GNOMON

Newsletter of the Association for Astronomy Education

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A grant from The Royal Astronomical Society enables "The Universe in the Classroom", the Newsletter of The Astronomical Society of the Pacific, to be sent to members with issues of "GNOMON".

BUMPER AUTUMN ISSUE! *PLEASE NOTE:*

There are many enclosed items in this issue of Gnomon.

You should have:

1) A RENEWAL NOTICE - please deal with that now to save us mailing out reminders! Thanks
2) Universe in the Classroom - the usual good value publication from the Astronomical Society of the Pacific
3) A leaflet on Choosing a Telescope - from the National Astronomy Week team (written by AAE council member, Steve Tidey)
4) The National Astronomy Week events listings - just in time!

EDITORIAL COMMENT

This is my fourth issue of GNOMON. It seems like only yesterday that I took over the reins from Eric Zucker. It's been a busy year for many people in the astronomy field in getting ready for National Astronomy Week and also the IAU colloquium.

In this issue you will find a couple of pieces of interest from the Colloquium. More will follow over the next issues as there was far to much in the way of good and useful information to cram it all into one issue.

Also in this issue is some information about the solar and lunar eclipses of this year. Make the most of the suggestions on observing if you can and it isn't cloudy. Readers reports are welcomed, so if you and your class, or just you manage to make some worthwhile observations which you think may be of interest to the readership then please send them in.

For those of you with internet access, the AAE now has web pages! Over the coming months these will be changing as we put in links to useful things. Please make us your first stop on the net and we will try to make sure that we have links to the most useful teaching and information sources for you so that you don't have to surf for them yourselves. More in this issue.

Finally, I want to draw your attention to the notice above and the leaflet enclosed (in among the many) about renewals. The AAE is undergoing a process of change in determining what are the best services that we can provide for our membership. We hope that GNOMON is also proving to be a valuable resource. There are plans in the pipeline for updating some of the resources that we have available and with the new equipment for our INSET courses, we hope to be even better value in the future. The AAE does depend on its membership to enable us to continue to be there when we are needed. Please take the time to fill out and send off the renewal form now so that we don't have to use our precious resources mailing out reminders!

Many thanks!

MEMBERSHIP of the AAE costs £10.00 a year for individual members, £15 for corporate membership and £5 for retired persons. For more information, contact Nik Steggall (address letters to: AAE, Royal Astronomical Society, Burlington House, Piccadilly, London W1V 0NL). Members receive 4 issues of GNOMON a year.

GNOMON - definition from the **Concise Oxford Dictionary:**
Pillar, rod, pin or plate of sundial, showing time by its shadow on marked surface; column, etc. used in observing sun's meridian altitude

Subscription Rates:

Individual Members	£10.00
Retired Members	£5.00
Corporate Members (e.g. schools, colleges, etc.)	£15.00

Corporate Members will receive three copies of *Gnomon*.

Extra Copies:

0-10	£1.00 per copy
11-50	£0.75 per copy
51-	£0.50 per copy

Back numbers, not less than one year old, half these prices.

There will generally be a 10% discount to AAE members on all publications and advertising rates.

Practising teachers may claim their subscriptions as an allowance against income tax, thereby effectively reducing their contributions.

All communications (except those to the Editor) should be addressed to:

The Association for Astronomy Education,
The Royal Astronomical Society,
Burlington House, Piccadilly,
LONDON. W1V 0NL.

Editor: Alex Lovell, Vaughan, Wistow Hall, Kibworth Road, Wistow, Leicester LE8 0QF - for all enquiries concerning the Newsletter.
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Advertising Charges:

Whole page	£120
Half page	£60
Quarter page	£30
Inserts	£75*

* These may be of any size which may conveniently be inserted into the newsletter. There may also be an additional charge for posting if the inserts are heavy.

The prices are for *one* issue.
A 25% reduction is made for advertising in all four issues.

Publication Dates:

These are the equinoxes and the solstices, that is four times a year. Copy deadlines are two months *before* these dates.

FOR YOUR INFORMATION . . .

About our President . . . AAE president Alan Pickwick has also just been awarded the honour of becoming the Chair of the Royal Astronomical Society Education Committee. This is a great honour and a great opportunity for both organisations to ensure that they work closely. Alan mentions that this is also the first time a working teacher (Alan teaches at Manchester Grammar School) has been Chair of the RAS Education Committee. Congratulations Alan!

Astronomy Speakers List Those AAE members who are also ASE members in the London area will have recently received a list of professional astronomers, mostly from UCL, who are willing to go and talk on various astronomical topics to groups of school children.

This list is a pilot scheme, and one which we would like to extend nationwide, but there exists other lists of science and astronomy speakers so co-ordination and research is now required to see how best to approach this. We are happy to report though that in the very short time that the list has been in circulation, the take up has been good with about 15 requests.

Council member Dr Ian Crawford (UCL) who is managing this project reports:

"I gave my first talk under this scheme today to Whitton School in

Twickenham. The teacher told me that she "couldn't believe her eyes" when she opened the ASE mailing to find a list of people "actually willing to visit schools to talk about astronomy!"

Any AAE member in the London area who has not got a copy of this list, please drop the AAE a line at the address on the front cover, enclosing a large SAE.

