Fair test investigations to do at home

FB post: Our school is moving to online learning and our Y9s are just starting fair testing. Would love any ideas for a fair test which they could do easily and safely at home on their own, to collect data which could be used to make a line graph. Thanks! Theresa Cowen

* Heat related investigation.
  + sitting ice in different cups/materials, measuring the amount of water produced over time.
  + how long it takes to heat water on different windowsills
  + use the story of Goldilocks and porridge cooling to devise a fair test
* Leaf size compared to height on a tree
* Cooking experiments
  + what's the best temperature to bake cookies?
* making butter - change the amount of salt to cream ratio to see which one changes to butter the fastest - lots of further learning around control, catalysts
* Do more grasses or more clover grow in heavily walked areas?
* Does the weight of the book correspond to how many pages it has? (needs scales)
* How strong is cardboard in different shapes?
* Strength of different paper towels
* Can mum and dad taste their preferred coffee or tea recipe?
* If they have a trampoline they could look at how many bounces vs weight of brothers and sisters.
* Investigate drop height relationship to bounce height (ball, ruler/measuring tape). Or investigate pull back stretch rubber band to distance ‘missile’ travels. Both can create table of data, and produce a graph
* Use phet simulations <https://phet.colorado.edu/>
* Rate of reaction with diluted vinegar
  + Could use detergent and bubble height as your end point
  + Could compare various different types of vinegar and their reaction with baking soda. Balsamic, red wine vinegar, white wine vinegar etc.
* Rubber band catapults firing little bits of paper.
  + Investigate how changing the distance the rubber band pulled back affects the flying distance. Gives nice easy results. I used this with y11 too
  + simple, non invasive, and everyone should have something they can use - if they can't find a rubber band a hair tie....
  + super fun and easy too.
  + Or number of rubber bands and distance propelled
* Teaspoons of salt or sugar & time to visibly dissolve.
* Exercise and pulse is a good one… no equipment needed
  + Breathing or heart rate vs the length of star jumps or plank
* Boiling water cooling in different containers or with different volumes or surface areas
* Phone apps
  + Accelerometers and pressure is available on most phones.
  + magnetic field,
  + decibels
* Measure distance travelled in 5 steps, diivide by 5 to get stride length. Correlate to leg length
* Height of ramp vs distance ball/car travels. Would be interesting doing at home cause you'd have so many different ways - ie ramp could vary from a book to a slide. (ruler, car/ball)
* With year 9s I would get them to video or photograph their set ups to give others some inspiration
* Helidroppers where they change the length of a blade on the rotor or a paper helicopter.
  + Paper helicopters [https://www.exploratorium.edu/science.../roto-copter.html](https://l.facebook.com/l.php?u=https%3A%2F%2Fwww.exploratorium.edu%2Fscience_explorer%2Froto-copter.html%3Ffbclid%3DIwAR2rOmuN4FdZUsOJWaEk3jCXmsPy_s3qOPPUGJUzrm7Oul6KwQu-_LPQ3Io&h=AT3BCvTOafxc4We_ZE9lkWPRvs0W61XyS50HVh_MOzARRr6tQbtrcha4AMvsQdRajKU1d4Yj2aEyw2o6nVZP_eX_T5jh76LZhjbPZDcwrznCPIhuYYqhXb9i5_3Uwr6NHFC5xYf--Q&__tn__=R%5d-R&c%5b0%5d=AT0-T3EamOp2rMPd8k-Laj4gpf26AVa7-77zXhwgHXu_g567dhGh4UbeC6shZ9V8tiyLDBlYKbKsmcFEMZByoNm43yJ3Ck6WJimcmfnHTydCO_1FQhKlWaoqfC3HO2e9BYoZsEgEF0mCUa4v6flOOhIDBhRs) it worked well for my y9s last year.
  + this one works well, you can also drop cupcake cases and time their fall - different heights, different number of cases, etc
* Sometimes cornflour and water solutions act like a solid, sometimes like a liquid. You could measure mass of Cornflour and volume of water to find out how much you need to make a good consistency for solid or liquid…easy to do at home and good states of matter and measuring skills.
* Salinity of water vs buoyancy. Start with 1L of water, carefully float a small bowl in the water and mark the waterline, record. add a tablespoon of water each time and repeat measuring
* Bouncing balls
  + Same ball on different surfaces, bouncing different balls same surface (ball, ruler)
  + there is a nice ARB on this idea pitched well at NOS curriculum L3-4. Tying ball bounce into suitability for a football game. A set of data for the students to figure out what isn’t ‘fair’
  + a good one to scale up and use in Year 11 to start to talk about outliers and reliable data
  + Rationale behind steering away from bouncing different balls on same surface or the same ball on different surfaces is that you can’t (easily) take a measurement of the friction coefficient(?) of the surface or quantify the IV being continuous. Changing ball on same surface you run into different uncontrolled variables such as air resistance due to SA of different sized balls and their elasticity for bouncing.
* Pendulum on a string. ??? physicists suggest caution.
  + Time oscillations with different length string or different weight
  + can do some research around the Big Ben too, as I'm sure every so often they have to correct the time on it because it eventually is too fast/slow
  + I got my speedy finishers to check out how different mass effected the pendulum too.
  + slightly triggered with the pendulum mass approximation. Take care on this.
  + it was great to see my students ask questions and do some experimenting themselves. But you’re right. For fair testing it would not be so great. To messy.
  + it’s a great fair testing (for modelling) practical for y13 physics. So many opportunities to relate evidence to a reasonable mathematical equation.
  + care needs to be taken using this one due to discrete/continuous data collection, to fit the fair testing model
  + I don’t play in discrete/continuous lands until L1/2. How do you manage to handle this in y9/10?
  + keep it real simple such as discrete is the counting data (I.e. colour of fruit bursts in a single packet), continuous you measure (heights of students in class). It’s also in maths at L5 of the curriculum for stats
* Measuring mass of Gummy bears (or carrots) in different salt solutions. You could give them instructions on how to make the different concentrations