

Science & Technology Equipment News

For Primary Schools and Teachers of S1/S2 courses

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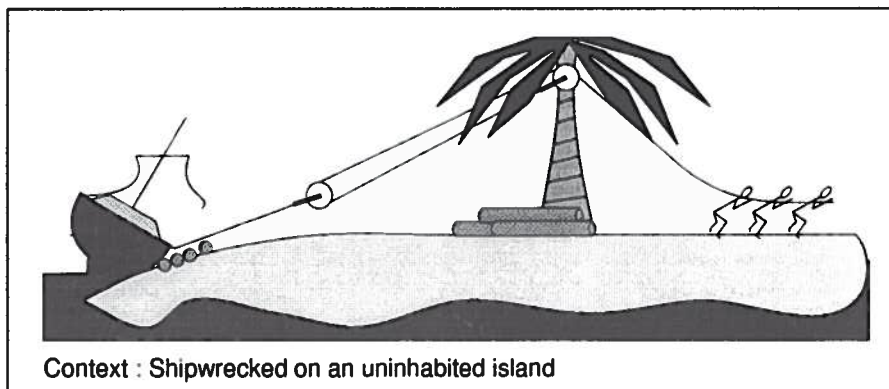
STS National Support Services in
Science, Technology and Safety

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SCOTTISH SCHOOLS EQUIPMENT RESEARCH CENTRE

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At recent twilight in-service sessions, we were taken to task for not putting enough of the activities fully into the context of work with pupils. We thought it best not to patronise a primary sector audience and allow them to form their own professional opinions on how best to present material in their own classrooms. This time such an approach was not appreciated by many participants. We gave in. The work was put into the context of a science topic - a shipwreck, on an uninhabited island, of the Robinson Crusoe type. With this recent INSET experience in mind, subsequent discussion with a concerned primary advisor, and certain evaluation questionnaire comments; we have yet again changed the format of the News. Herewith - more kits, one on the Shipwreck theme the other with a Victorian Factory context. What we would, really, really like, is to hear directly from teachers, as to the format and content they would find most useful. We would be delighted to have constructive comments on *The News* or any ideas for inclusions. Our 'phone, fax numbers, address and email details are given above - let's hear from you.

Understanding Energy and Forces *Forces and their effects : Pulleys*



Context : Shipwrecked on an uninhabited island

The Shipwreck.

One of the first tasks for our castaways will be to get useful items from the wreck to the place chosen for shelter. This assumes the wreck is washed up on or near the beach. How can the survivors move heavy pieces of material and equipment up a sandy beach? What other problems would they encounter attempting to move materials over both hard and soft sand? A windlass kit (Figure 1) we think could be used with children from P3 to P6. In the first instance pulling loads by a handle, and progressing to driving the windlass by pulley and electric motor. All the bits necessary for manual operation are supplied with a kit, as are full construction notes. If need be, we can supply additional parts to motorise the windlass. Once one model has been made, it should be easy to make others. We suggest that you use our design at first before going on to suss its many possible variations.

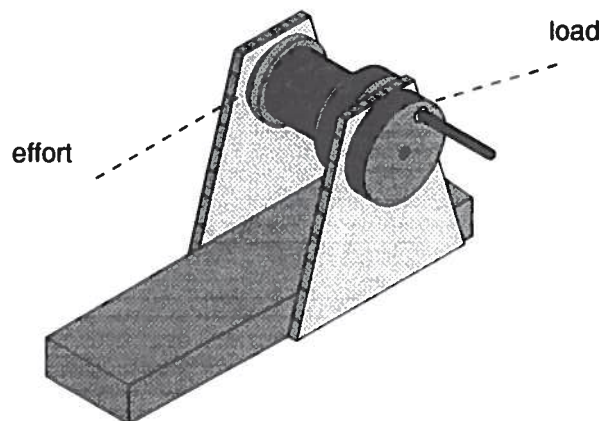


Figure 1 Windlass

Something to your advantage

A simple pulley block can be made with a cotton reel, some scrap corrugated plastic (eg Corriplate), three wire nails and a length of 25mm ribbon or tape. Figure 2 shows some construction details. *Safety note* - the pointed ends of the nails should be removed or flattened before the children handle them. Use a 'Junior' type hacksaw or a couple of taps with a hammer. The ribbon or tape should be attached as shown in the sketch. A system of two pulleys should in theory give a force advantage of 2. Alas this does not work in practice. Why not?

