Science fair variables examples: independent, dependent and controlled

Peabody blog · Science · updated 2026-11-05

Independent, dependent and controlled variables explained with eight real science fair projects, plus the control level, the mistakes judges see, and a quiz to practise.

Every fair test has three kinds of variable: the independent variable is the one thing you change, the dependent variable is the one thing you measure, and the controlled variables are everything you keep the same so the test is fair. On Peabody's sheets they're called what you change, what you measure and what you keep the same, which is easier to say at 2nd grade and means exactly the same thing at 8th.

I built every project on Peabody's science fair pages with those three written in: the change and its levels, the measure and its unit, and at least two things kept the same. So here are eight real examples, straight from the projects.

Eight projects, three variables each

- Project: Does a bigger parachute fall slower? · Independent (I change): the size of the parachute: 20, 30, 40 cm square · Dependent (I measure): how long it takes to fall (seconds) · Controlled (I keep the same): the same weight underneath, the same drop height, the same length of string
- Project: Which paper towel soaks up the most water? · Independent (I change): the kind of paper towel: kinds A, B, C · Dependent (I measure): how many spoonfuls it holds (teaspoons) · Controlled (I keep the same): the same size of square, the same spoon, the same plate lying flat
- Project: Does stirring make sugar dissolve faster? · Independent (I change): how the water is stirred: none, slow, fast · Dependent (I measure): how long a spoonful takes to disappear (seconds) · Controlled (I keep the same): the same amount of water from the same tap, one teaspoon of sugar each time, the same cup and spoon
- Project: Does a cover keep water in the sun warmer? · Independent (I change): what covers the water: none, plastic wrap, foil, black paper · Dependent (I measure): how many degrees it warms in one hour · Controlled (I keep the same): the same amount of cool tap water, the same kind of cup, all twelve cups side by side in the same sunny spot
- Project: Does a longer string swing slower? · Independent (I change): the length of the string: 20, 40, 60 cm · Dependent (I measure): how many swings in 15 seconds · Controlled (I keep the same): the same weight, letting go from the same distance out, counting for the same 15 seconds
- Project: Do leaves help celery pull up coloured water? · Independent (I change): how

many leaves are left: all, half, none · Dependent (I measure): how far up the colour climbs in four hours (cm) · Controlled (I keep the same): stalks about the same size from one bunch, the same water and colour, the same warm, bright room

- Project: Does a heavier toy car roll farther? · Independent (I change): the weight on the car: 0, 5, 10, 20 pennies · Dependent (I measure): how far it rolls (cm) · Controlled (I keep the same): the same car, the same 2-book ramp, the same start line, letting go without a push, pennies taped in the same spot
- Project: Does salty or sugary water change a bean plant? · Independent (I change): what the plants are watered with: plain tap water, salty, sugary · Dependent (I measure): how tall the plant is on day 14 (cm) · Controlled (I keep the same): the same kind of bean soaked overnight, the same cups, soil and amount of liquid, the same windowsill, watering on the same days

Read across any row and you have the hypothesis: "If I change the length of the string, then the number of swings in 15 seconds will…, because…". The hypothesis examples by grade fill that sentence in nine ways.

A quick way to tell them apart

- Independent: you choose it before you start. It's the left-hand column of the results table.
- Dependent: you find it out. It's the numbers in the table, with the unit in the header.
- Controlled: you'd have to write it in the steps to keep it the same. If changing it could change your numbers, it belongs on the list.

If a child can't say the unit, the dependent variable isn't clear yet. "How good the paper towel is" can't go in a table; "how many teaspoons it holds" can.

The control level

Some projects have a level where nothing is done. In the ice project, What melts ice fastest: salt, sugar or sand?, one cube gets nothing sprinkled on it. In the bean project above, one set gets plain tap water. In the cover project, one cup has no cover.

That level is often called the control. It isn't a controlled variable; it's one of the levels of the independent variable, the one that shows what happens on its own. Without it, you might know that salt melted the ice in 14 minutes, but not whether that's fast. With it, you can say "27 minutes faster than nothing" (those are the made-up numbers from the conclusion examples).

When the dependent variable is a score

A few projects measure something you look at rather than something you time or count. What keeps a cut apple from going brown? measures "how brown the slice is after an hour" as a brown score, 0 to 5. That's allowed and judges see it often. Make it fair by drawing the scale

on the sheet first (0 is not brown at all, 5 is as brown as the darkest slice) and scoring every slice with the same scale, ideally by the same person.

Mistakes judges see

1. Two independent variables at once. Testing a big paper parachute against a small plastic one changes size and material together, so nobody can say which mattered. Peabody has a project for each: size and material.
2. A dependent variable with no unit. "It went far" is a description. "152 cm" is a result.
3. Controls that weren't really kept. "The same drop height" means measured with a tape measure every time, not guessed.
4. Only one try. Repeating each level three times isn't a variable, but it protects the test from one odd try. Every Peabody project does at least three.

Try tonight

Start with the variables helper at the top of this page: two taps, what your child will change and what they'll measure, and it names all three variables and shows the Peabody projects built the same way. If they tap "which one is best", it says why that can't be measured and what to measure instead. Then the three quizzes, which are quick and where every answer is one of three boxes: Which one changes?, What do you measure? and Keep it the same. Then open your child's project page and ask them to point to each of the three on it. The guide Change, measure, keep the same goes into more detail.

Questions grown-ups ask

Are controlled variables the same as constants?

Yes. Some teachers say constants, some say controlled variables, and Peabody's sheets say "what I keep the same". Use your teacher's word on the board.

How many controlled variables does a project need?

At least two named on the board; most projects have three or four. Peabody's projects all name at least two.

At what grade do the words "independent" and "dependent" come in?

Usually around 5th or 6th grade. Before that, "what I change" and "what I measure" are clearer, and judges are happy with them.

Peabody (peabody.kids) is free through the end of 2026, with no ads and no sign-up. The library has free stories by reading level.

Free at peabody.kids/blog/science-fair-variables-examples