Success in PPARC PUST awards! The Particle Physics and Astronomy Research Council have awarded a small grant to the AAE in its second round of the small awards scheme for the Public Understanding of Science and Technology (PUST). We had applied for some money to put together some durable equipment for use at our training days at ASE conferences and RAS training the trainer days. Up until now, council members have been raiding their school physics labs for the necessary equipment, or bring their personal supplies.

This money will enable us to purchase some of the items that we most frequently use, together with suitable carrying cases to enable the items to be easily transported. This will enable us to design more activities for our workshops, and also to use the equipment at many different locations.

Your turn!

If you have a project that you believe fulfils the aims of public understanding of science and you'd like to apply for some money, PPARCs third round is coming up fast!

Highlights of the scheme:

Anyone can apply.
Awards range form £100 to £10K per project (maximum).
Encouragement for projects involving schools and young people.
Applications for jointly funded projects are welcomed.
Must be relevant to publicising or teaching PPARC science areas, namely: particle physics; space, planetary and solar science; astronomy, astrophysics and cosmology.

The closing date for receipt of applications is 10th October 1996. For application forms contact: PUST Office, Rm 2232, PPARC, Polaris House, North Star Avenue, Swindon, Wiltshire SN2 1SZ, tel 01793 442123, fax 01793 442002, email PR_PUS@pparc.ac.uk

A further round is planned in Spring 1997.

NEPTUNE

NEWSPAPER COMPETITION FOR SCHOOLS

CALLING ALL YOUNG PEOPLE WITH AN INTEREST IN ASTRONOMY

Imagine it is September 1846 and you have just heard that planet Neptune has been discovered. Get together a group of pupils at your school and produce a newspaper telling the story of the discovery. Your paper can have news items, feature articles, cartoons, letters from foreign correspondents, or what you will. Lay out your entry in the style of a modern newspaper; four sides of A4 if desktop published or four sides of A3 if largely handwritten. Each article should have the name of the contributor.

Superb prizes from many sponsors including Xemplar Computers, National Express Coaches, Tasco Telescopes (Hama Ltd), Maris Multimedia, Astronomy Now, New Scientist, Usborne Publishing, Talks by RAS Astronomers and many more. It is hoped that every genuine entry will receive a small prize.

Open to groups of pupils in age ranges 7-11 years, 11-14 years and 14-16 years.

For teachers, the project is an excellent opportunity to forge cross-curricular links and a real reason to use the Internet as full details of the Neptune story are on the National Astronomy Week web pages which can be found at:
http://www.ast.cam.ac.uk/~naw96

In addition the September issue of Astronomy Now has a feature on Neptune.

On the front page of your newspaper you must include: Name, Address and Telephone Number of your School, Name of your class or group, Age Range (7-11, 11-14 or 14-16 years), Name of your teacher.

Remember, your entry should cover four sides of A4 if desktop published or four sides of A3 if largely handwritten. The closing date is Friday 29th November.

Send your entry to: Neptune Competition, Royal Astronomical Society, Burlington House, Piccadilly, London, W1V 0NL.

The competition is organised by the Education Committee of the Royal Astronomical Society.

MILLENNIUM COUNTDOWN CLOCK

Accurist have sponsored a clock to be placed on the Greenwich Meridian at the Old Royal Observatory that will count down the days until the year 2000. The press release states that it will count down the days, hours, minutes and seconds to midnight on 31st December 1999. So there you have it. Those in the know at Greenwich have gone with popular opinion on when the next millennium starts. Ask an astronomer, and they'll probably tell you that they think it should be 31st December 2000. What do you think?

Since the listing last issue of the mobile planetaria, Bob Mizon has sent me information on the **Mizar Travelling Planetarium,** now operating in the Dorset and surrounding areas. If you wish to find out more, contact Bob on 01202 887084 or write to 38 The Vineries, Colehill, Wimborne, Dorset, BH21 2PX.

While on the subject of mobile planetaria, the **Inter-Action Learning Domes** project is seeking some very part time help. This project tours a portable StarDome planetarium throughout the UK supporting key stages 1,2,&3. The programme, which has been running for seven years visits around 110,000 young people a year.

In that last two years, Inter-Action have been developing a new projector and dome to enable a broader range of topics to be presented. The charity is now urgently looking for someone to work on a part time basis to help develop the new equipment. The ideal person would be very practical and able to make up the film projection images for the system. These are made from photographic film glued into a drum shape and lenses added.

It is envisioned that the work would be done from home, and would require about 20 hours a month. Payment for this work is negotiable. If you think you can help, or if you know someone that can, please call Suzy Humphries on 0171 583 2652 or write HMS President(1918) , Victoria Embankment, London, EC4Y 0HJ.

FREE moon rock! PPARC in conjunction with the British National Space centre are operating a FREE loan scheme to schools. Samples of moon rock are presented in encapsulated disks and microscope slides, and are of interest to everyone from a geology student to a young child. Each package contains a set of slides and information sheets.

In addition, you can also borrow Meteorite packages that have been put together by the Natural History Museum. These contain various polished sections of meteorites that can be handled!

For information on how to obtain either of these packages on loan, contact PPARC at the address previously given in FYI or call 01793 442030.

THE IAU COLLOQUIUM

The International Astronomical Union Colloquium on New Trends in Astronomy Teaching was a big success. The AAE had many members there, especially from council, and there were a great many mentions of the work that the AAE has done. Indeed, when you compare the support for astronomy in this country to some of the amazing problems that other countries are facing, you can start to feel that we are quite lucky!

