

For Primary Schools and Teachers of S1/S2 courses

STS National Support Services in
Science, Technology, Safety

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The revised 5-14 guidelines have been simplified and now appear easier to understand and map. Or perhaps we are all just more experienced through repeated exposure to the original document? Teachers are reminded that what they offer must not only be good fun but that there should be measurable learning outcomes. Sounds fair enough. To the regret of some, Environmental Studies have also been deconstructed (as the literary critics would say). This, somewhat arbitrary, divvying up into ICT, Social subjects, Technology and Science means that it is now less easy to conceal a lack of real, appropriate, science and technology in some topics or projects. One, somewhat jaundiced, view is that it's now "harder to find places to hide". We take a more relaxed, less cynical, line. It can be useful for planning purposes separately to identify Attainment Targets for the various components of Environmental Studies. It is also perfectly possible to plan an activity, topic or project which covers several Attainment Targets from the various bits. We can then still have cross-curricular topics having a degree of rigour, with a 'joined up' feel to them and still 'fun' to learn and teach. To that end this edition looks at some selected activities illustrating technological and social aspects of "The Romans" from a Primary topic of that name. It also contains a science investigation.

The Romans

As is our usual practice, suggested activities have been trialled, in this case all successfully, with children. The relevant attainment targets are taken from across Environmental Studies and include:

<i>Social subjects</i>	Describe some features of life in the past
<i>Technology</i>	Design and modelling of a useful artefact
<i>Science</i>	Describe what happens when materials are burned
<i>ICT</i>	Searching and researching, creating and presenting

Deconstruct the described activities, if you can, and match them to the relevant attainment targets. Note too, the opportunities to develop literacy skills.

Lead Kindly Light

To keep a lamp burning we have to keep putting oil in it.

Mother Theresa

We are spoiled nowadays. Most of our domestic electrical appliances react to the flick of a switch. Before, we used oil lamps fuelled by paraffin or, environmentally unfriendly whale, oil. We had candles of tallow or paraffin wax and then we used gas lighting.

Figure 1

Shop bought model lamp



In Roman times, primitive oil lamps were in use with olive oil as fuel. Making a model oil lamp is a fairly straightforward exercise using a favourite modelling material, plasticine or modelling clay.

One type of modelling clay we have used is FIMO supplied by Opitex, this has the advantage that the finished model can be fired in an oven. The disadvantage is that it cannot be used again, so it could be pricey. We show examples of a shop bought lamp (Figure 1) and one made from FIMO (Figure 2 below).



Figure 2 'Homemade' model lamp

The strange colour of our lamp is because the children used up all of the bright colours making their lamps. We were left with a little black, purple and white. It does, however, have that antique, somewhat distressed, look. We filled our lamp with olive oil and used a cotton wick. As you can see from the photograph it worked well. Note that such working models should not be made with ordinary, soft, modelling materials.

* * *

*Lord Finchley tried to mend the Electric Light
Himself: It struck him dead: And serve him right!
It is the business of the wealthy man
To give employment to the artisan.*

Hilaire Belloc

Burning questions

So much for Roman artefacts. Now for the science. Why does the wick in the lamp burn so brightly? It must be the oil of course, but what would happen if we cover the lamp? Would it continue to burn? As we probably do not have an authentic Roman lamp (having sold it to buy books) we can try with some other type of flame source, in this instance a nightlight. If we place a small drinking glass over a burning nightlight what happens? After a few seconds it goes out. Why? Now place a burning nightlight in a saucer of water and cover it with the drinking glass. What happens? Water enters under the glass, probably covering the night light.

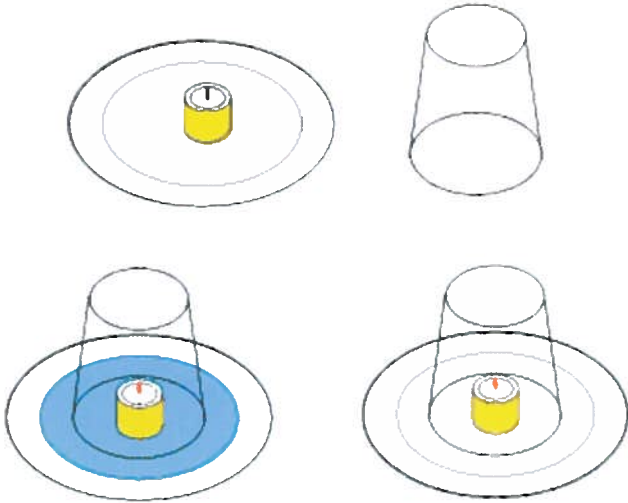


Figure 3 Candle in a jar - investigations into burning.

