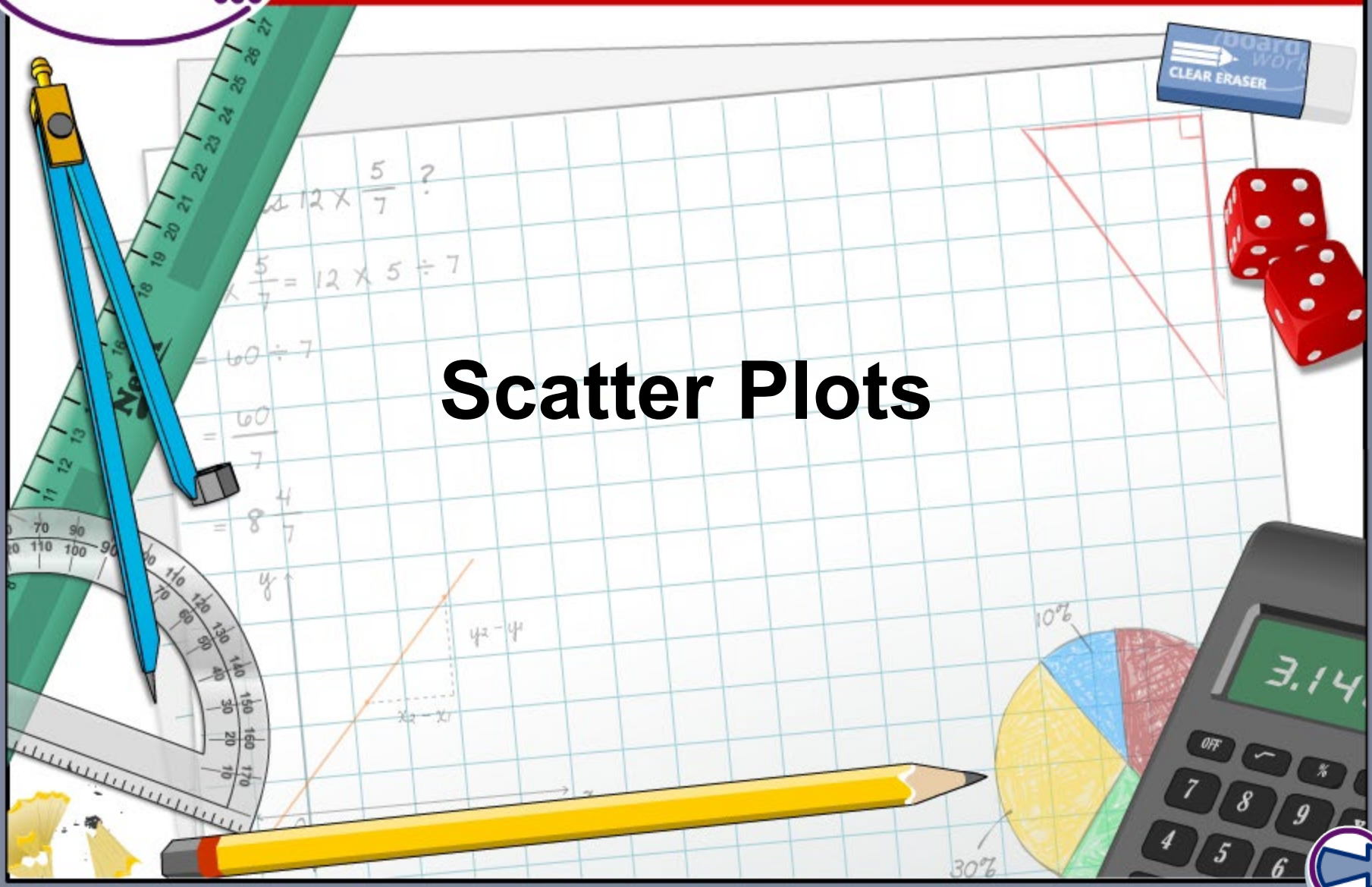


Scatter Plots

Information

Common core icons

This icon indicates a slide where the Standards for Mathematical Practice are being developed. Details of these are given in the Notes field.

Slides containing examples of mathematical modeling are marked with this stamp.

This icon indicates an opportunity for discussion or group work.

The **Standards for Mathematical Practice** outlined in the Common Core State Standards for Mathematics describe varieties of expertise that mathematics educators at all levels should seek to develop in their students.

These are:

1) Make sense of problems and persevere in solving them.

2) Reason abstractly and quantitatively.

3) Construct viable arguments and critique the reasoning of others.

4) Model with mathematics.

5) Use appropriate tools strategically.

6) Attend to precision.

7) Look for and make use of structure.

8) Look for and express regularity in repeated reasoning.