There are far too many things to include in just one issue of GNOMON, so over the coming issues, there will be articles about some of the more pertinent presentations and posters. First though are the impressions of council member Steve Tidey who met a great many people and took away some valuable information.

TEACHING TIPS FROM THE COLLOQUIUM

The Teaching Trends in Astronomy Colloquium drew together approximately 130 of the world's top educators from 35 countries, and so there was no shortage of ideas in the air! For example, an educator from Mexico has struck on the clever idea of designing a series of boxes, one for each planet, which, when opened, reveal a small that would be found on that particular planet.

A German teacher demonstrated a no-cost way of showing your pupils that the year isn't exactly 365 days long. You simply need to use a pinhole-projection method to cast the tiny image of the Sun on to classroom wall on the same day each week for a month, and mark the spots. Wait exactly a year and repeat the experiment on the same calendar dates. Your pupils will see that the Sun's apparent position on each day will have changed slightly. By analysing this shift they will note that it corresponds to one quarter of a day. You can delight them by saying they have observational proof of the need for a leap year!

If you have access to the World Wide Web, you may want to look at the Royal Greenwich Observatory's site on which you can get information about many free information leaflets for beginners that they produce about astronomy. Their URL is: http://www.ast.cam.ac.uk:80/pubinfo/leaflets/.

NASA is keen to get American students involved in analysing the marvellous observations made from the Hubble Space Telescope. To see how they do it, drop into their Web site at: http//quest.arc.nasa.gov/livefrom/hst.html.

In an effort to bring modern research techniques into the introductory astronomy laboratory, a team of educators from Gettysburg College in Pennsylvania have set up a useful Web site used by 45,000 students worldwide each year. Contemporary Laboratory Experiments in Astronomy (CLEA) can be found at:
http//:www.gettysburg.edu/project/physics/clea/CLEAhome.html.

An educator at the Carter Observatory in New Zealand, informed delegates at the colloquium that he shows visitors the glow-worms that inhabit the foliage in the observatory's grounds, and relates their patterns to the constellation shapes!

Finally, a few words about students themselves. Studies in the USA have indicated that children get most of their astronomy knowledge from television, followed by school lessons and lastly from books. If you're having problems trying to get your students to understand the Earth's motions, don't worry, you're in good company; 10% of Harvard graduates can't explain, in astronomical terms, the difference between day and night!

It is naive in the modern world to expect people of any age to simply believe without question what you tell them about the Universe, just because you are the teacher. They will want to see evidence for your claims, and so hands-on equipment is appearing more and more in the modern classroom. The ideas that came out of the colloquium showed that the didactic mode of teaching is very much old hat where the teaching of astronomy is concerned, so bear this in mind in your approach to organising courses about the night sky.

Steve Tidey

COMMONLY CITED MISCONCEPTIONS ABOUT ASTRONOMY - FROM A TALK BY NEIL COMMINS, UNIVERSITY OF MAINE

Stars

1. The North Star is the brightest star in the night sky.
2. Stars last forever.
3. All stars are the same colour.
4. Stars really twinkle.
5. All stars are single.
6. Pulsars are pulsating stars.
7. Shooting stars are stars falling through the sky.
8. Black holes are empty space.
9 Black holes are like giant vacuum cleaners sucking everything up.

Solar System

10. Seasons depend on the distance between the Earth and the Sun.
11. The Asteroid belt is as densely packed as in Star Wars.
12. Comet tails are always behind the comet.
13. All planetary orbits are circular.
14. All planets have prograde rotation.
15. All moons are spherical.
16. We see all sides of the Moon.
17. Ours is the only moon.
18. Spring tides only occur in the spring.
19. Only the Moon causes tides/the Moon has no effect on the tides.
20. High tide is between the Earth and the Moon.
21. Once the Ozone is gone it is gone forever.
22. Mercury is hot everywhere on its surface.
23. The Giant planets have solid surfaces.
24. Saturn is the only planet with rings.
25. Pluto is always the farthest planet from the Sun.
26. The Sun emits predominately yellow light.
27. The Sun is solid and shines by burning gas or molten lava.
28. Meteors, meteorites, asteroids and comets are all the same things.

These are interesting reading. I agree that some of them are common misconceptions, but I'm not sure if the rest are just from reading out of date library books or because the topic is a little complex, eg tides. I would be interested to compile a list of GNOMON readers most common 30 misconceptions. I suspect that while we will see some of the same points, many will be different.

Dare I say more interesting was John Baxter's presentation about the changes in understanding in astronomy, seven years from the introduction in 1988. More on this interesting presentation next issue.

Alex Lovell

THE PARTIAL ECLIPSE - OCTOBER 12th 1996

Adapted from information from the EAAE at
http://www.algonet/~sirius/eaae/newsl3/eclipse.htm

On Saturday October 12th will occur quite a rare phenomenon; a partial solar eclipse. This will be visible from Northern Canada, all Europe and Northern Africa. Interested schools can follow some of the activities suggested below to make the most of this event.

From the UK, between 55% and 65% of the sun will be eclipsed depending on how far east you live.

The Eclipse begins on	**October 12^d 11^h 59.5^m**
greatest eclipse is at	**12^d 14^h 02.0^m**
and the eclipse ends at	**12^d 16^h 04.8^m**

Sharp-eyed folks will notice that this is a Saturday. In order to ensure that the eclipse is observed in safety, you may wish to organise a session at your school.

