

## Answer Key - Explore the Relationship Between Correlation and Linear Association

1. Strong positive linear association: The points should lie roughly on a straight line that slopes upwards to the right. The value of  $r$  should be 1 or close to 1. Strong negative linear association: The points should lie roughly on a straight line that slopes downwards to the right. The value of  $r$  should be -1 or close to -1. No linear association: The points could be scattered all over the grid with no pattern at all. The value of  $r$  should be zero or close to zero. Or the points could be in a pattern that has a strong shape other than linear, for example a circle, or a strong curve, which could have an  $r$  value close to zero.
2.  $r = 1$ . Points exactly on a straight line sloping upwards to the right.  $r = -1$ . Points exactly on a straight line sloping downwards to the right.  $r = 0$ . Points randomly scattered over the grid. Once a few points are put on the graph, students can hit the Show Line button and then add points one at a time to create a balance in the graph that makes the value of  $r$  closer and closer to zero.
3. If the outlier is close to the other points, the scatterplot may still look roughly linear. If the outlier is far away, the line will be pulled away from the original points. The  $r$  value will be close to 1 if the outlier is close to the original points, but will be farther away from 1 if the outlier is farther away.
4. If the 10 points are closely packed in the very bottom left corner and the outlier is in the far right top corner, then the data are obviously not linear, but the  $r$  value will be close to 1.
5. The result of (4) above shows that a high  $r$  value does not necessarily go with a linear trend.