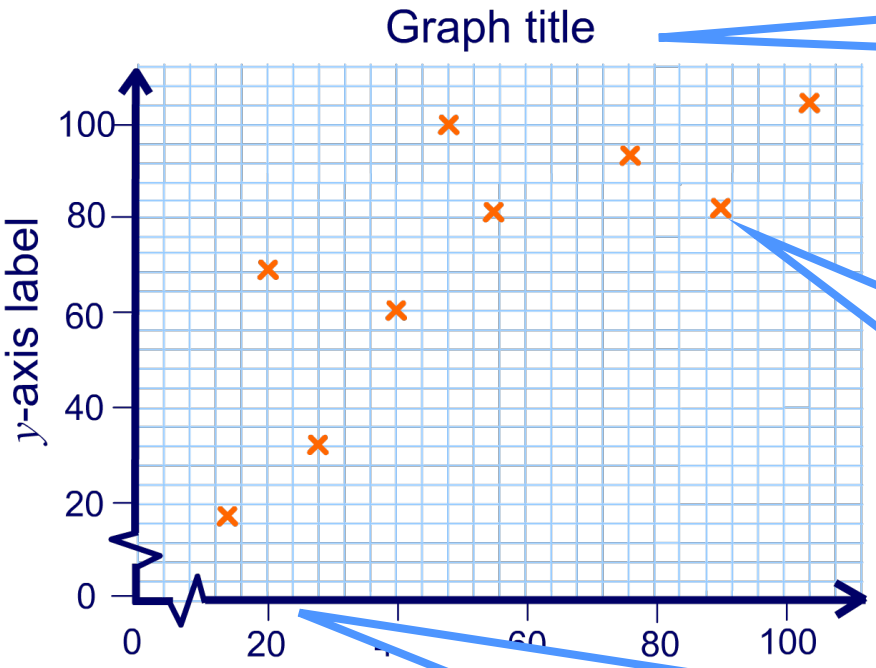
This icon indicates that the slide contains activities created in Flash. These activities are not editable.

This icon indicates teacher's notes in the Notes field.

Drawing a scatter plot

A **scatter plot** can be drawn to show the relationship between two variables.

When drawing a scatter plot:



give the graph a title

draw a small cross on the graph for each data pair

draw an x-axis and a y-axis, both with appropriate scales and labels

Scatter plots and correlation

We can use scatter plots to find out if there is any relationship, or **correlation**, between two sets of data.

For example:

- Do tall people weigh more than short people?
- If there is more rain, will it be colder?
- If you study longer, will you get better grades?
- Do used cars get cheaper with age?
- Is more electricity used in cold weather?
- Are people with big heads better at math?

Plotting height and weight

MODELING

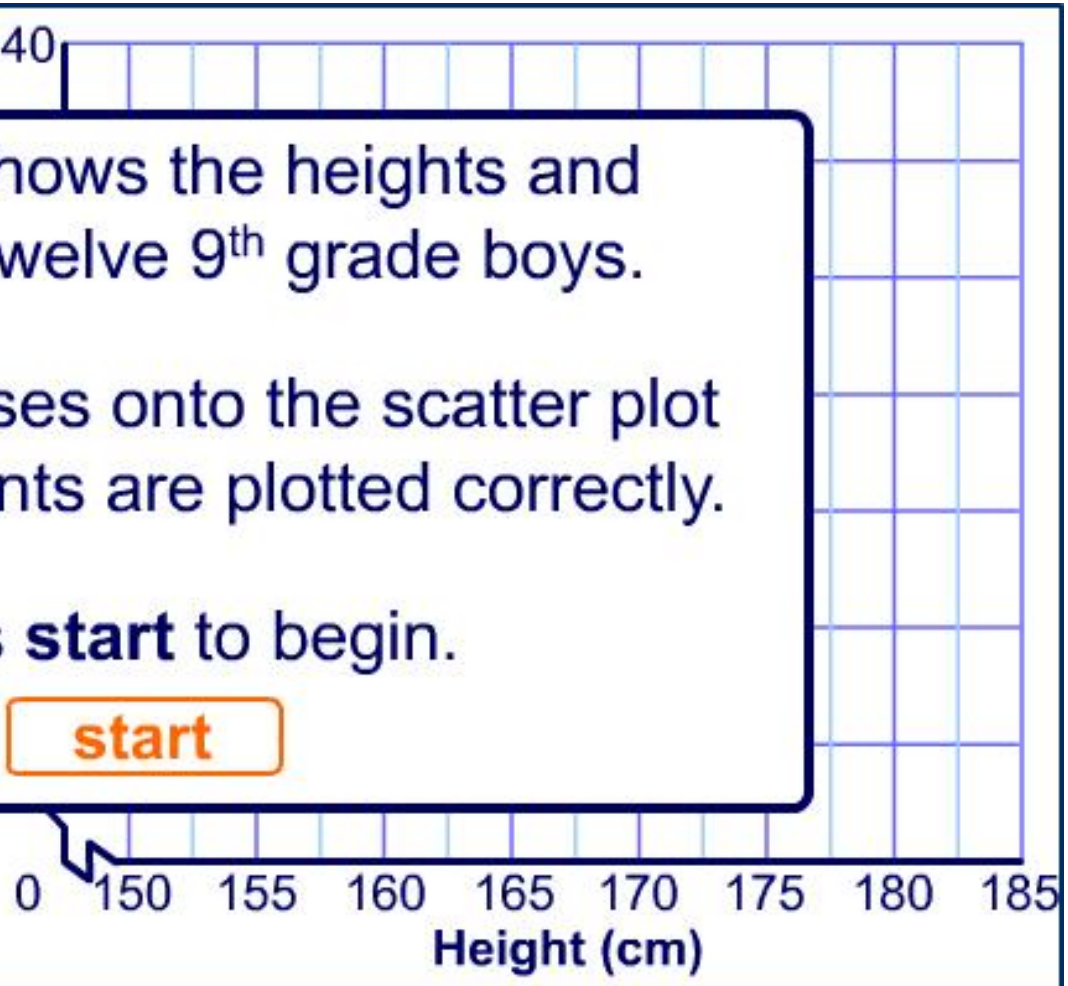
Name	Height (cm)	Weight (lbs)
Theo		
Finley		
Connor		
Ben		
Liam		
Joshua		
Aiden		
Nasir		
Zac		
Peter		
Tristan		
Max	169	121