PREPARING FOR THE ECLIPSE

Prior to this eclipse, explain that Eclipses of the Sun can only happen when the Moon is new because it has to be between the Earth and the Sun.

Now, many children will wonder why an eclipse doesn't happen every new moon. One analogy that seems to throw some light on this is to imagine that the Sun is a buoy in a lake, and the Earth is a duck sitting on the lake. The moon is a flying fish that swims around the duck, for part of the time it is out of the water, and for part of the time it is swimming under the water. The points where the fish enters and exits the water move slowly around the duck. There are a few times when the fish enters or leaves the water directly between the duck and the buoy and when that happens, from the ducks point of view, the fish has blocked the view of the buoy. This is a solar eclipse. Most of the time though, the fish is either in the air above the buoy from the ducks point of view, or swimming below the water, so no eclipse happens.

This might seem like an odd way to look at it, but the lake provide the necessary plane of the Earth's orbit without needing to mention it specifically. Planes in space are quite a tough thing to visualise because there is nothing there.

HOW TO OBSERVE THE ECLIPSE

Make sure that you never look at the sun with your naked eye! Blindness can result.

Some simple ways to view the sun are:

1) By pinhole camera

Make a hole in a piece of black card and aim it at the sun until the sunlight falls through the hole and shines onto a shaded wall beyond the pinhole. The further away from the pinhole your screen is, the larger the image.

This is a nice way to observe the sun. If you pin sheets of paper to the screen, you can draw the progress of the eclipse as it happens, and then try to estimate what percentage of the sun was covered from where you were observing from. Remember that your image will be upside down.

A few hints. The hole will need to be small to get a sharp image. About 1mm in diameter is sufficient. Your screen will need to be at least 1metre away to get a reasonable image. As a rough guide, the size of the Sun's image will be about 1 percent of the distance from the hole to the screen so a screen 4metres away will give a 4cm image.

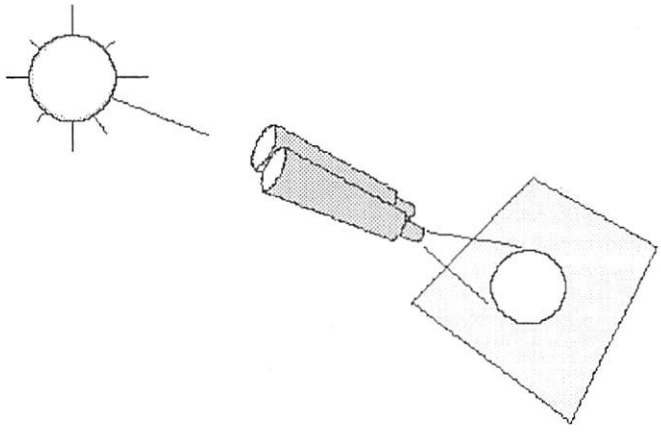
2) The Mirror Method

Take a SMALL mirror and position it so that it reflects the image of the sun back into a shaded classroom or onto a dark screen. A bit of experimenting with this should enable you to find a good spot to tape or anchor your mirror. As a guide, a dentists mirror placed about 10metres away from your screen produces an image about 10cm in diameter.

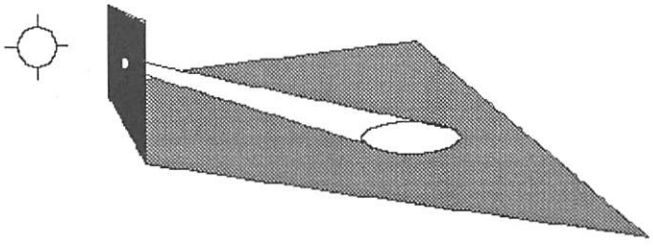
If you have to use a larger mirror then tape off all but a small segment.

3) Projection

Using a small telescope or half a pair of binoculars (make sure you tape up the other eyepiece) set them up so that they project and image through the eyepiece onto a shaded screen. DO NOT look through the telescope or binocular to find the sun. The best way to do this is to set the optical device up on a tripod, or balance it on a table, and then move it slowly towards where you think the sun is and watch its shadow. When you have it lined up exactly, there will be a very bright image of the sun, but the device should also have a tiny or non-existent shadow as it is aimed directly at the sun. Finding a way to shade the image is often difficult, but a cardboard box makes a good screen and shade. Experiment to get a good sized image that you can easily draw to follow the progress of the eclipse.



The Pinhole Camera



DO NOT USE:

Sunglasses, negative film or welding glasses as it is difficult to know that the ones you are using will fully protect

you. Sunglasses are never any protection, and negative, exposed film only works if it contains silver nitrate which very few films do nowadays. Welders glasses can be bought that protect against infra red and ultra violet, but unless it is stressed how special those particular glasses are, there is a danger that children will copy with a piece of smoked glass which won't protect their eyes sufficiently.