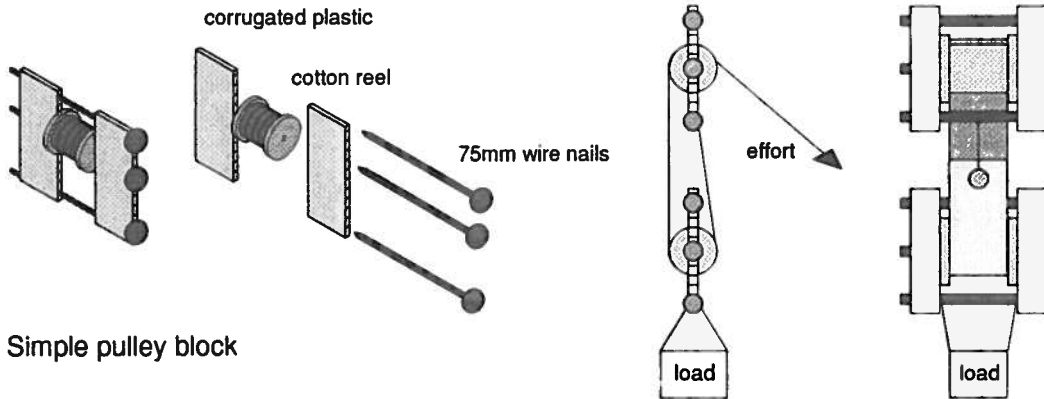
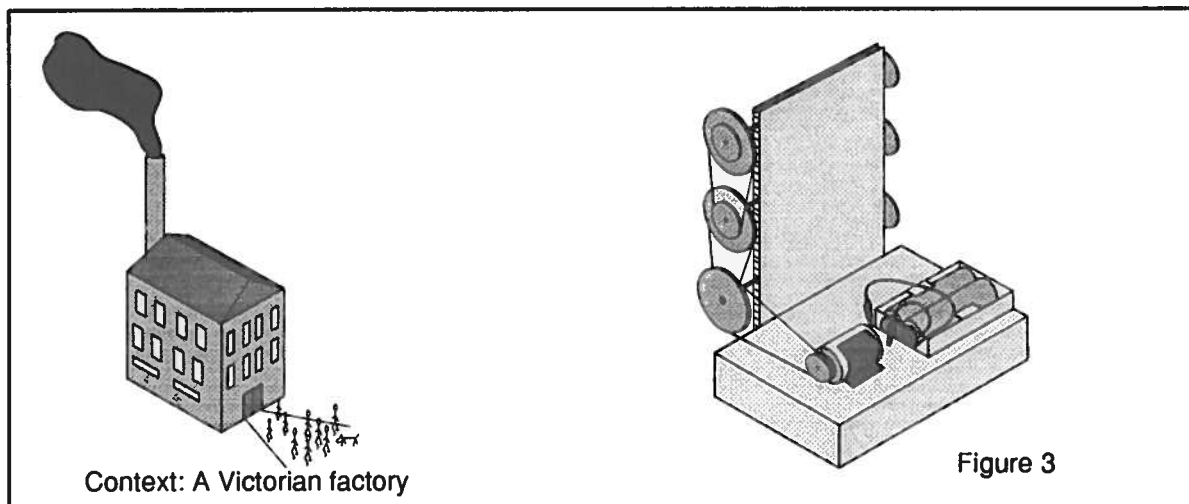


Figure 2 Simple pulley block



Context: A Victorian factory

Figure 3

Dark Satanic Mills

This next is a further kit of parts to build a Victorian factory pulley system. Well - perhaps to build an example of changing output speed using pulleys. For an impression of the finished model see Figure 3.

Once again we offer all the parts necessary to build your first model. We will be delighted to hear of modifications or new designs, or even how easy or difficult the kit was to assemble.

Factory kit with all parts ready for assembly. Includes :

- | | |
|-------------------|---------------|
| 3 pulley wheels | 9 spacers |
| 1 battery holder | 2 AA cells |
| 1 battery clip | 1 motor 3V |
| 1 motor mount | corr. plastic |
| 2 wooden supports | 1 wooden base |
| d/sided tape. | 1 switch |

£3.50 including postage and VAT

Shipwreck Topic Kits : It should be noted that the diagrams are only intended as indications of the designs. We reserve the right to make changes in the interests of continuous product improvement!

Windlass kit with all parts ready for assembly including teacher's notes. Includes :

- | | |
|--------------------|------------------------|
| 1 axle | 1 cotton reel |
| 2 pulley wheels | 1 plastic wheel/handle |
| 2 corriflute sides | 1 wooden base |

£3.00 including postage and VAT

Windlass kit upgrade with electric motor. Includes :

- | | |
|-------------------|-------------------|
| 2 crocodile clips | 1 pulley |
| 1 battery holder | 2 AA cells |
| 1 motor 3V | 1 motor mount |
| 1 wooden base | double sided tape |

£2.50 including postage and VAT

Science

Understand Energy and Forces

P1/P3 Forces and their effects :

- the effects of pushing, pulling, floating, leading to the idea of force
- moving and stopping effects.
- the turning effect of force.

