

The PhET website

Reviewed by Eric Deeson, UK

Physics Education Technology (PhET to its friends) is the slick but not very meaningful title of a site that offers a wide range of excellent interactive physics simulations for secondary-school and university students. Based at the University of Colorado, PhET includes simulations not only of pure physics, but also of physical phenomena in biology, chemistry and earth science. There is also a category of mathematics simulations. The fact that the site is US-based is not a problem, even in terms of units – which are metric.

The PhET simulations have been specially designed so that they can be easily translated. As a result, most of the simulations are available in an astonishing variety of languages – from German, Hebrew, Czech and Vietnamese, to Finnish, Greek and Serbian. You can use all of the simulations either by running them live on the website or by downloading them.

PhET is a great resource and is regularly updated (you can follow the latest developments on Facebook and Twitter), so do not be put off by the fact that the site looks rather dated and is difficult to navigate. Checking what is new is a danger in itself, as you can easily lose several hours in play... I mean exploration. At the time of this review, examples of simulations in the 'new sims' section of the website include 'isotopes and atomic mass', 'states of matter', 'membrane channels', 'gravity and orbits' and 'build a molecule'.

After selecting a simulation, you are presented with a list of sample learning goals in addition to downloadable teaching resources related

to the simulation in question, such as student worksheets. These resources have been written by teachers and those that I have seen are of a very high quality. These are four of my favourites.

- The 'States of matter: basics' simulation, aimed at about Year 7 (ages 11-12), allows students to investigate the three main states of matter, exploring how raising and lowering the temperature affects samples of neon, argon, oxygen and water at the particle level.
- Students in Year 9 and above (ages 13+) can use the 'Gas properties' simulation to investigate the effects of volume, pressure, temperature and gravity on a gas, and discover how these properties vary in relation to each other.
- The 'Electric field hockey' simulation, suitable for students in Year 6 and above (ages 10+) is a more serious game. You have to try to control the path of a charged particle (the 'ball') through a complex space in which you place almost any number of fixed particles of the same and opposite charge. You can determine the charge and positions of the fixed particles, the mass of the ball, and the degree of difficulty, and choose whether or not to display the field lines and the ball's trajectory.
- Using the 'Capacitor lab' simulation, good Year 10 and more advanced students (ages 14+) can explore the workings of a parallel plate capacitor, altering the plate separation, area and dielectric to observe the resulting charge, field, voltage and stored energy and to

perform the calculations as the applied voltage is changed. An extended version of this simulation on a separate tab allows the students to combine two or three capacitors in various ways and observe the effects.

You must visit this site if you are involved in teaching science or physics – preferably when you have an hour or two to spare. PhET is the best source of free and effective interactive simulations in physics that I have come across!

Details

URL: <http://phet.colorado.edu>

Resources

If you found this review interesting, why not browse all the reviews in *Science in School*? See: www.scienceinschool.org/reviews



To learn how to use this code, see www.scienceinschool.org/help#QR