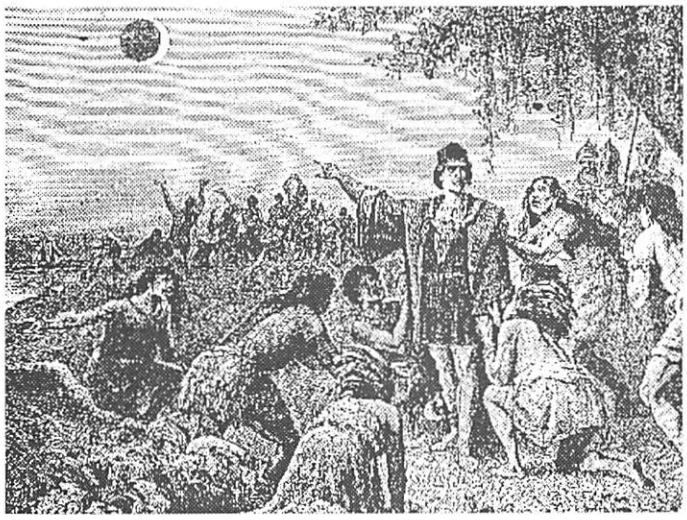
Avoid too the solar filters eyepieces that often come with small telescopes. These can crack suddenly without warning.

CROSS CURRICULAR ACTIVITIES

Investigate the fears and bad omens that have often been associated with eclipses. Columbus for example was able to gain influence over the natives he met in the Caribbean by his 'magical' prediction that the Moon was about to be eaten.

Two Chinese astronomers were once beheaded for failing to predict a solar eclipse. The Emperor was so certain of terrible consequences for not being prepared for this event that he made certain that the astronomers could not make that mistake again.

The Bible mentions that during the crucifixion, the sky darkened. This could have been an eclipse, or a sandstorm which was a common occurrence in Golgotha. If you have an astronomy programme that can calculate these things, you may like to see if you can find an eclipse in the first few years of this century. The actual date is uncertain because the calendar has been altered several times in the last two centuries and to work backwards there are many small adjustments to be made.



REVIEWS

WELCOME TO THE PLANETS CD-ROM

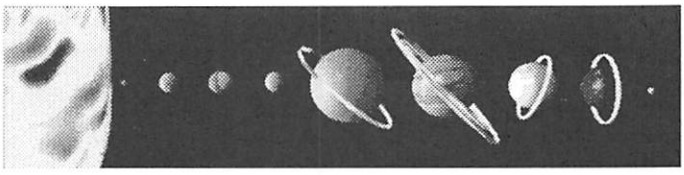
This CD-ROM encapsulates the whole of the planetary exploration effort of NASA and must be the best buy of recent years. For $15 including postage, you get not only all those beautiful images of the planets but also intelligently written and spoken commentaries. The CD also covers asteroids and comets but not the Moon.

Teachers will value the lesson plans. Although based on an American curriculum they are directly applicable to the UK Key Stages 3 and 4. Also there is a mass of data for research projects. The images are copyright free within limits and can be easily extracted to construct other presentations or documents

The disk will run on PC and Macintosh machines.

Fax or post your credit card details to: Welcome to the Planets CD-ROM, National Space Science Data Centre, NASA/Goddard Space Flight Centre, Code 633, Greenbelt, MD 20771, USA, Fax: 001 301 286 1635. Delivery by surface mail takes about 4 weeks. Worth every minute of the wait!!

Alan Pickwick



STARBASE ONE ASTRONOMY AND SPACE COLLECTION

The Starbase One CD-ROM is a very comprehensive collection of images, data and computer programs relating to astronomy. It has optical images of all the significant Solar System Bodies, the space missions and the Messier Objects. The Numerous Hubble Space Telescope images have corresponding text files giving detailed descriptions of each object. The collection is very up to date, having the Hubble Deep Field results which were only released in January.

There are many text files and images relating to the Apollo missions, including much detail about the Apollo 13 incident, recently recreated in a Hollywood feature film.

There are over 20 animation files. Of particular interest is the genuine sequence showing the Moon orbiting the Earth.

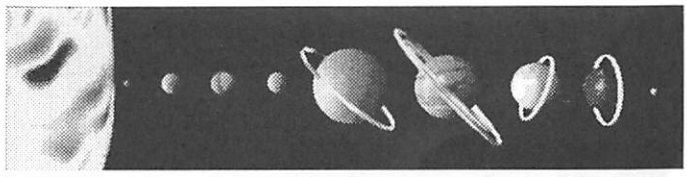
The Shoemaker-levy 9 collision with Jupiter is also well covered with images and animations. For space historians there is much about the Gemini missions.

In the Shareware directories there is a mass of useful programs. This will save you hours of internet downloading time.

The CD ROM is suitable for a user with some experience of image manipulation programs and has much more information than NASAs Journey to the Planets. However if you are an educator, NASA's offering would be much more valuable to get you going. The Starbase CD-ROM is not intended as a teaching aid but as a resource package.

The CD ROM can be purchased for about £10 from astronomy fairs or by making contact with Nick Stevens via the Starbase One BBS 0171 703 3593 or 0171 701 6914 or at:
http://www.ukindex.co.uk/ukastro/sb1main.html on the World Wide Web.

Alan Pickwick



A WALK THROUGH THE HEAVENS - A guide to the Stars and Constellations and their legends. Milton D Heifetz and Wil Tirion. Cambridge University Press 1996 ISBN 0 521 46980 5 pb 72 pages price £6.95 ($9.95)

This is a charming book, and actually quite useful for

introducing younger children to the wonders of the Night Sky. Many sky maps are full of explanation and technical terms which put them beyond the reach of school children. Similarly, some books designed for children are too basic, showing only a few major stars and containing just the usual basic information about what goes around what. This book then fills a gap in the market that has been occupied by a timeless book (now difficult to get hold of) by H A Rey, Finding the Stars, where children are introduced to the constellations by joining the dots!

