Science fair projects for middle school: a mean, then a second variable

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What a 6th to 8th grade science fair wants (three or more tries, a mean, named variables and a second test) and eleven projects that do it, from salt to dominoes.

A middle school science fair project isn't bigger than an elementary one; it's more careful: one question, three or more tries at every level, a mean for each level, the variables named, and then a second test that changes one more thing. Eighty-nine of Peabody's 115 projects reach 6th grade or above, and every one has a "Going further" line that spells out its second test. Most cost nothing and test in an afternoon.

I've written a post for each grade already: 6th grade (two variables named), 7th grade (a real question and a second variable) and 8th grade (a full investigation, not a volcano). This one is for the family that searched "middle school" and wants the whole band at once: what changes from 6th to 8th, and eleven projects those three posts don't cover.

What a middle school fair expects

- The words. Middle school fairs use independent variable (what you change), dependent variable (what you measure) and controlled variables (what you keep the same). Every Peabody project page says which is which, in those words.
- Three or more tries, and a mean. Add the tries at a level and divide by how many there were. Five tries a level is better where a try is quick, and several projects below ask for five.
- A graph that fits. A bar for separate kinds (shoes, materials), a line for a number that grows (pennies, degrees, centimetres).
- A second variable by 7th grade. Run the test again with one more thing changed, and put both on one graph.
- Sources of error. Judges ask what could have made one try come out differently. A logbook with a dated line for each day answers it before they ask.

By 8th grade a project usually has a written report with an abstract; the report builder fills one in from the child's own numbers.

Eleven projects the grade posts don't cover

- Project: Does warm water hold more salt than cold? · Grades: 5th–8th · Tries: 3 · Testing: 60 min · Cost: free · The second test: the same with sugar, side by side
- Project: Does a full bottle roll down a ramp faster? · Grades: 5th–8th · Tries: 5 · Testing: 45 min · Cost: free · The second test: a steeper ramp, both lines on one graph
- Project: Does a heavier pendulum swing faster? · Grades: 5th–8th · Tries: 3 · Testing:

40 min · Cost: free · The second test: strings 20, 40 and 60 cm long

• Project: Do dominoes fall faster when farther apart? · Grades: 4th–8th · Tries: 5 · Testing: 60 min · Cost: about $4 · The second test: speed (length ÷ time) against gap

• Project: Does salty water take longer to freeze? · Grades: 4th–8th · Tries: 3 · Testing: about 4 hours · Cost: free · The second test: sugar instead of salt, spoon for spoon

• Project: Does a cold ball bounce lower than a warm one? · Grades: 4th–8th · Tries: 3 · Testing: 60 min · Cost: about $3 · The second test: a second kind of ball

• Project: Which shoe grips a slope best? · Grades: 4th–8th · Tries: 3 · Testing: 40 min · Cost: free · The second test: 20 pennies in each shoe

• Project: Which material makes the slowest parachute? · Grades: 4th–8th · Tries: 5 · Testing: 60 min · Cost: free · The second test: the best material in three sizes

• Project: Does a steeper hill wash away more soil? · Grades: 4th–8th · Tries: 3 · Testing: 60 min · Cost: free · The second test: sand, potting soil and garden soil on the steepest slope

• Project: Do crowded seeds grow shorter? · Grades: 4th–8th · Tries: 3 · Testing: 14 days · Cost: about $2 · The second test: a bigger cup for each number of beans

• Project: Which kitchen scrap helps a plant grow most? · Grades: 4th–8th · Tries: 3 · Testing: three weeks · Cost: about $3 · The second test: one, two and four tablespoons of coffee grounds

The middle school page lists all eighty-nine, the hardest first, and the Top 10 for 7th and 8th grade takes the ten that reach 8th grade and start oldest, so the hardest lead.

A worked mean

Say the pendulum with 10 pennies makes 21, 22 and 21 swings in 30 seconds. Add them: 64. Divide by three: 21.3 swings. Do the same for 2, 5 and 20 pennies, then put the four means on a line graph with pennies along the bottom. If the line is flat, the weight didn't change the swing, and that's a real result: write it in the conclusion with the numbers. The Graph Maker works out each mean and shows the spread of the tries, so a child can see at a glance which level had a try that wandered.

The second variable, done properly

The second test changes one more thing and keeps everything else as it was. For the bottle on the ramp, that means the same four amounts of water (empty, a quarter, half and full), five rolls each, down a steeper ramp. Then both sets of means go on one graph as two lines. Now the conclusion can say two things: what the water did, and whether the steeper ramp changed that. Judges at middle school fairs look for exactly this, and the what judges reward guide says why.

Engineering instead of an experiment

Some middle school fairs accept an engineering project: a goal, limits, three designs, a test and an improvement. The engineering design sheet lays that out with a test table and means. The parachute and the domino projects both turn into engineering projects easily: "design the slowest parachute from a plastic bag" is a goal with a measurement.

What comes after the school fair

Many middle school fairs feed a regional fair, which has stricter rules and forms. Above that, Society for Science runs the Thermo Fisher Scientific Junior Innovators Challenge for 6th, 7th and 8th graders; its page (read 31 October 2026) says the top 10% of 6th to 8th grade competitors at a Society-affiliated fair can be nominated. Check your school's sheet first: it's the one that applies.

Questions grown-ups ask

How much should a parent help in middle school?

Less than before. At this age a grown-up advises and checks safety; the child runs the test, keeps the logbook and writes the board. Ask questions instead of giving answers: "What did you keep the same?" is more useful than a fix.

Is three tries enough?

Three is the minimum most fairs accept. Where a try takes a minute (the bottle, the dominoes, the parachute), five is easy and makes the mean steadier.

What makes a middle school project stand out?

A clear question, a mean for every level, an honest conclusion when the hypothesis was wrong, and a second variable. A dramatic display matters much less.

Peabody (peabody.kids) is free through the end of 2026, with no ads and no sign-up. The library has stories for older readers, for the evenings after the board is done.

Free at peabody.kids/blog/science-fair-projects-for-middle-school