



# Connect

## Correlation doesn't necessarily infer causation!

What explains the below correlations?

There is a positive correlation between lung cancer and smoking

Smoking makes lung cancer more likely

There is a negative correlation between temperature and heating bills

Higher temperature means that the heating is on for less, lowering the heating bills.

There is a positive correlation between ice creams sold and number of barbeques

No causal relationship between the two! Positive correlation due to the fact that warmer weather causes both!





# Independent task

1. Decide if you think these variables are correlated. Explain any causation.

- Your last maths test score.
- How far you can run.

No correlation

- The age of a car.
- The price of a car.

Negative. Higher age causes lower price

- Number of ice creams sold
- Air temperature.

Positive. Higher temperature causes more ice creams sold

- Height of secondary students.
- Age of secondary students

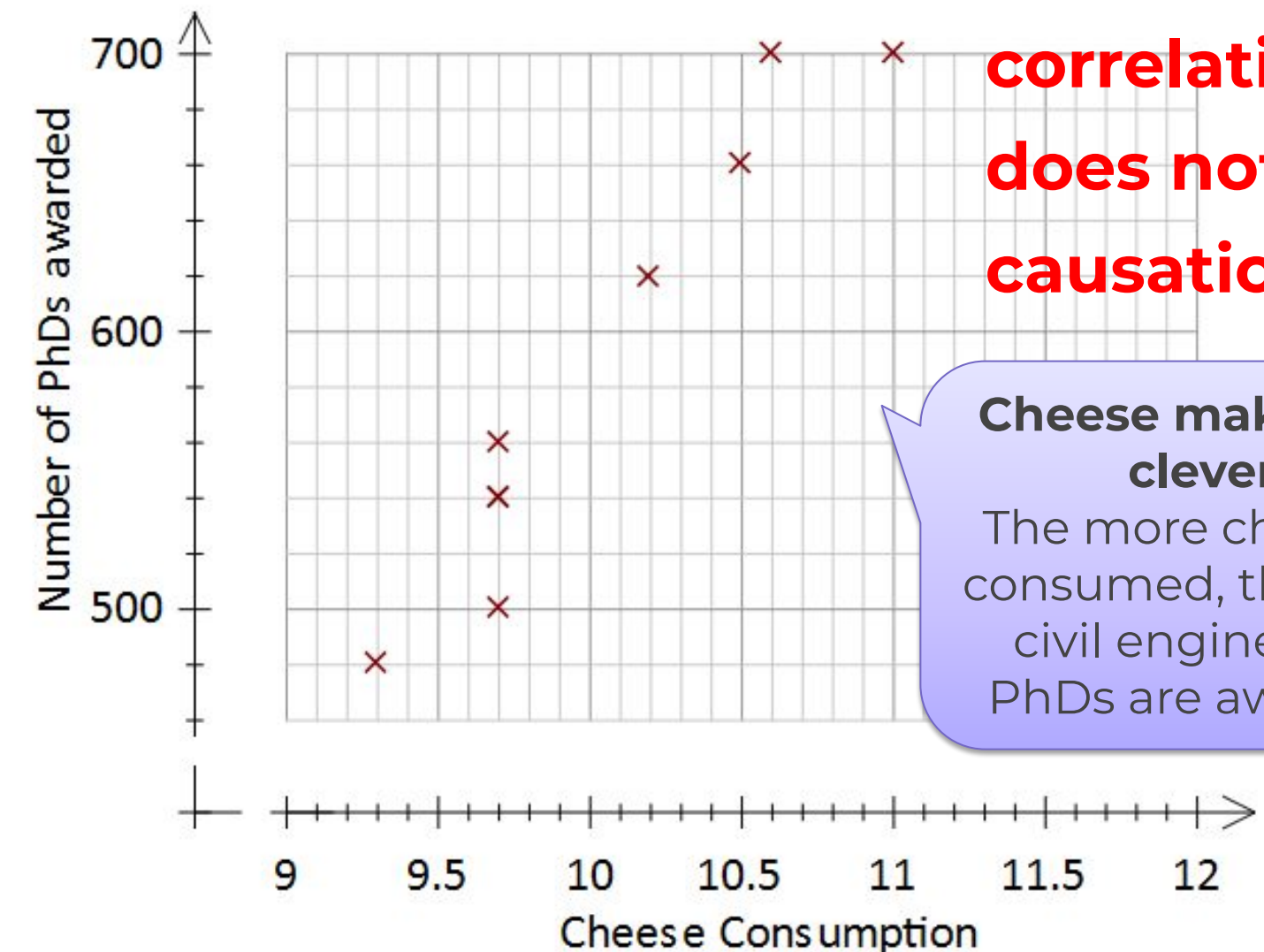
Positive. Higher age causes higher height

- The distance you live from school.
- The time it takes you to get to school.

Positive. Greater distance causes longer time

2. Do you agree or disagree with this statement? Explain why.

**Disagree:**  
**correlation**  
**does not infer**  
**causation!**



**Cheese makes you clever!**  
The more cheese is consumed, the more civil engineering PhDs are awarded.



# Explore

Each variable below has been paired with the other variables.

What correlation would you expect between each pairing? Why?

Which do you think might have a causal link? Why?

Eg Higher car ownership leads to higher personal car use, which leads to higher greenhouse emissions

Eg Higher cycle ownership leads to higher cycle use, which leads to lower personal car use, which leads to lower greenhouse emissions

