

Physics at home (11-14)

These ideas might help with constructive activities while students are working from home. We've made an effort to divide them by topic. **More ideas will be coming**, but it is hoped this will save you time right now so students can have something while we all adjust.

Forces (types and effects)

- **Marvin and Milo** [Loop the loop](#), [Head hanger](#), [Unbalanced balloons](#)
- Hooke's law PhET [Hooke's law](#); [Masses and Springs: Basics](#) – 'Stretch' tab
- PhET [Forces and Motion: Basics](#)
- Balanced forces - **Veritasium** [Falling Slinky](#) **Marvin and Milo** [Slinky drop](#)

Forces (motion)

- Calculating speed based on changes in distance (tape measure) and time (stopwatch on phone). Model cars on ramp, pets, falling cup-cake cases for terminal velocity etc.
- [Parachutes](#) or [balloon-powered cars](#) from ExpeRImental would be great sources of data for any calculations. See also simulations like the [Moving Man at PhET](#)

Forces (gravity, pressure)

- **Cannon ball and feather drop** [Misconceptions About Falling Objects](#)
- Make a three hole bottle ([teacher information](#)) and investigate relationship between distance and depth of water, time taken etc.
- PhET [Under Pressure](#), **Marvin and Milo** e.g., [Collapsing bottle](#), [Mushrooming marshmallows](#)
- Floating and sinking **Marvin and Milo** [Floating egg](#), [All change](#)

Static electricity

- Use the [attracting can](#) activity to introduce why charged objects exert forces on uncharged objects. Also see videos at [ExpeRImental](#) (straws and balloons) followed by this PhET [simulation](#)
- **Marvin and Milo** – [Static UFO](#); [On a Roll](#); [Forceful Comb](#), [Static Spinning Straw](#), but with 2 charged straws to show repulsion

Current electricity

- **Classroom Physics** [Electric circuits](#)
- PhET [Circuit Construction Kit: DC](#)
- [Squishy circuits](#) needs LEDs, [zinc batteries](#), flour, oil, lemon juice

Magnetism and Electromagnetism

- Explore fridge magnets and toys **Marvin and Milo** [Moody magnets](#)
- From **Catalyst** [Iron from cornflakes](#)
- PhET [Magnets and Electromagnets](#) is a good start and [Faraday's Electromagnetic lab](#) covers nearly all of Electromagnetism for those that want to go further.

Sound

- **Marvin and Milo** [Bottle Orchestra](#) and [Musical Coathangers](#) (which also works with roasting racks!)
- Use soundmeter apps to learn about the effect of distance and insulating materials on amplitude. Using the free download https://www.zeitnitz.eu/scope_en gives students a 'software oscilloscope' that uses a computer's sound card would be the next step.
- [Dancing Sprinkles](#) shows that a loud sound is capable of making small grains jump. You can use it to introduce the idea that sound is a vibration of the air.
- Classroom physics - [sound pull-out](#)

Light

- Make a [pinhole camera](#) - Pringles tubes make good ones - hole in the metal end, greaseproof under plastic cap, foil removed
- Law of reflection - **The Physics Classroom** [Who can see who?](#)
- Refraction – **PhET** [Bending light](#) and **The Physics Classroom** [Refraction and lenses](#)
- Coloured surfaces in coloured light - **The Physics Classroom** [Stage Lighting](#)
- **Marvin and Milo** [Deceptive CD](#) for colour addition, [Garden Rainbow](#)

Matter

- Density **Marvin and Milo** [Sinking sugar](#) and [Cartesian ketchup sachet diver](#)
- **Exploratorium** [Gas model](#)
- Anomalous behaviour of water **IOP Quick** [Ice-water-oil](#)
- Evaporation **Marvin and Milo** [Drinks cooler](#)

Space Physics

- **PhET** [My Solar System](#)
- Size of the universe [Magnifying the universe simulation](#), **IOP video** [The scale of the universe](#), [The powers of ten video](#), Planet separation to scale [Toilet paper solar system](#) (can also be done with string!)
- **IOP videos** [Phases of the Moon](#), [Models of the Solar System - Earth, Sun and Moon](#)

Energy

It is probably best to cover forces and electricity first and avoid energy for home-based learning. Students are likely to find many conflicting models and working independently might cause more problems than it solves.

- **Exploratorium** [Coupled pendulums](#) **Sixty symbols** [Coupled pendulums](#)
- **Marvin and Milo** [Melting race](#) for conduction
- **PhET** [Energy Skate Park: Basics](#) - has bar charts for stores emptying and filling

Other ideas

- Project-based - [PEEP](#) has lots of useful info for this sort of thing which can be matched to student interests:
Climate change, Energy resources, Transport, Public Health, Medical Physics, Weapons, Space, Communications, People, Robotics
- Video channels e.g. **IOP videos** - [Teaching astronomy and space](#) - has videos of demos as well; [Physics demonstration films](#) and [Careers Clips](#) have suitable content for 11-14 year olds.