The table shows the heights and weights of twelve 9th grade boys.

Drag the crosses onto the scatter plot so that the points are plotted correctly.

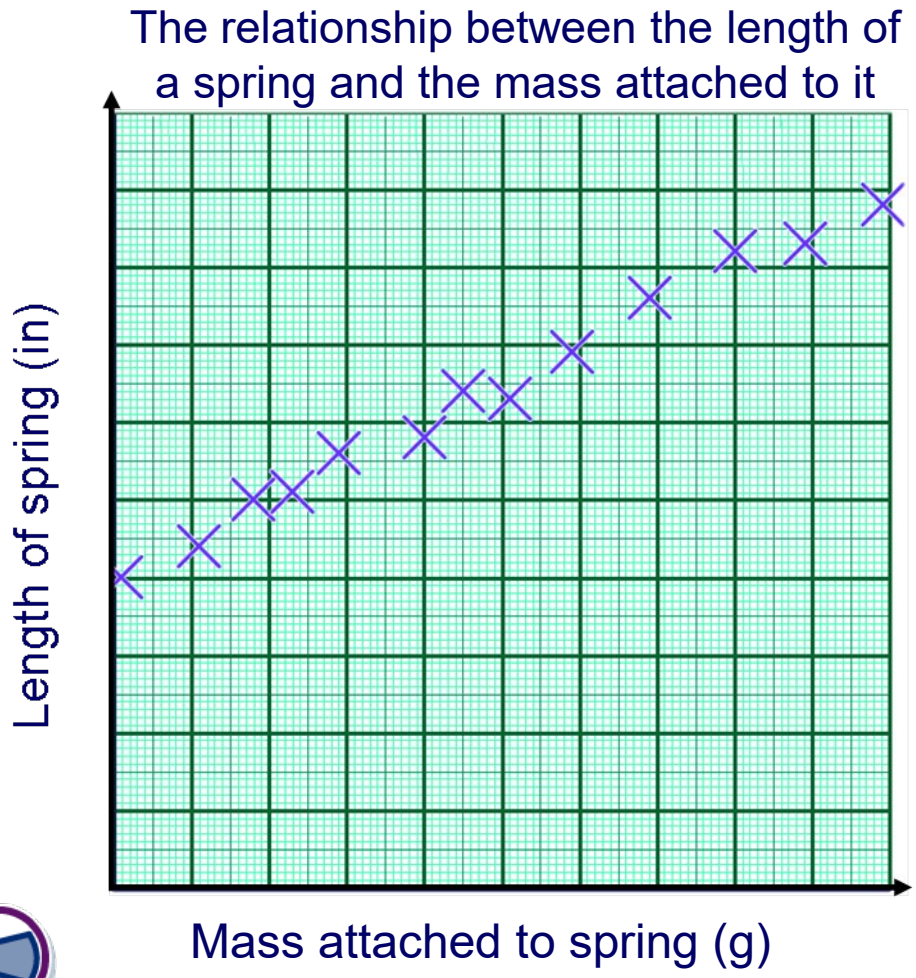
Press **start** to begin.

start



Positive correlation

When one variable *increases* as the other variable *increases*, we have a **positive correlation**.