We can ask why this happens and likely we'll receive a number of interesting answers. We know that a goodly part of the oxygen in air, which supports burning, has been used up and is replaced by water. For pupils it may only be necessary to explain that part of the air has been used up and that water replaces it. Just like children do now, Joseph Priestley struggled to explain what happens during burning, and he was by then well grown. In the 18th century, he carried out experiments and investigations of the *candle in the jar* type. He it was who coined the word *phlogiston*, for stuff which he thought was contained in everything that could be burned and was given off in the process. The other stuff left behind after burning he called *calx*. This *Phlogiston Theory*, that things lost weight when they burned, lasted for quite a wee while. In fact many pupils, and not a few adults still, are members of the Priestley fan club. It's just that they don't realise it!

Then a Frenchman, Antoine Lavoisier, experimented further. Using Priestley's basic approaches, but weighing everything before and after, he found that some substances were actually heavier after burning. Lavoisier then burned tin in a sealed flask. If Priestley was correct, when the seal was broken air should have come out of the flask.

To Lavoisier's delight the opposite happened. Some of the air had been used up. When the seal on the container was broken, more air rushed in to fill the flask. The air ('air' in those days also stood for 'gas') that had been used up he named oxygen.

Why "oxygen"? (Or "how?" if you prefer the Scots!)

Gladiators and Chariots

The film *Gladiators* gave one version of life in ancient Rome and mayhap a reasonable picture of aspects of the games. Chariot racing was a pastime enjoyed by the wealthy. It was ancient Formula 1 - a dangerous and costly sport. Our chariot is neither dangerous nor costly and is sized for one of the 'Borrowers'. It is also easy to make. Whilst our photograph (Figure 4) shows one way, there are many other possible designs.

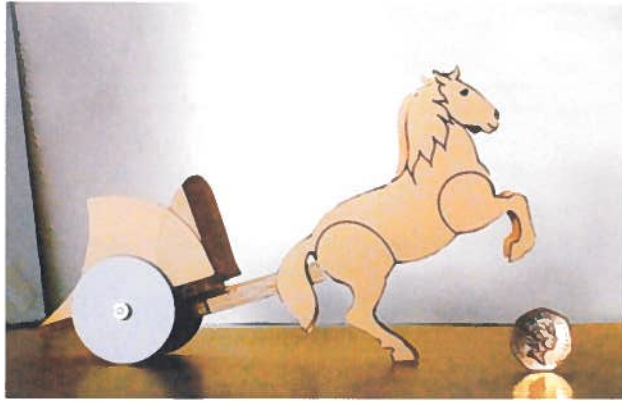


Figure 4 Roman chariot model made from card (fifty pence coin for scale).

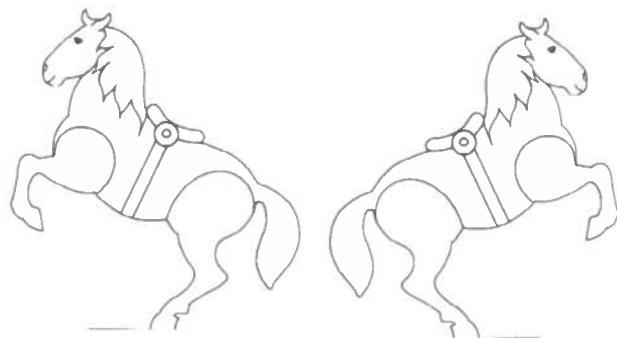


Figure 5

Figure 6

Figures 5 and 6 provide sketches as left and right hand templates. These need to be enlarged in the photocopier on card. The children then can cut them out to represent the two horses. More on the chariot later (see note at the end on the availability of kits).



*Bring me my Bow of burning gold;
Bring me my Arrows of desire;
Bring me my Spear: O clouds unfold!
Bring me my Chariot of fire!*

MILTON Poem in 2 Books
W Blake 1804

Sticks and Stones

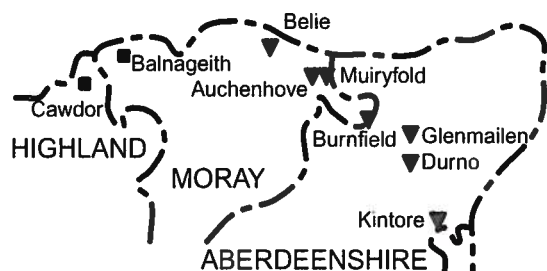


Figure 7 Map showing various Roman remains in North-east Scotland.

