KEY STAGE 3

HOW SCIENCE WORKS *INTERACTIVE*

PHYSICS V1.0

Getting Started

RISING STARS

www.risingstars-uk.com

Contents

Introduction

This booklet provides the on-screen Getting Started instructions (in the 'investigation' section of each unit) from the *How Science Works Interactive Physics* CD-ROM in printed form. It should be used alongside the CD-ROM to facilitate discussion and planning of the investigations particularly if they are to be carried out by students with minimal teacher support.

4.1 Energy Transfer and Electricity: *Bulbs in parallel circuits*

In an electrical circuit the voltage from the battery pushes the current round the circuit. We can work out the transfer of energy each second – the power or 'wattage' – using this equation: watts = volts × amps.

Click on the ***e*** button to find the equipment you need to begin your investigation.

Change the components in the circuit and measure the current and voltage at different points using the meters provided. Record your results and work out the power transferred by each component and the power output by the battery.

Go to the follow-up screen and work through the questions and challenges in each section to extend your thinking and learning.

4.1 Energy Transfer and Electricity: *Selecting the right glass*

Choose a type of glass to investigate from the drop-down menu at the top of the clipboard and choose the glass thickness. Record the information given about that glass using the data handling tool. Investigate how long it takes the air in the conservatory to warm up to the external temperature of 20°C by clicking the 'minutes' button and watching the thermometer in the conservatory. Record and plot your results.

Continue to choose different types and thicknesses of glass to investigate and record.

NB: The 'special coating' reflects heat. If a glass is given a '1', only one side (the outside) of the glass is coated. If a glass is given a '2', both sides are coated.

Go to the follow-up screen and work through the questions and challenges in each section to extend your thinking and learning.

4.1 Energy Transfer and Electricity: *Energy transfer in dead bodies*

Click on the ***e*** button to find some equipment. You may decide to use these to provide you with missing data. Alternatively, you can input any data you want into the body mass, liver temperature and ambient temperature sections on the chart.

The estimated time dead is automatically calculated.

To compare the bodies, start your investigation by deciding which variables you want to fix and which you want to vary. Click 'next crime scene' to choose which bodies to compare. Record your results in a table.

Go to the follow-up screen and work through the questions and challenges in each section to extend your thinking and learning.

4.2 Forces:
Balancing forces

The wood is vertical when a combination of the effects of four weights is balanced.

Click on the ***e*** button to find the equipment you need to begin your investigation. Drag and drop the weights onto the workbench to begin your investigation.

Move the wood to a vertical position by dragging different weights to all the strings. There are a number of ways to combine the weights. Find at least **three** different combinations each time before clicking the 'start again' button. Record and present your results to show the patterns in the data.

Use the timer to record how long you took. Record and plot this data to investigate your learning curve.

Go to the follow-up screen and work through the questions and challenges in each section to extend your thinking and learning.

4.2 Forces:
Electromagnetic forces

Click on the ***e*** button to find the ruler that can be dragged to the workbench and rotated.

Change the current in the coil by clicking on the ammeter. Measure the effect on the circular magnet. Record and plot your results.

Go to the follow-up screen and work through the questions and challenges in each section to extend your thinking and learning.

4.2 Forces:
The pressure of 1 bar

Click on the ***e*** button to find the equipment you need. Drag the weights to the workbench and choose a tube to begin your investigation.

Notice that the mercury has already been pushed a little way round. This is because the weight of the platform on the 1 cm^2 tube is 0.5 N. The weight of the platform on the 2 cm^2 tube is 1 N.

Add weights to the platform to push the mercury round the tube. Record and plot the different heights and the difference in height between the two columns as you change the weight on the platform. Repeat the investigation using the other tube and record/plot your results again.

Go to the follow-up screen and work through the questions and challenges in each section to extend your thinking and learning.

5.3 Earth, Space and Beyond: *Watch the Moon*

Click on the 'days' button to view the Moon each night over a 30-day period. On the 6th, 7th and 8th nights, you will see that more than 90% of the Moon is illuminated. On the 21st, 22nd and 23rd nights, you will see that less than 10% of the Moon is illuminated.

For each night record your estimate of the amount of the Moon that is illuminated. Show your estimates as percentages. Plot your results.

Go to the follow-up screen and work through the questions and challenges in each section to extend your thinking and learning.

5.3 Earth, Space and Beyond: *Earth's orbit around the Sun*

Click on an Earth to display its distance from the Sun and its angle from the Earth that is closest to the Sun. (The Earth closest to the Sun is highlighted for this investigation's purposes by a dotted line to the Sun.)

Click on the ***e*** button and drag and drop each new Earth into its correct position. Record and plot the distance and angle of each Earth from the Sun.

Click on the ***e*** button again to drag and drop each season label to the Earth that is correctly positioned relative to the Sun during this season in the Northern Hemisphere.

Go to the follow-up screen and work through the questions and challenges in each section to extend your thinking and learning.

5.3 Earth, Space and Beyond: *Jupiter's moons*

Io, one of Jupiter's moons, orbits Jupiter every 1.77 (Earth) days.

Information about the four moons is revealed by clicking on each one. Click on the '1 × Io orbit' to begin the movement of the moons around Jupiter.

Complete the table with each moon's approximate orbit time. Print or save your results.

Go to the follow-up screen and work through the questions and challenges in each section to extend your thinking and learning.

RISING STARS

Rising Stars UK Ltd
22 Grafton Street
London W1S 4EX

For more information about the How Science Works Interactive series:
0800 091 1602
www.risingstars-uk.com/hswphysics