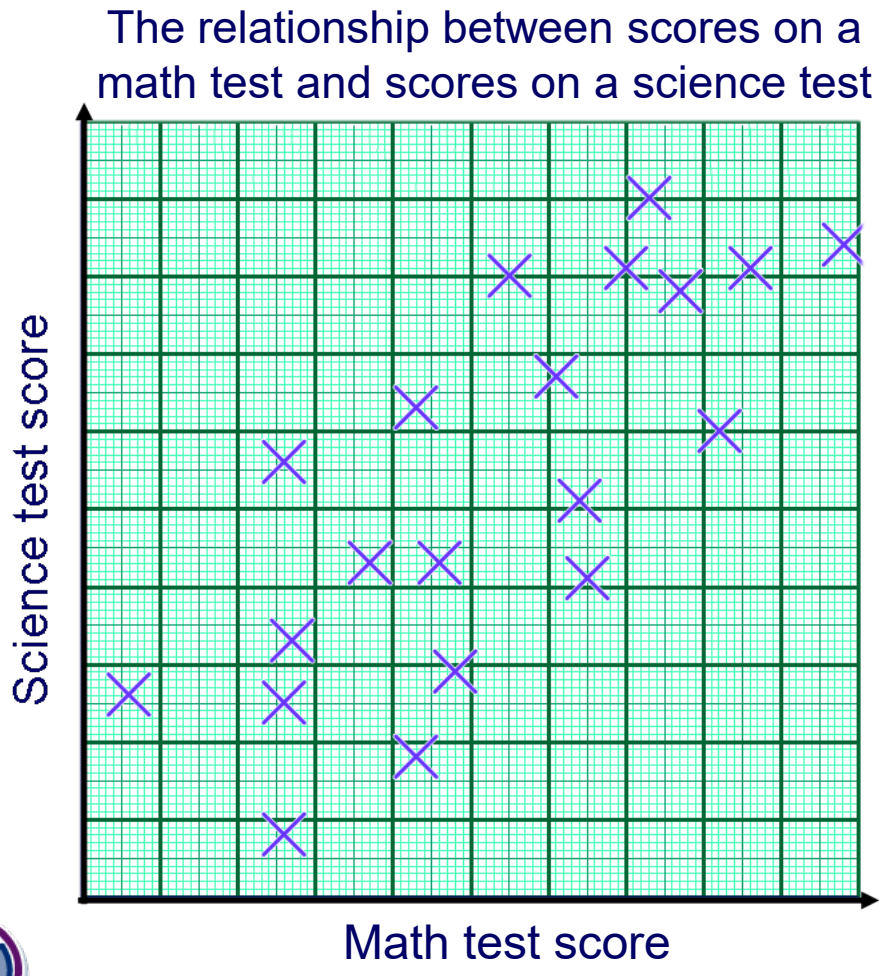


This scatter graph shows that there is a **strong positive correlation** between the length of a spring and the mass of an object attached to it.

Weak positive correlation

Sometimes, the points in the plot are more scattered.

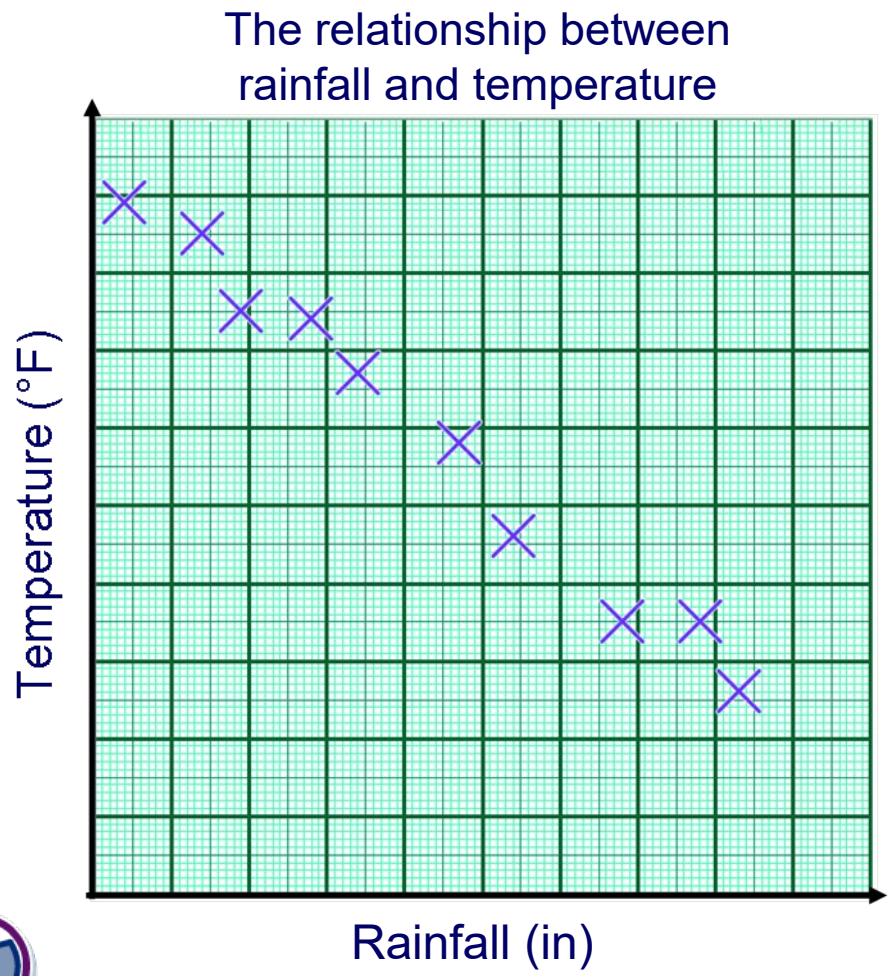
We can still see a trend upwards.



This scatter plot shows that there is a **weak positive correlation** between scores on a math test and scores on a science test.