Romans conquered much of what is now the European Union, building forts throughout southern and eastern Scotland and as far north as Moray (see map, Figure 7 above). A fuller map showing the various known forts, camps, settlements and defensive works in Scotland is available on the web at :

http://www.morgue.demon.co.uk/Pages/Map_pages/MAP6.HTM

This shows so many symbols for the varied Roman remains in Scotland that it resembles a plum duff. It is just too difficult to reproduce here on a relatively small scale.



Figure 8 'Roman legionaries' operating an onager.
(See www.esg.ndirect.co.uk/artiller.htm)

A major reason for the success of Rome was its highly disciplined and well equipped army. The Legions had weapons that must have terrorised many of the people in lands they invaded. One such major weapon was the onager* (Figure 8). This was like a modern field gun but, instead of shells, it propelled large stones.

Figures 9 and 10 show a working model of an onager. Should you build one of these you will understand why it was so called. "Onager" is a name for the wild ass of Central Asia - ergo - the weapon has a kick like an ass.

For advice on safety when testing an onager, or other catapult-like device, see Section 5 "Forces and Motion" in the new, third, edition of ASE's *Be safe!*

*Footnote : *With apologies to Len and Dick of the weel kent 'Rude Mechanicals', from whom it may be thought this idea was stolen. Honestly boys, it's just happenchance although the use of string with a lever rather than an elastic band was pure Midsummer's Night Dream.

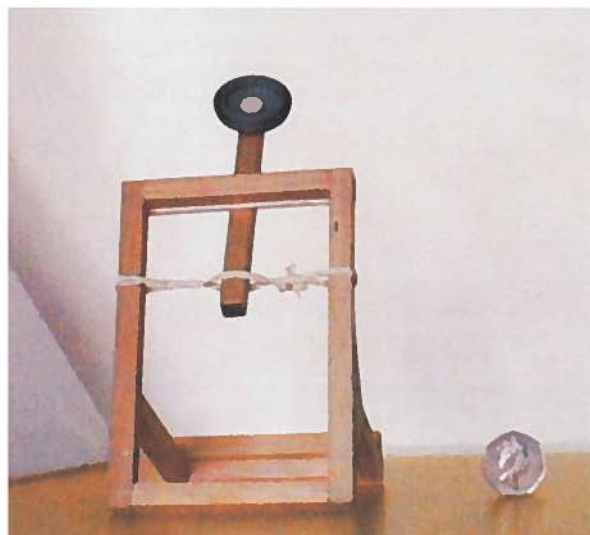


Figure 9 Working model of an onager

Kits

We have a simple kit of parts to build an onager with wood already cut to length. All that is needed is some accurate assembly work, wood glue and a length of string. An onager kit costs £2.00 including postage.

A kit of parts for a chariot with templates that can be photocopied and all other necessary parts is also available from SSERC at the same price.

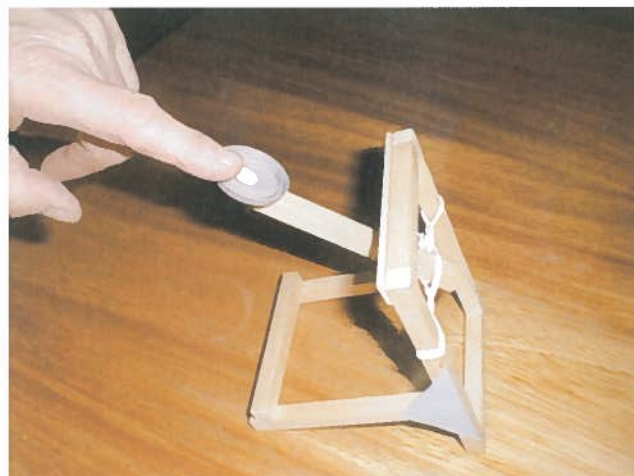


Figure 10 A model onager in action

Address details

OPITEC Educational Materials Ltd, 7 West Road, Woolston, Southampton SO19 9AH Tel. 023 8044 65 15
Fax 023 8044 6991 Web: www.opitec.co.uk
Email: info.uk@opitec.com

Rude Mechanicals, The Schoolhouse, Morebattle, Kelso, TD5 8QG Tel 0157 440537 Web: www.mechanicals.co.uk

