

Grade 8 - Scatter Plots and Association - Lesson

Common Core 8.SP.A.1, 8.SP.A.2 · maths-pdf.fr/en/

A scatter plot graphs pairs of numbers as points to show how two variables are related. The points can show a positive association (rising), a negative association (falling), or no association, and the pattern can be linear or nonlinear. When it is linear, draw a straight trend line close to the points to judge the fit.

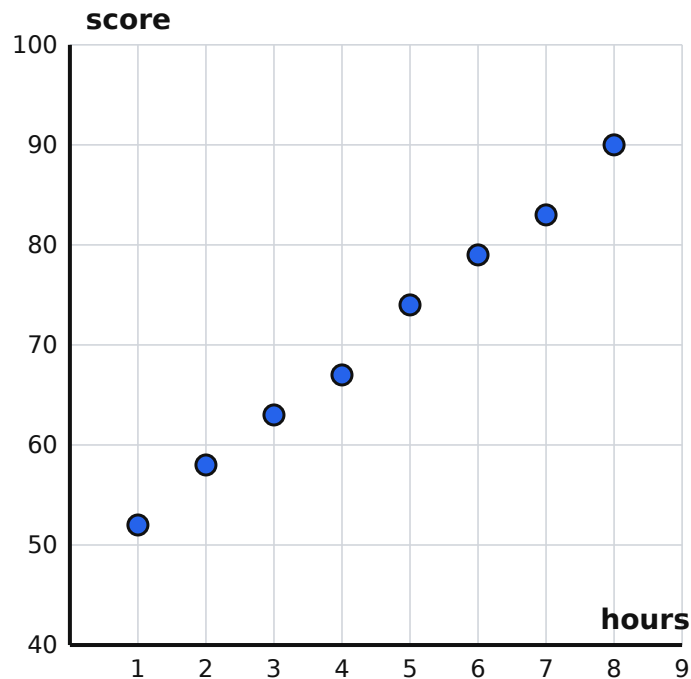
Grade 8 · Common Core State Standards: **8.SP.A.1, 8.SP.A.2**

Key facts

- Positive association: as x increases, y tends to increase.
- Negative association: as x increases, y tends to decrease.
- Clusters are groups of points; outliers are points far from the pattern.
- A linear association has points near a straight line; nonlinear follows a curve.
- A trend line has about as many points above as below and is close to the points.

What is a scatter plot?

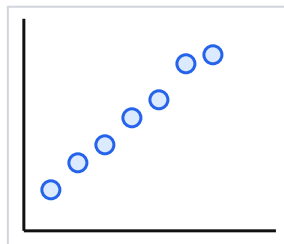
A scatter plot shows the relationship between two numerical variables. Each point is a pair of values, such as hours studied and a test score. Scatter plots help you see whether the variables are related.



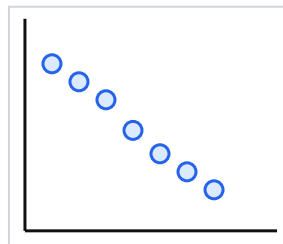
Each point is one student.

How do you describe association?

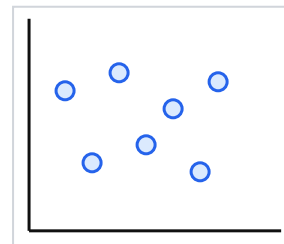
Look at the overall pattern. If the points rise from left to right, there is a **positive association**. If they fall, it is a **negative association**. If they show no pattern, there is no association. A pattern can also be linear (points near a straight line) or nonlinear (a curve).