Negative correlation

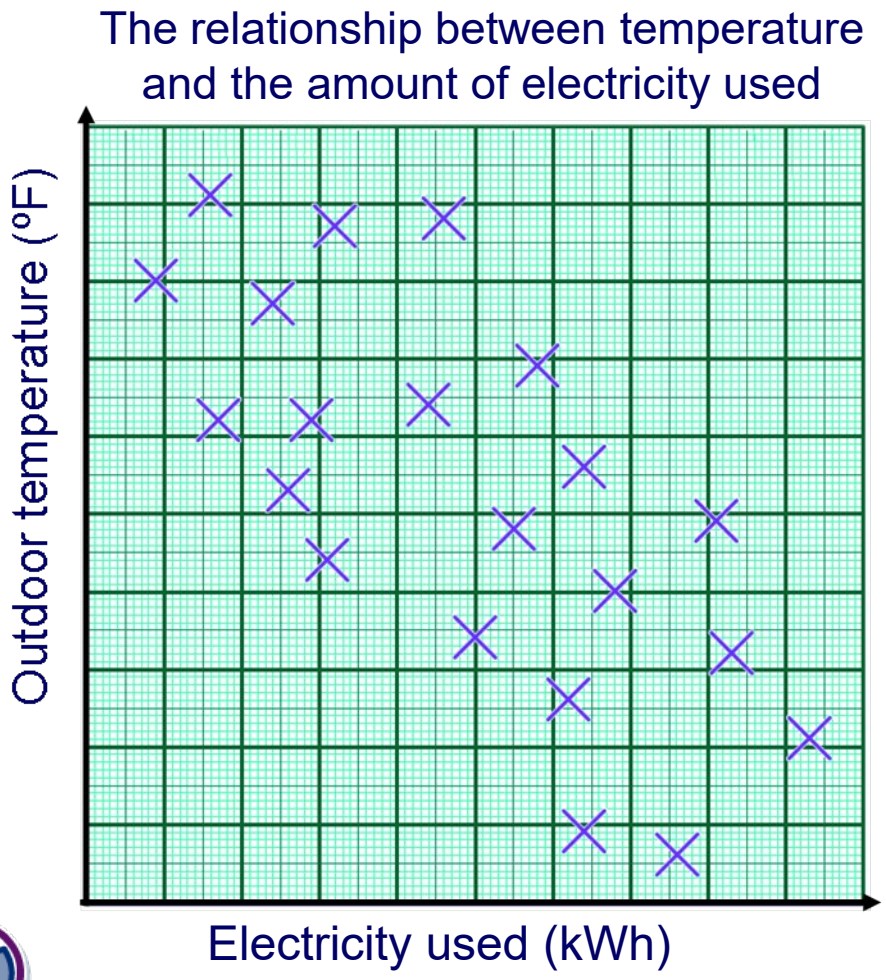
When one variable *decreases* as the other variable *increases*, we have a **negative correlation**.



This scatter plot shows that there is a **strong negative correlation** between rainfall and the temperature.

Weak negative correlation

Sometimes the points in the plot are more scattered.

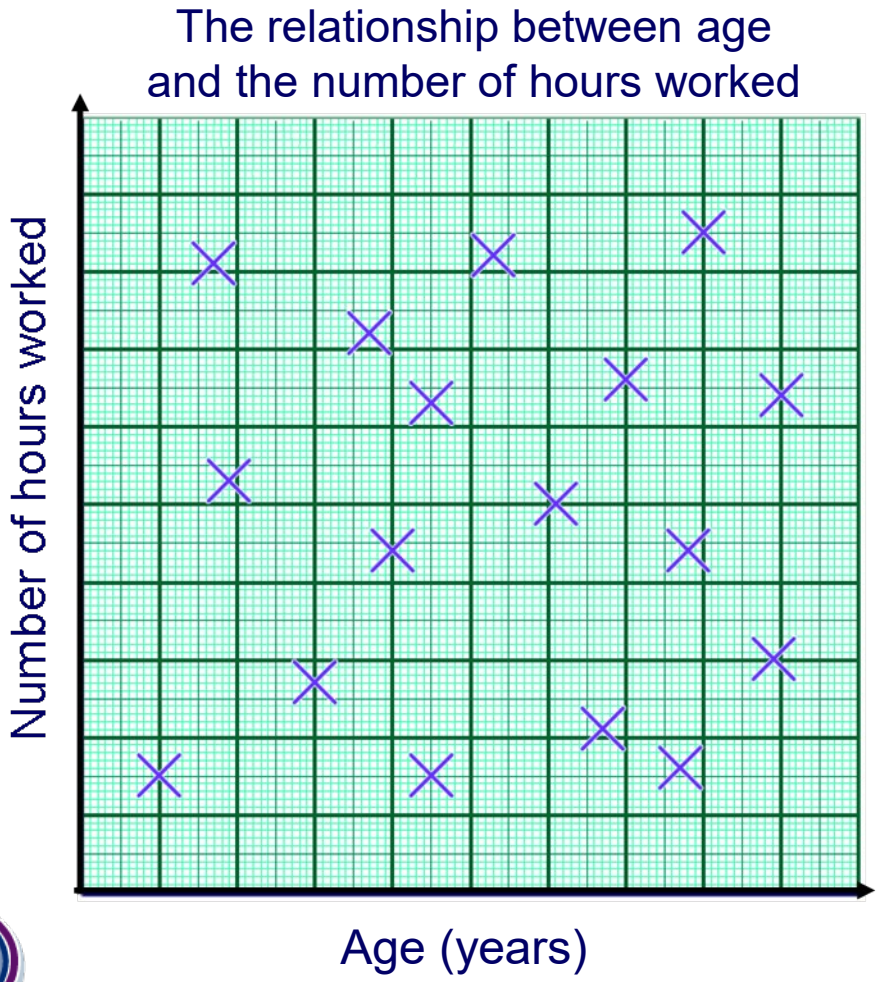


We can still see a trend downwards.