For useful gateways to more web sites on Romans see:

www.bbc.co.uk/education/romans/resources.html

and

www.learn.co.uk/guardianarchive/webguides/romans.htm

Components & Materials

Item	Description	Price
593	Miniature motor, 1.5V to 3V, 2mm dia. shaft	30p
614	Miniature motor, 3V to 6V, 2mm dia. shaft. Both motors above can be used for project work but they run at fairly high speeds, some gearing will be required. See worm/gear, item 811.	45p
621	Miniature motor, 1.5V to 3V, now with 8 tooth pinion. The open body of this motor makes it ideal for showing how such a motor is constructed	25p
798	Pack of 24 gears, 6 each of 12, 20, 30 or 40 teeth, dia.15, 22, 32 and 40 mm. 12 tooth gear fits motor shaft and 40 tooth gear push fits in cotton reel	£2.00
799	Pack of 24 cams, 6 of each of 4 shapes	£1.00
800	Pack of 100 wheels, 39 mm dia., assorted colours, 3 mm axle hole	£5.25
811	Worm and gear, 34 to 1 speed reduction	35p
817	Axles 3 mm dia., nickel plated, round ends, push fit on SSERC plastic wheels, gears and pulleys: 70 mm long, per pack of 4	40p
818	As above but 95 mm long, pack of 4	40p
819	As above but 12 mm long, pack of 4	40p
820	Worms to fit 2 mm electric motor shaft, pack of 5	£1.00
821	Reducers 3mm to 2mm enables gears, pulleys and wheels, to be fitted to motor shaft, per 5	25p
867	Reducers, 4 mm to 2mm, as above, per 5	25p
868	Reducers, 4 mm to 3 mm, as above, per 5	25p
710	Sonic switch. Clap your hands, the motor starts, clap again the motor reverses and on the third clap the motor stops. Needs 4 AA cells.	85p
723	Microswitch miniature, lever operated	40p
822	Plastic toggle switch, low voltage	40p
688	Crocodile clips, red, miniature, insulated	5p
759	As above, but black.	5p
788	Crocodile leads, assorted colours, insulated croc. clips at ends, 36 cm long. Pack of 10	£1.35
835	2 x AA Cell ('battery') holder	15p
845	2 x C Cell ('battery') holder	20p

Item	Description	Price
789	MES (miniature Edison screw) bulbs 3.5 V	10p
691	MES battenholders for above.	20p
866	Lens end lamps, 1.2 V MES. Ideal for use where a narrow, concentrated beam of light is needed. Bargain pack of 100	£3.50
508	LED (light emitting diode) 3 mm, red, per 10	50p
761	LED 3 mm, yellow, per 10	60p
762	LED 3 mm green, per 10	60p
790	3V buzzer (works with solar cell see Item 838)	55p
846	Sound module with 'melody' chip	£1.00
838	Solar cell, 100 x 60 mm, 3.75 V per cell, max.	£2.10
839	Solar motor, body 25 dia. 12 mm long with shaft 2 mm dia 6 mm long	£1.70
840	Solar pack : one of each solar cell, solar motor propeller (801), and 3 V buzzer - with notes.	£3.75
836	Motor mounts, plastic, push-fit with self adhesive base pad for SSERC motors 593 & 614, 10pk	£2.35
801	Propeller, 3 blade, to fit 2 mm shaft. Blade 62 mm long	35p
792	Propeller kit with hub and blades for ten 3 or 2 bladed propellers	£3.50
794	Cotton reels (for making buggies, rubber powered tanks etc.) pack of 20*	75p
796	Pack of 20 pulleys, 5 of each of 10, 20, 30 and 40 mm diameters.	£2.50
837	Ring magnet, 40 mm o.d., 22 mm i.d.	35p
815	Ceramic square magnet, 19 x 19 x 5 mm	15p
823	Ceramic magnets, poles at ends, 10 x 6 x 22mm	12p
824	Ceramic magnets, poles on face, 25x19x6mm	35p
861	Bimetallic strip, 10 cm length	30p
882	Quartz clock movement , dimensions 56x53x17mm, with wall hanging bracket, Suitable for dial thickness up to 10mm. Includes plastic hands suitable for dial diameter to 200mm. Requires an AA battery. See CD Clocks, Newsletter 18.	£1.75
884	Onager kit. Wood cut to length etc.	£2.00
885	Chariot kit. Templates and parts.	£2.00

*Item 794 ~~Not~~ 200 as previously stated in error

An interactive, web page version of this Newsletter with links to sites on 'The Romans' has already been posted on the SSERC site : www.sserc.org.uk

Prices do not include VAT which will be charged at the ruling standard rate. Cash with order only when total value is less than £5 and please add £1 for carriage solely to these small orders (except where an inclusive price is indicated eg kits, etc). For orders totalling more than £5 please do not send payment etc but await delivery and then pay on our advice note or invoice.

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