Positive



Negative

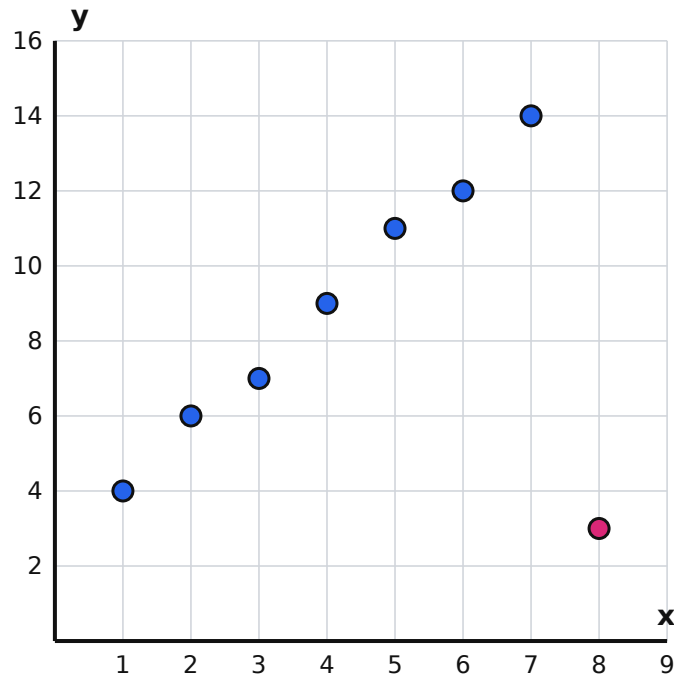


No association

Positive, negative and no association.

Patterns to look for

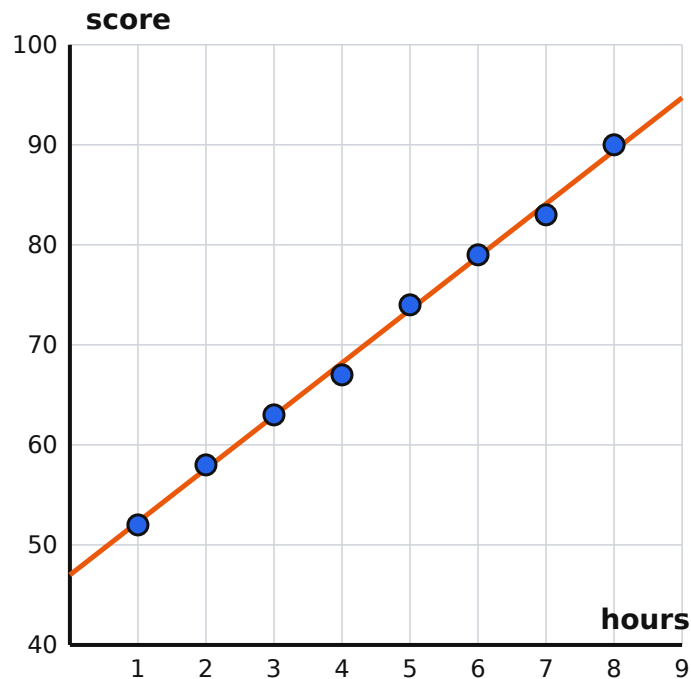
Cluster: a group of points close together. **Outlier:** a point far from the rest. **Linear association:** the points follow a straight line. **Strong** association: the points are close to the line. **Weak:** the points are spread out.



The point (8, 3) is an outlier.

How do you fit a straight line?

When the association is linear, draw a straight line that passes as close as possible to the points, with about as many points above as below. This is called a **trend line** or line of best fit. Choose two points on the line to find its slope.



The trend line $y = 5.3x + 47$ is close to every point.

Scatter plots appear everywhere. A team might plot practice time and free throws made, a store might plot the temperature and the sales of cold drinks, and a family might plot the age of a car and its price. In each case, you read the plot from left to right, say whether the points rise or fall, and decide how tightly they follow a straight line. Always name the two variables and include units when you describe a pattern.

For the study data, the line passes near (1, 52) and (8, 90), so the slope is about $\frac{90-52}{8-1} \approx 5.4$. A good line has small gaps between the line and the points. Judge the fit by how close the points are; a line that is far from many points is a poor fit.

Questions about scatter plots and association

What does association mean?

It describes how two variables tend to change together, such as height and shoe size. It does not say that one causes the other.

What is an outlier?

An outlier is a point that lies far from the overall pattern. It may come from a measurement error or an unusual case.

How do I draw a trend line?

Place a ruler so the line passes through the middle of the points, with roughly equal numbers above and below. The line does not have to touch any point.

What is the difference between a positive and a negative association?

In a positive association both variables tend to rise together. In a negative association one rises while the other falls.

Does a strong association mean cause and effect?

No. Two variables can move together because of a third factor. For example, ice cream sales and sunburns both rise in summer.