This scatter plot shows that there is a **weak negative correlation** between the temperature and the amount of electricity a family used.

No correlation

Sometimes a scatter plot shows that there is **no correlation** between two variables.

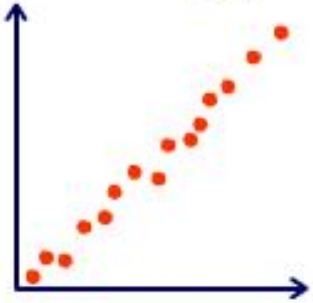


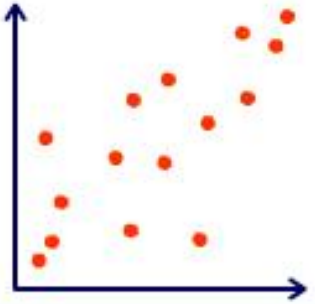
This scatter plot shows that there is **no correlation** between a person's age and the number of hours they work per week.

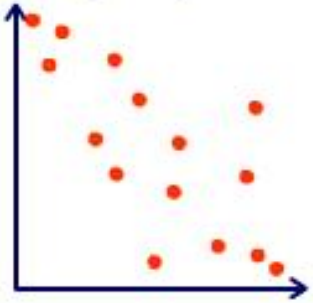
The points are randomly distributed.

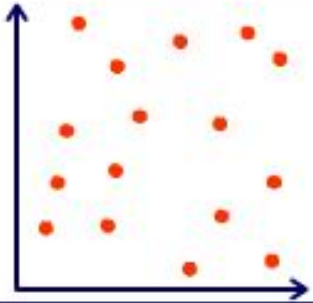
Correlation from scatter plots

What type of correlation is shown in these graphs?

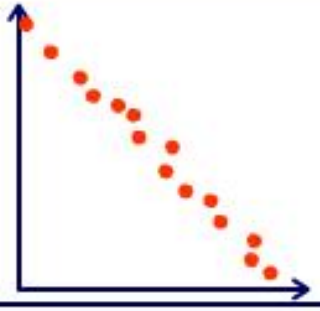






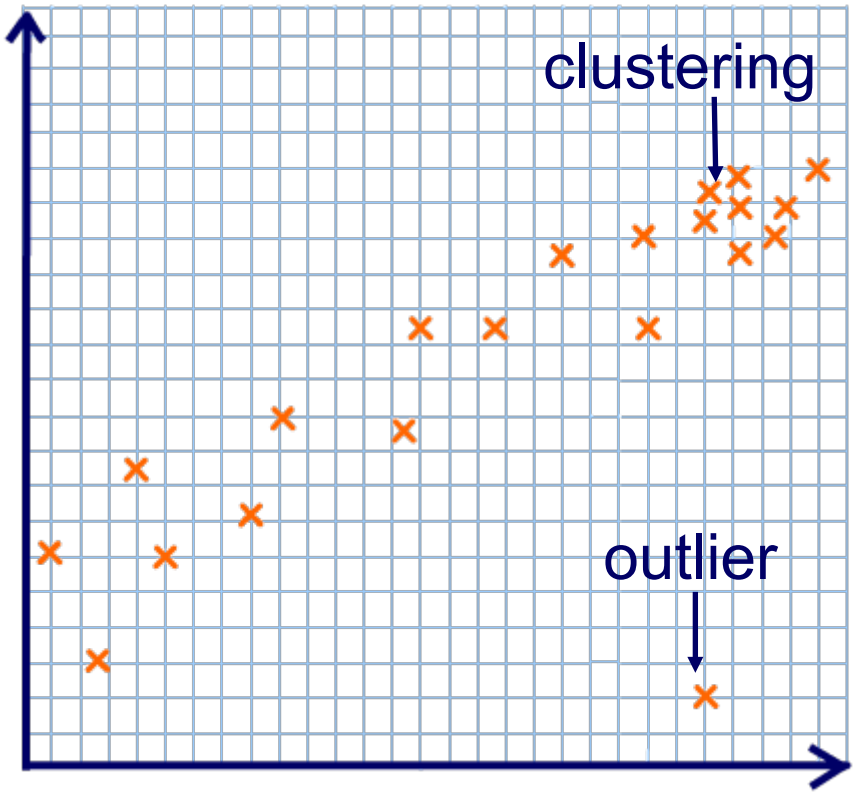


strong negative



Clustering and outliers

The following terms also help us describe data on scatter plots.

