Three abstract examples:

Measurement of the ratio h/e2 in an advanced undergraduate laboratory

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The two-dimensional integer quantum Hall effect is shown to be a feasible experiment for an advanced undergraduate laboratory. A measurement of the ratio h/e^2 yielded a value of 25,811 ± 4. The established value is 25,812.81. Techniques, which would improve this accuracy to 15 ppm, are suggested.

The flight of a balsa glider

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A simple analysis is performed on the flight of a small balsa toy glider. All the basic features of flight have to be included in the calculation. Key differences between the flight of small objects like the glider, and full-sized aircraft, are examined. Good agreement with experimental data is obtained when only one parameter, the drag coefficient, is allowed to vary. The experimental drag coefficient is found to be within a factor of 2 of that obtained using the theory of ideal flat plates.

On the rise and fall of a ball with linear or quadratic drag

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We review the problem of a vertically thrown ball, with a drag force, which is either linear or quadratic in the speed. It is stressed from the outset that these two types of drag correspond to specific ranges of the Reynolds number ($Re<1$ and $103<Re<2\times105$, respectively) and do not hold outside these intervals. We also include the buoyant force in our treatment of the problem. The equations of motion are solved analytically and several true-to-life examples are discussed. The calculations are somewhat harder than for the well-known case without drag force, but no highbrow mathematics is required and the extra effort is amply compensated by the gain in realism and surprise value.