The first part of the book looks at how to measure distances in the sky using your hand. This is a good way to get children to look up and helps them with the maps later on when they get to apply the knowledge that an outstretched fist is about 10 degrees to help them star hop to the various constellations.

A short piece of information on brightness, distances and the universe completes the brief picture before we move on to Wil Tirions clearly drawn star maps.

The second part of this book is the Walk through the Heavens. Taking small sections of sky at a time, the author guides us through locating a major 'signpost' in the sky and then using that pattern of stars to star hop, using fingers and fists to the other nearby constellations. Eventually, using this method, you cover most of the night sky visible from the Northern Hemisphere.

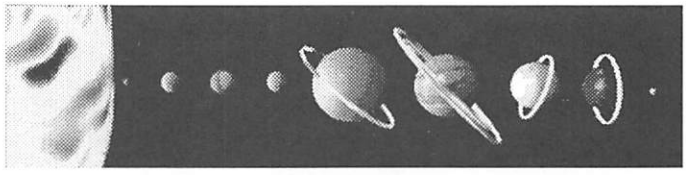
The large maps (pale purple backgrounds with white stars - odd, but works!) are each labelled with direction and time of night, and unlike many maps, these are drawn for 9pm in the evening, a much more friendly time than the usual 11pm or midnight.

The third part of this book is a section on the legends of the note sky which have been modified slightly to make them more appropriate for a younger audience. This has been done very well, and they would make suitable reading aloud short stories.

There are a few things to watch out for though. This book is a how to manual and is not that easy to just sit down and read. It is for use in the field. Despite being a CUP book, it is printed with American spelling, very aggravating, especially when you want to use it in the classroom. Finally, one weird feature that was not explained is the use of the numbers 1 through 10 to number the brightest stars in a constellation. Now, I know that most children will not have seen the Greek alphabet before, but this merely gives you a chance to introduce the idea. I think it will confuse many children to get used to a star being number one in Orion and later to find another map with it labelled alpha.

In all though, I think this is potentially a very useful book, and at the price, certainly better value than a planisphere for teaching the constellations.

Alex Lovell



HANDS ON UNIVERSE - An Educational Project for 7 -11 year olds

Produced by the Royal Greenwich Observatory and PPARC, Hands on Universe introduces children to the exciting world of astronomy. This pack has been designed for pupils studying the subject at Key Stage 2.

This colourful resource pack consists of six full colour double sided information cards which are really nicely done, and a teacher with two of these packs would probably want to stick these cards onto board to enable them to be more widely used. These are accompanied by six photocopiable black and white activity cards which relate to the information cards.

Each of the six cards investigates a specific area of astronomy and covers the programmes for the following statements under Physical Processes - The Earth and Beyond.

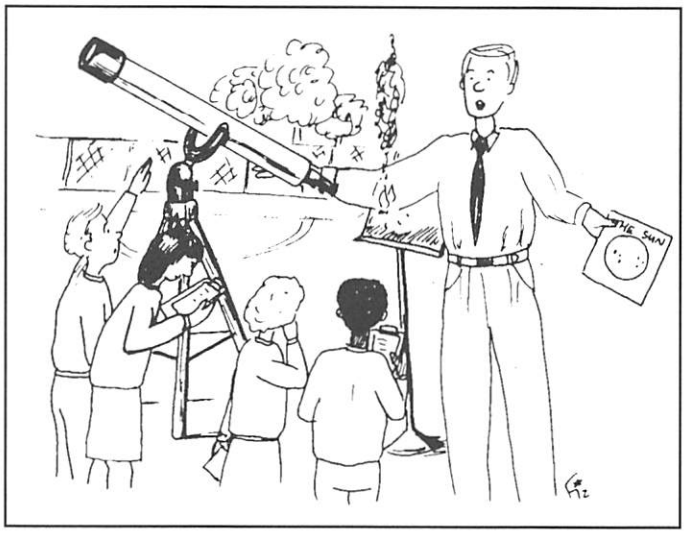
a) that the Sun, Earth and Moon are approximately spherical
b) that the position of the Sun appears to change during the day
c) that the Earth spins around its own axis, and how day and night are related to this spin.
d) that the Earth orbits the Sun once each year, and that the Moon takes approximately 28 days to orbit the Earth.

In addition the activities also cover some statements in forces and motion and light and sound.

The information is presented to enable the activities to be led by the students, meaning that the teacher doesn't need any specialist knowledge of astronomy. There is a comprehensive glossary and much of the information required can also be obtained from a library.

The pack contains a colourful solar system poster for the classroom wall.

This pack sounds totally ideal doesn't it? And I have to say that it is great. Written by AAE council member Tony Lacey, it shows a real understanding of making the subject accessible to teachers and pupils. There is even better news to come though. It doesn't cost anything! Copies can be obtained by writing to: Educational Project Resources Limited, Hands on Universe, Freepost NH4190, Northampton NN6 9BR.



