

Reading Scatter Plots and Spotting Patterns

Grade 8 math · Lesson · Standards: 8.SP.A.1

Quick answer: A scatter plot shows pairs of measurements as points so you can spot a relationship. Points that rise from left to right show a positive association, points that fall show a negative association, and points near a straight line show a linear association. Clusters and outliers are unusual features.

Standards: 8.SP.A.1 · **Level:** Grade 8

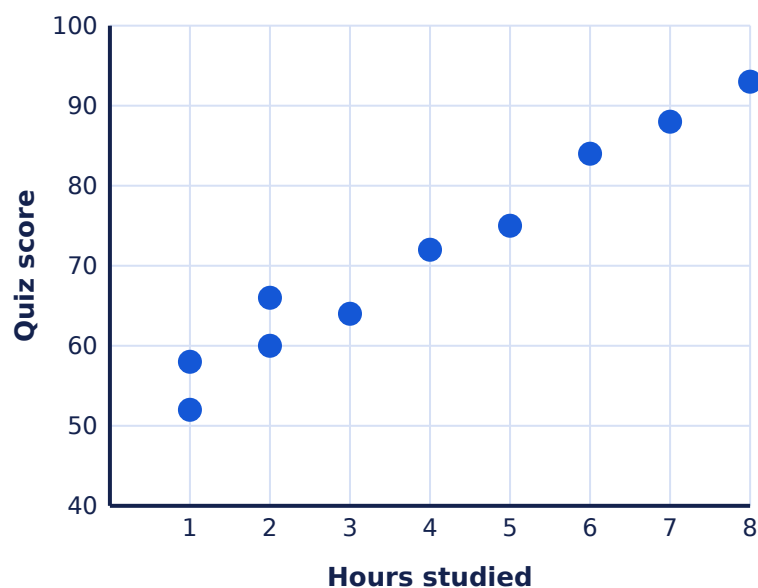
What is a scatter plot?

Scatter plot

A scatter plot graphs pairs of numbers as points, one pair for each person, day, or object. The horizontal axis shows one variable and the vertical axis shows another. It lets you see whether the two variables are related.

How do you describe the pattern?

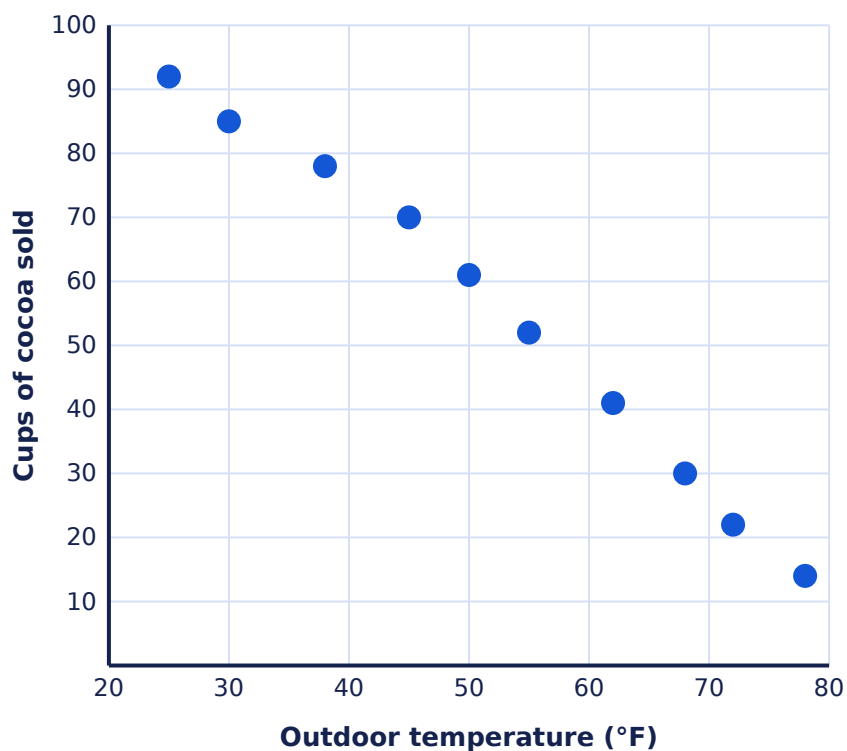
Look at the cloud of points as a whole. A statistician reports its direction, its shape, and any unusual features. In the first figure, scores climb as study time grows, so the association is positive and linear.