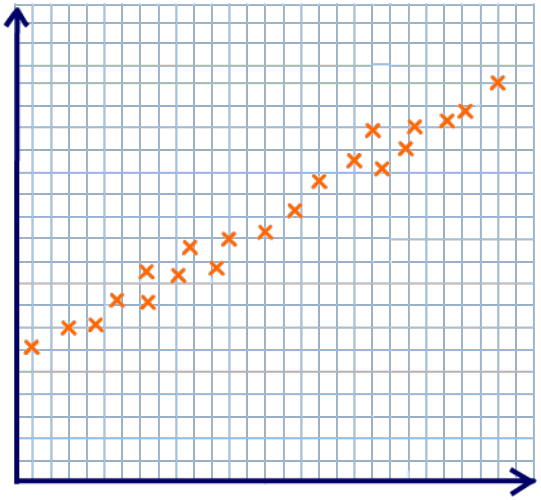


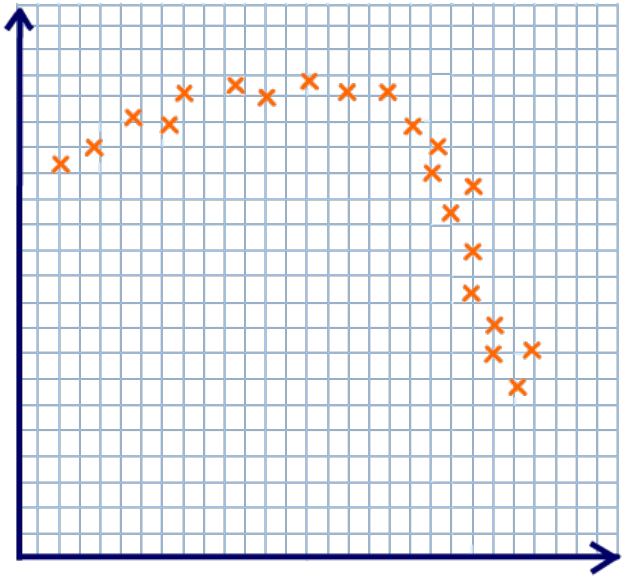
Clustering – this describes where data points are grouped together.

Outliers – these are points that do not appear to fit the trend.

Linear and non-linear patterns

Some scatter plots have a **linear pattern of association**, as they appear to follow a linear pattern.

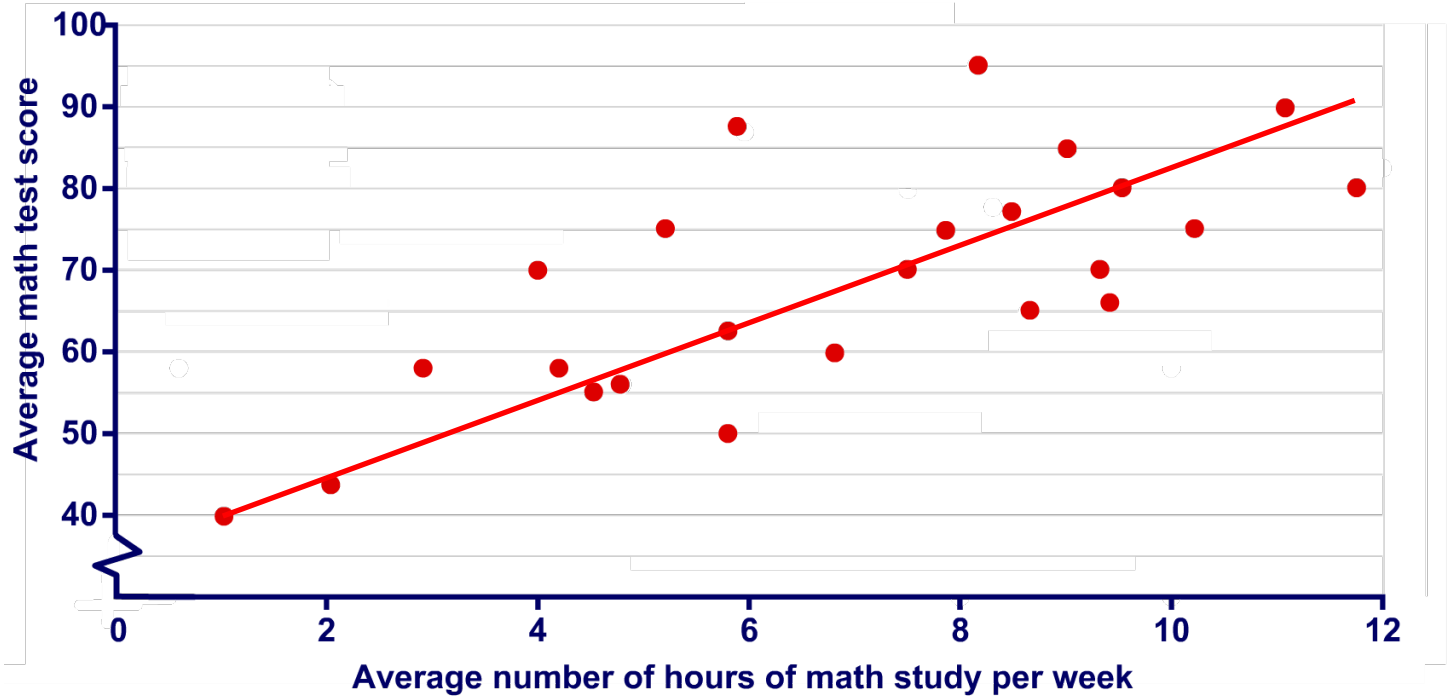




Others will have a **non-linear pattern of association**, meaning that they will not appear to follow a linear pattern. For example, they may follow a curved pattern.