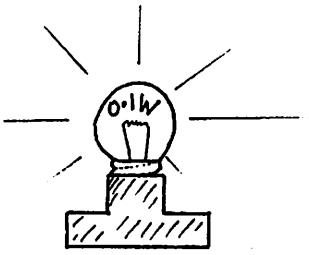
CURRICULUM CORNER

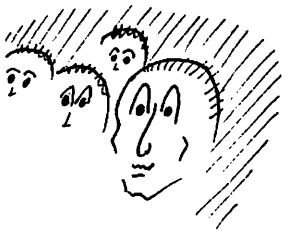
From a Distance

by Bob Kibble

The Sun is a star just like all the rest. Can you really believe this when the Sun looks so different from other stars? When our side of the Earth turns to face the Sun we are treated to such an intense dose of energy that our skin turns brown, water evaporates and plants grow to name but a few things. At night when thousands of other stars are evident in the night sky their combined energies don't even seem to cast a shadow on the ground. Their light will not give you a tan or make your garden grow.

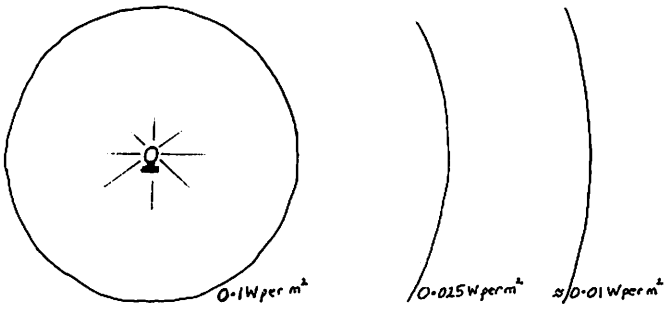
The solution to this problem is of course distance. The Sun is so much nearer than the other stars. It is our own local star. How far would the Sun need to be to appear just like any other star? To help you find an answer to





this problem it will help to create your own 'Sun' in a classroom. You will need a small mes lamp and a battery. A whole class can use the same lamp.

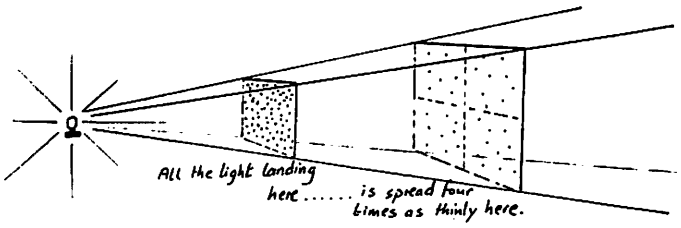
A typical mes lamp might give a power of about 0.1W. Let's use this value for simplicity. Place the lamp on a bench and look at it. How much energy per second is emerging from the lamp? Well just over 0.1W. How much of this energy is passing into your eye? This depends on how far away you are. From a distance the lamp will look dimmer because less energy is reaching your eye. To help you to calculate the energy you receive you need to appreciate that the lamp's energy



spreads out in all directions. Imagine this by thinking of the energy falling onto the surface of a sphere around the lamp.

At a distance of about 30cm the surface of the sphere is about 1m². The intensity of the lamp's energy at 30cm is about 0.1W per m². (The entire 0.1W is spread over an area of 1m².)

At twice the distance from the lamp the intensity falls to about a quarter of this value, 0.025W per m². At three times the distance (now about 1m away) the intensity falls to about one ninth, becoming about 0.01W per m². The reduction in intensity in this way is known as an 'inverse square' pattern. Every time you double the distance away the intensity reduced by $2^2 = 4$ times.



Q. At ten times further away by how much would the intensity have reduced?

A. It would be 100 times weaker. ($10^2 = 100$)

Back to our lamp. Place the lamp at some distance from your eye, so far that it starts to look as dim as a star. Doing this at night will be a better comparison. You could use the school playground or a long corridor. Placed at 100m away your lamp will look like a dim star. Let's look at a calculation based on this result.

If the intensity at 1m was about 0.01W per m² then at 100m it will be 100^2 times less.

$[0.01/100^2 = 0.000001]$

You have now calculated how bright a star is. It is as bright as a lamp at 100m away. The starlight's energy is as intense as 0.00001W per m².

Now back to the Sun. The Sun's visible energy landing on Earth on a bright day is about 1000W per m². As bright as 1000 small lamps placed only 30cm from your eye.

If the Sun were placed twice as far away as it is then the intensity would fall to a quarter of this value, to 250W per m². This is how bright the Sun appears from Mars. At ten times further it would reduce by 100 times to 10W per m². This is how bright the Sun appears from Saturn. Sunlight landing on the surface of Saturn is only as intense as 10W per m².

So how far must the Sun move to become as bright as our lamp at the end of the corridor which we judged to be as bright as a distant star?

In order for the Sun's intensity to be reduced to 0.000001W per m² it would need to be removed to a distance calculated from:

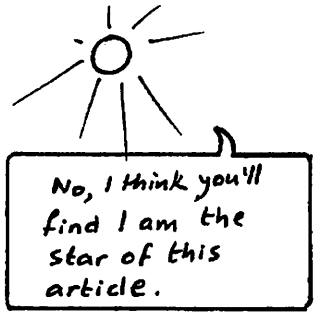
Intensity of a distant star (or lamp) / Sun's intensity at the Earth

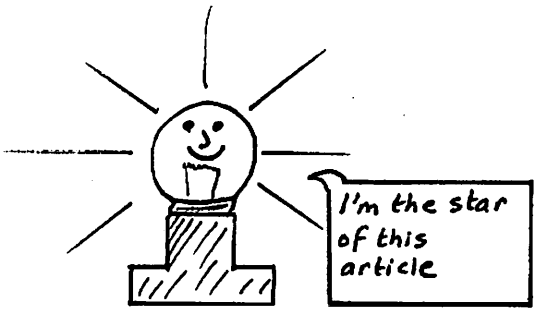
= 0.000001/1000

= 32,000 times further away

This would place the Sun about half a light year away. Not quite as far as the nearest star but approaching it.