Positive linear association: more hours studied, higher scores.

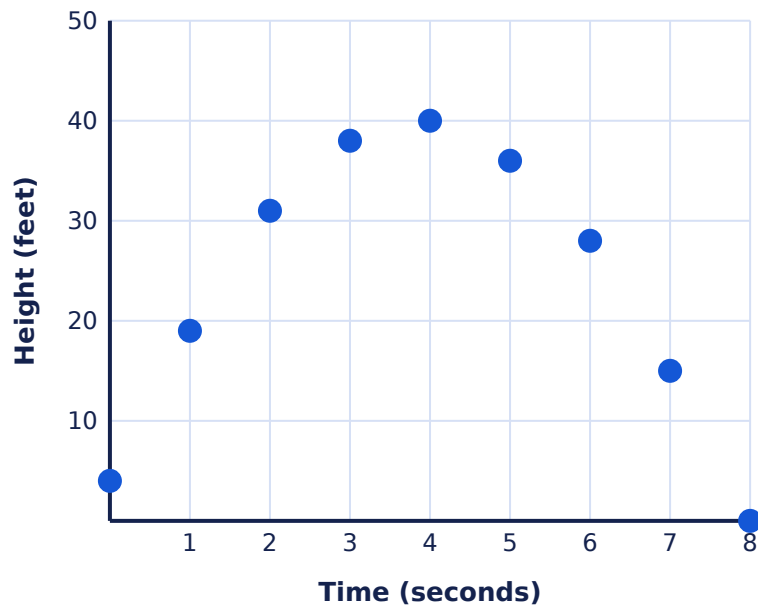
Types of association

Pattern in the points	Name	Example
Rise from left to right	Positive association	Hours studied and score
Fall from left to right	Negative association	Temperature and cocoa sales
No clear direction	No association	Shoe size and quiz score
Points near a straight line	Linear association	Both figures above
Points follow a curve	Nonlinear association	Height of a thrown ball



Negative linear association: warmer days, fewer cups sold.

When the points fall, large values of one variable go with small values of the other. This is a negative association. When the points have no pattern at all, the variables show no association.



Nonlinear association: the points follow a curve, not a line.

What are clusters and outliers?

A cluster is a group of points that sit close together, often separated from other groups by a gap. An outlier is a point that stands far away from the overall pattern. Outliers may come from errors or from unusual cases, so always look at them in context.

How do you read a scatter plot?

Method

1. Read the axis titles to learn what each variable measures.
2. Decide whether the points rise, fall, or show no direction.
3. Decide whether they follow a line or a curve.
4. Notice clusters, gaps, and outliers.
5. Write one sentence that names the pattern and uses the context.

Worked example

A bakery plots the price of a muffin against the number sold each day. The points slope down from the upper left to the lower right and stay near a line, with no stray points. The association is negative and linear: higher prices go with fewer sales.

Common mistake

Association does not prove that one variable causes the other. Ice cream sales and sunburns both rise in summer, but buying ice cream does not cause sunburn.

Mathbot's tip

Trace the pattern with a pencil from left to right. If your pencil goes uphill, the association is positive.

Key points to remember

- A scatter plot graphs two numerical variables as ordered pairs.
- Rising points mean positive association; falling points mean negative association.
- Points near a line show linear association; points along a curve show nonlinear association.
- A cluster is a group of nearby points; an outlier is far from the pattern.
- Association does not prove cause and effect.

Reading Scatter Plots and Spotting Patterns: frequently asked questions

What is an association between two variables?

An association is a pattern that links the two variables, such as taller students tending to have longer arm spans. It is described by direction, shape, and strength. Association alone does not show that one thing causes the other.

How can I tell positive from negative association?

Follow the points from left to right. If they generally go up, the association is positive; if they generally go down, it is negative. If they show no direction, there is no association.

What is an outlier in a scatter plot?

An outlier is a point that lies far from the rest of the data and breaks the overall pattern. It may be a recording error or a genuine unusual case, so it is worth checking in context.

What does it mean for an association to be nonlinear?

The points follow a curve instead of a straight line, such as an arch or a leveling-off pattern. A straight line would not describe how the two variables change together.

What is a cluster?

A cluster is a group of points that are close together and often separated from other points by a gap. Clusters can reveal different groups in the data, such as small and large dogs in a weight and height plot.