



making physics matter

# CORNWALL PHYSICS EDUCATION PARTNERSHIP



# Physics Partners

EXPERT PRACTICAL HELP FOR SCHOOLS

## **AQA GCSE INSET 2: Dynamics and force**

**Venue:** Richard Lander School

**Workshop Leader:** Ben Lloyd-King (Richard Lander School)

Following on from the successful launch at Truro School, the *Cornwall Physics Education Partnership*, supported by *The Ogden Trust*, held its second teacher workshop on 5 December at Richard Lander School, Truro. Delegates from five local schools attended – Camborne Science and International Academy, Falmouth School, Richard Lander School, Truro School and Wadebridge School. Led by Ben Lloyd-King (Physics teacher and greenpower car coordinator at Richard Lander) teachers tackled the required dynamics practical work from the new GCSE specifications.



We have found it best to pair teachers from different schools to help provoke further discussion and sharing of ideas when testing out the practicals. It also helps to start attempting the practical with just a brief introduction from the workshop leader-- too much explanation beforehand can stifle the opportunity for the teachers to collaborate. The practicals on acceleration of trolleys, stretching of springs and measuring of density seemed simple enough, but the experience of trying to set them up showed the important thinking skills required. It was a challenging and

enriching experience evaluating the practical arrangements and discussing how to improve the quality of data and create alternative arrangements. Replicating such discussions with pupils would be a very good way of ensuring pupils cover the whole range of Bloom's taxonomy. The new GCSE theory papers will cover questions on the standard practicals, including methods of analysing results and ways of improving reliability, precision and accuracy of the recorded data. The workshop teachers began to troubleshoot the types of questions that might be asked.

Measuring the density of sand proved a little tricky and is well worth using with pupils when it comes around to measuring the density of irregular objects. This simple practical

is one of the standards required for the AQA GCSE. It may well have been work pupils completed earlier in Key Stage 3 and as such may be viewed by them as being rather trivial. However, while pupils may be familiar with the water displacement method, asking them to find the density of sand may prove to be quite challenging; it would be worth asking them to estimate how much of the apparent volume of sand in a measuring cylinder is air before attempting the required measurements. Be prepared to let the pupils have time to repeat their attempts.

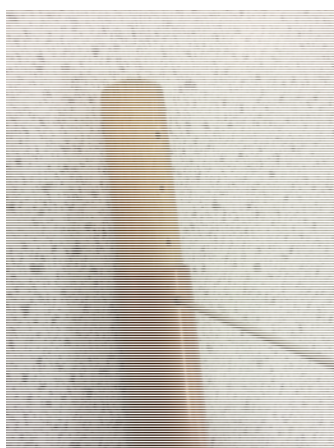
For the datalogging dynamics practicals, schools may not have enough equipment for all pupils to work simultaneously. We discussed ways in which schools could manage this: for example, a circus of different practicals could be used (as for the teacher workshop), or practicals interspersed with GCSE theory questions related to the practicals. After each practical, pupils could then share their experience of some of the pitfalls of the practical before the next group makes their attempt.

Falmouth School has introduced a number of excellent new teaching and learning approaches, most notably Kagan Cooperative Learning. It was agreed that in our next workshop on electricity the Falmouth hosts would share appropriate Kagan structures they would use to help stimulate cooperative learning during practical work.



An essential part of our workshops is the session where teachers share their best ideas related to the themed workshop. Adam Laity from Truro School brought along a homemade spring-loaded launcher. In this contraption a compression spring is used to project a wooden dowel vertically in the air. Pupils can investigate how the maximum launch height reached is related to the compression distance. This is a good mini-investigation to get pupils thinking and being resourceful. For example, measuring the height reached could be aided by using the video facility on a smartphone. The design of the launch mechanism is illustrated below:

- steel compression spring
- dowel with regular holes drilled
- copper pipe with a hole drilled in – to allow a steel pin to be inserted as the “trigger” release mechanism



The whole year's AQA GCSE programme is detailed below:

School	Topic	Pre-training afternoon: <i>Week beginning . . .</i> <i>(time schedule to be confirmed)</i>	INSET Training Workshop afternoon: 3.30pm – 6pm <i>Week beginning . . .</i>	Physics Teacher INSET Leader
Truro	Waves, light and optics: reflection, refraction	Mon 26 Sept	Mon 10 Oct	Adam Laity
Richard Lander	Dynamics: acceleration, work done by a spring, $F = ma$ , momentum, density	Mon 21 Nov	Mon 5 Dec	Ben Lloyd-King
Falmouth	Electricity: I-V characteristics, circuits	Mon 16 Jan	Mon 30 Jan	Joe Robins
Camborne	Heat: SHC, infra-red emission and absorption, thermal insulation	Mon 6 March	Mon 20 Mar	George Reynoldson
Wadebridge	Electromagnetism: transformers, the motor effect	Mon 26 June	Mon 10 July	Jayne Williams