So there you have it, a small lamp at the end of the corridor is as bright as the Sun placed half a light year away. Not a lot of people know that!





NET NOTES

As mentioned on the front page, the AAE now has a home page. It can be found at:

http://www.star.ucl.ac.uk/~aae/homepage.htm

Thanks to Mike Dworetsky and John Deacon at UCL for hosting us!

This page is still being worked on, so all comments and suggestions welcome. If you have a favourite link then please email it to us so that we can add it in. You will notice that this is also the homepage for the UK web site of the EAAE (European Association for Astronomy Education) This is a Europe-wide group of astronomy educators who are putting together a wonderful idea called ASTRONOMY ON-LINE.

Astronomy on-Line is taking place in the European Week for Scientific and Technological Culture. It will be active from October 1st 1996 and reach a climax on November 18-22 1996.

Astronomy on-line is the worlds biggest astronomy event on the World Wide Web, bringing together thousands of students from all over Europe. Whilst learning to use the vast resources of tomorrow's communication technology, they will also experience the excitement of real-time scientific adventure and the virtues of international collaboration.

Sky Diary Autumn 1996

Information supplied by Eva Hans

With the summer constellations of Sagittarius, Scorpius, Aquila, Cygnus and Lyra setting in the west, the autumn constellations of the distinctive square of Pegasus, Perseus and Andromeda and a host of faint 'watery' constellations like Aquarius the water bearer and Pisces the fishes come into view.

Drawing a line down through the easternmost side of the square of Pegasus will lead you to a bright yellowish star-like object. This is the planet **SATURN,** currently among the stars of Pisces. It is at opposition on the 26th Sept. when it can then be seen all night. As we get closer to winter, it will start to set before midnight, becoming an evening object. A small telescope may show you the rings which are almost edge on to us at the moment.

Just after the sun has set, in the south-west you may see **JUPITER.** It is still on of the brightest objects in the sky and binoculars will show it's stripy disk and four main moons. It sets a couple of hours after sunset.

Early risers may catch **MERCURY** in the morning sky from Sept. 25th to Oct. 20th. After superior conjunction it then reappears in the evening sky from Nov.19th. **MERCURY** is a very difficult planet to spot. Binoculars to scan the horizon are a help but be careful to wait until the sun has fully set. The best conditions to observe this planet are in the first half of October.

Early risers cannot fail to miss the 'morning star' **VENUS,** shining very brightly in the eastern sky.

MARS is also a morning object although it rises nearer to midnight by the winter. It is moving quite fast and observation over several weeks, if plotted on a star chart, will show it moving from Cancer, through Leo and into Virgo.

The Equinox is on Sept. 22nd at $18^h\ 00^m$ and the Solstice occurs this year on Dec. 21st at $14^h\ 06^m$.

THE MOON.

New Moon	First Quarter	Full Moon	Last Quarter
Sept. $27^d\ 02^h\ 51^m$	Oct. $4^d\ 12^h\ 04^m$		
Oct. $12^d\ 14^h\ 14^m$	Oct $19^d\ 18^h\ 09^m$	Oct $26^d\ 14^h\ 11^m$	Nov $3^d\ 07^h\ 50^m$
Nov $11^d\ 04^h\ 16^m$	Nov. $18^d\ 01^h\ 09^m$	Nov. $25^d\ 04^h\ 10^m$	Dec. $3^d\ 05^h\ 06^m$
Dec. $10^d\ 16^h\ 56^m$	Dec. $17^d\ 09^h\ 31^m$		

The Moon occults the bright star Aldebaran in Taurus twice during October. One of these occultations, on the 22nd should be visible from most parts of the UK. It starts at 22hrs.

There are also two eclipses during Autumn 1996. Read all about the solar eclipse in his issue.

A Lunar eclipse happens on Sept. 27th. Times are as follows:

Moon enters penumbra	Sept. $27^d\ 0^h\ 12.4^m$
Moon enters umbra	$27^d\ 1^h\ 12.3^m$
Totality begins	$27^d\ 2^h\ 19.3^m$
Middle of eclipse	$27^d\ 2^h\ 54.4^m$
Totality ends	$27^d\ 3^h\ 29.4^m$
Moon leaves umbra	$27^d\ 4^h\ 36.3^m$
Moon leaves penumbra	$27^d\ 5^h\ 36.4^m$

METEORS

There are three showers visible in the Autumn.

Name of shower	*Dates Visible*	*Best night*
Orionids	Oct 16th-26th	Oct 21st/22nd
Leonids	Nov 14th-20th	Nov 17th/18th
Geminids	Dec 6th - 16th	Dec 13th/14th

Of these, the Geminids will probably be the most spectacular with several tens of meteors per hour from a clear dark site. This shower also has the advantage that there will be virtually no moonlight.

Through the WWW, participants will 'meet' in a 'marketplace' where a number of different 'shops' will be available, each of which will temp students with a number of exciting and educational events, prepared for ages 12 and upwards.

The contents of the Astronomy On-Line project are changing regularly, and for more information you should access the EAAE pages via the AAE page mentioned above where you can also register to take part in all the activities.

The main Astronomy On-Line page can also be accessed at:
http://www.eso.org/astronomyonline/