Interpreting scatter plots

This scatter plot shows the relationship between average hours of math study per week and average math test score.

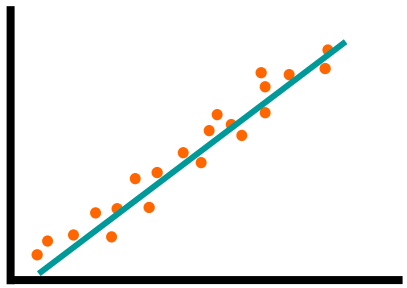


What can we add to this graph to help us see the general trend of the data more easily?

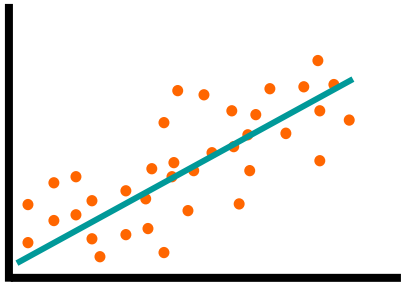
Lines of best fit

A **line of best fit** (or a **trend line**) is drawn on a scatter plot to show the linear trend in a set of data.

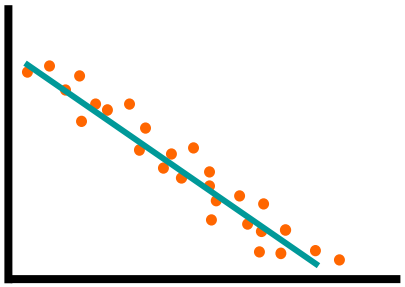
It is drawn so that there are roughly an equal number of points above and below the line.



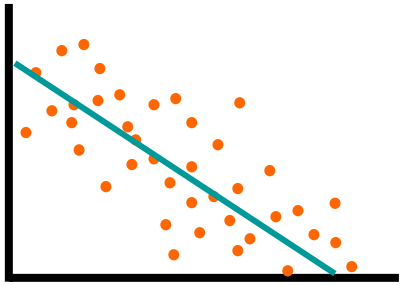
strong positive correlation



weak positive correlation



strong negative correlation

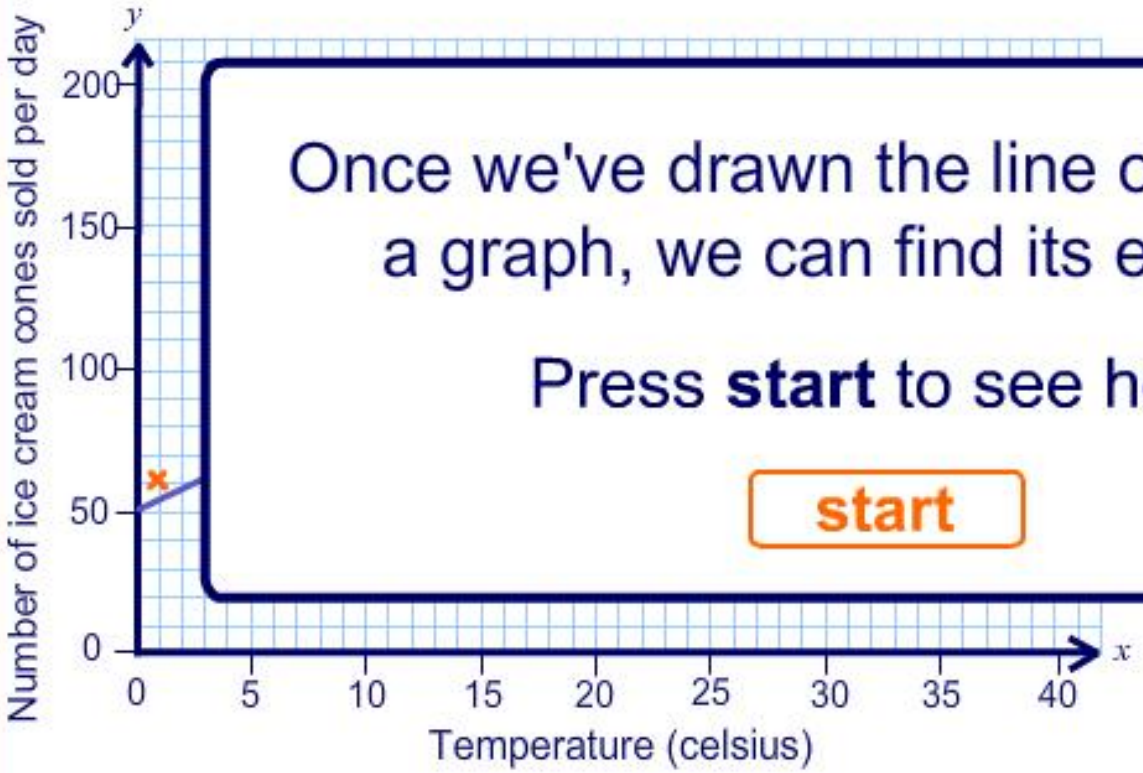


weak negative correlation

The stronger the correlation, the closer the points are to the line.

Equation of a line of best fit

Finding the equation of a line of best fit



Once we've drawn the line of best fit on a graph, we can find its equation.

Press **start** to see how.

start