Using Toys to promote scientific thinking

Name and description	Image	Science opportunities	Suppliers and alternatives
Silly Putty (or Potty Putty). A non-Newtonian substance		An excellent material to stimulate thinking about particles and how they might be arranged. A good introduction to Non-Newtonian materials.	Available in many good toy and novelty shops. There are recipes to make it from PVA glue and borax (or starch) on the web.
Gauss gun (rifle): 2 powerful neodymium magnets (approx 12mm diam x 3mm thick) and 5 stainless steel ball bearings (approx 12mm diam) plus a 15 cm track		In principle this is a magnetic version of a Newton's cradle. It can be used to illustrate energy transfer and students can investigate the effects of changing the sequence of the balls. Allowing the single ball bearing to roll gently towards the magnet produces a surprising effect.	Although they can be purchased on the internet (e.g www.**grand-illusions**.com) it is cheap and easy to make them. A piece of electrical trunking makes a suitable track. An interesting approach is at http://scitoys.com/scitoys/scitoys/magnets/gauss.html
Zoids (buzz magnets, magnetic torpedoes or 'dinosaur eggs'). A pair of spindle shaped powerful magnets.		A range of magnetic effects can be explored. Elastic collisions can be demonstrated by holding the magnets slightly apart using the thumb and 3 fingers and throwing them into the air. If timed correctly the collisions produce a characteristic whirring noise. Students can be asked to explain how this happens.	Good toy shops or on-line at www.**grand-illusions**.com as 'magnetic torpedoes' or try Googling the names in the LH column.
Rattlebacks (or 'Celts') A slightly asymmetric plastic boat shaped object		Rattlebacks appear to defy the laws of motion. When induced to spin they will rotate in one direction smoothly, but when attempts are made to spin them in the opposite direction they appear to stop and change direction. The maths of this can be explored on the web by entering 'rattleback' into Google	Difficult to make. Available from good toy shops or a number of on-line suppliers, although sourcing them in the UK is now difficult. The US supplier (http://www.teachersource.com) is very reliable
Russian Rattleback		A variation of the above but in this model the centre of gravity can be adjusted by rotating the tortoises.	Available from www.**grand-illusions**.com

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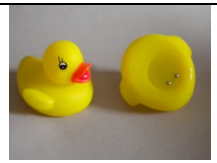
Tippe (Tippy or Flip over) tops		These tops provide an excellent thinking exercise. When set spinning they will suddenly flip over and spin on the central rod. But how does this happen? The maths is very complex but a good introduction with references is at http://en.wikipedia.org/wiki/Tippe_top	Available for toy and novelty shops and on-line from Hawkins Bazaar (as flip over top) http://www.hawkin.com/20670-13104/party-bag-filler---flip-over-top
Colour changing ('magic') pens. A set of coloured pens the colours of which are changed by a 'magic' pen		Investigating how these pens work can lead to a number of extended investigations, involving a range of laboratory techniques.	A range of manufacturers and brands available from good toy and art shops. Hamleys in London do 2 versions – one of which has 2 magic pens giving different effects http://www.hamleys.com/Colour_Magic_Pens_|_Hamleys_Toys/564195,default,pd.html
Electric ducks – plastic ducks containing an electric circuit which can be completed by bridging the 2 contacts on the base (and turning on an LED)		A range of opportunities for investigating the nature of electric circuits. A circle of people joining hands can demonstrate the ability of the skin to conduct an electric current.	Toy shops and on-line at http://www.hawkin.com/20670-09074/flashing-rubber-duck
Round (spherical) Dice		An exercise in constructing models from observations. Students are challenged to predict what the mechanism for these dice is, based on their investigations.	Available on-line from Tarquin Maths http://www.tarquingroup.com/product.php?SKU_Code=555
Fountain Connectors (or Connections) (Not to be confused with Tornado tubes!)		These are used to join two pop bottles together. Students are asked to predict what will happen when the bottles are inverted. They are then challenged to explain their observations based on their understanding of air pressure and gravity.	Available on line from Teacher Source at http://www.teachersource.com/AirPressure/AirPressure/FountainConnection.aspx
Astroblaster – a set of rubber balls fixed on a spindle to which a smaller ball can be loosely slotted on the end		A useful toy for spectacularly demonstrating elastic collisions. When dropped vertically onto a hard surface the energy is transferred to the small ball which is propelled upwards with some force (hence safety specs). Students can be asked to speculate / calculate how high a ball could be propelled.	Available from Timstar Ltd http://www.timstar.co.uk/Physics/Forces-and-Motion/Projectiles/ASTRO-BLASTER-/

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