Difference between pulling through water and sand on the beach.
Difference in stopping on land and on water, why? Using a windlass to move heavy loads.
(A system similar to that used in an old fashioned well).

P4/P6 Forces and their effects :

- friction on different surfaces, reducing friction
- measurement of force
- unit of force

Following on from above investigate the difference the position of the winding handle has to the effort needed to move the load. Positional difference is the distance from the axle. Perhaps a larger diameter wheel? Change the windlass to a block and tackle. Move load over a variety of surfaces. Forcemeters to measure effort required to move load. Introduce friction. Why it is there and how it can be reduced? Try rollers, wetting the surface, wheels or a sledge. Simple pulley systems for speed changes.

P7/S2 Forces and their effects :

- simple pulley system
- measurement of force
- units of force
- lever as a force magnifier

From above continue with block and tackle and forcemeter, units of force. Levers as force magnifiers. Simple pulley systems for speed changes.

Technology

Understanding and Using Technology in Society

Understanding and Using the Design Process

Technology in Society :

- technology and human need
- technology to control the environment

Using the Design Process

- devices and tools associated with control and their application
- effectiveness of design in creations/systems and environments

- P1/P3** Moving loads with the aid of a single pulley wheel or windlass.
- P4/P6** Follow on from P1/P3. Building structure to support pulleys in moving loads. Design and build a motorised windlass.
- P7/S2** Design and build both a manually operated and motorised crane using pulley blocks. Design and build a motorised buggy using pulleys to effect speed control.

Components & Materials

- | | |
|--|--|
| <p>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 form of gearing will be required. See worm/gear, item 811 45p</p> <p>621 Miniature motor, 1.5V to 3V, <u>now with 8 tooth pinion</u>. The open body of this motor makes it ideal for showing how such a motor is constructed. 25p</p> <p>798 Pack of 24 gears, 6 each of 12, 20, 30 or 40 teeth, dia. 15, 22, 32, 40 mm. 12 tooth gear fits motor shaft and 40 tooth gear is push fit 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 diameter, assorted colours, 3 mm axle hole £5.25
 811 Worm and gear, gives a 34 to 1 speed reduction. 35p</p> <p>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 95mm long, pack of 4 40p
 819 As above but 120mm long, pack of 4 40p</p> <p>820 Worms to fit 2mm electric motor shaft, pack of 5 £1.00</p> <p>821 Reducers 3mm to 2mm enables gears, pulleys and wheels, to be fitted to motor shaft, per 5 25p
 629 Dual tone buzzer with flashing light supplied with PP3 battery clip. Ideal for model burglar alarms, warning barriers, police car etc. 55p</p> <p>710 Sonic switch. Clap your hands, the motor starts, clap again the motor reverses, on the third clap the motor stops. Needs 4 AA cells, not included. 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</p> | <p>788 Crocodile leads, assorted colours, insulated croc. clips at ends, 36 cm long. £1.35</p> <p>835 2 x AA Cell ('battery') holder 15p
 845 2 x C Cell ('battery') holder 20p</p> <p>789 MES (miniature Edison screw) bulbs 3.5 V. 9p
 691 MES battenholders for above. 20p
 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</p> <p>790 3V buzzer. 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 £1.95p</p> <p>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</p> <p>794 Cotton reels (for making buggies, rubber powered tanks etc.) pack of 20. 75p</p> <p>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
 824 Ceramic magnets, poles on face, 25x19x6mm 35p
 823 Ceramic magnets, poles at ends, 10x6x22mm 12p
 825 Forehead temperature strips, liquid-crystal type, 36-40°C (96-104°F), [store in cool cupboard] 50p
 833 Floppy disks, 5 1/4" double density, box of ten 60p
 834 As above but double sided high density, ten 60p</p> |
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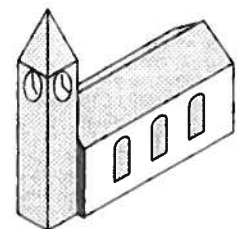
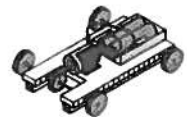
Cash with order only when total value is less than £5 and please add £1 for carriage solely to these small orders (except where an inclusive price is indicated eg kits, etc). For orders totalling more than £5 please do not send payment etc but await delivery and then pay on our advice note or invoice.

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Buggy pack £5 and Paper Engineering pack £2. See News No. 10. Solar cell and motor pack - see Item 840 in the listing above. Copyright free Skeleton template £1.25. Two new kits - inside.



For SSERC Primary Graphics - see News No. 13. and for inexpensive 5 1/4" Floppy Disks (3" sold out) Items 833 & 4.