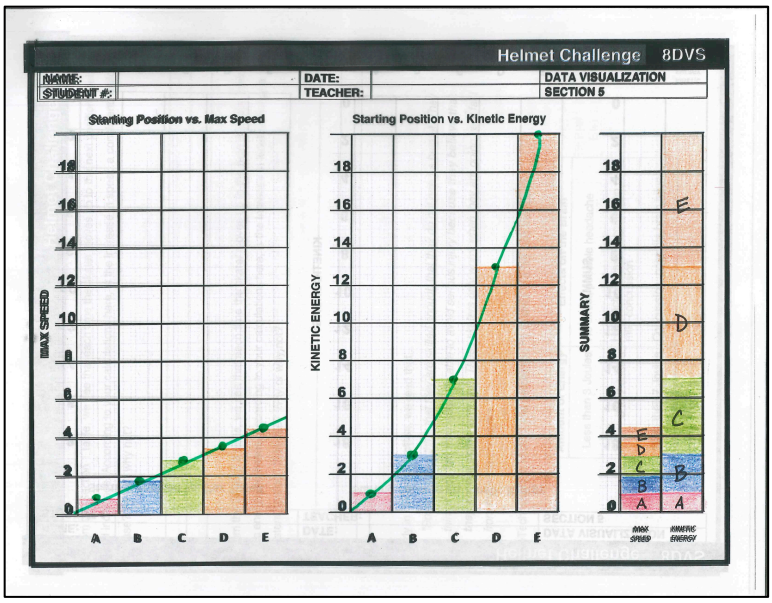
We Need Helmets Because of "Linear and Non-Linear Relationships"

Your investigations of max speed and kinetic energy is an example of how data visualization help us better understand ***cause and effect*** relationships in science. Here, as we raised the skater's position on the ramp (height), the max speed increases. That single change in position (from A to B to C...) produced a consistent change in max speed (roughly a 0.9 m/s increase) with each step up. When an increase in one variable produces a consistent change in another variable, we say their relationship is **linear**. Look at the graph you just drew. See how the Position vs. Max Speed graph resulted in a fairly straight line? They have a linear relationship.



Position vs. Kinetic Energy also shows cause and effect. Here, we see that as you raise your position on the ramp (height), the kinetic energy increases, too. However, it increases in a differently than the max speed did. As you go higher (from A to B to C...), each single change in position produces a BIGGER change in the kinetic energy. When increases in one variable produces larger and larger changes in another variable, we say their relationship is **non-linear**. Again, look at the graph you just drew. You can see how the Position vs. Kinetic Energy graph resulted in a curved (or non-linear) line?

Pretend we were to remove the bar graphs, and we only relied on the plotted points and line graphs. We could still see that kinetic energy, which is the damaging factor in skateboard falls, increases very quickly as a skater moves higher above the ground. Even at lower speeds, skateboarders need to use helmets.

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