



GNOMON

Newsletter of the Association for Astronomy Education

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SPRING 1992

EDITORIAL COMMENT

Travelling around schools and giving chats to schoolchildren, I am convinced of the need for the schools to own their own small telescopes (or binoculars). I often try to follow up my talks by making a telescope, or telescopes, available during the evening (borrowed from my local Astronomical Society). About nine times out of ten, the weather has been against me, resulting in frustrating delays or cancellations. (Every astronomer knows this, of course.) How much more convenient it would be if the school had its own instrument, available for use at any suitable time arranged at short notice. It will cost a bit of money – perhaps not so much as the schools may think, as there are always second-hand ones around (but beware of 'toy' telescopes!)

★ ★ ★

On the same subject (visits to schools), I was asked by a very young member of the audience whether it was true that the Moon was made of *green cheese*. I laughed at this, but then realised that the question was quite serious – she really believed the Moon was so constituted. Afterwards, when I had time to reflect, I thought that perhaps the cheese might have come from the Cow that Jumped Over the Moon! But seriously, when young minds are in the formative stage, we should have convincing arguments to deal with such ideas.

★ ★ ★

We receive from time to time programmes of local Astronomical Societies,

for which (if we do not have time to reply) we express our thanks.

Several Societies have joined the AAE as corporate members – they are also, probably, affiliated to the Federation of Astronomical Societies. We have recently received the Newsletter of the Liverpool Astronomical Society, and a lecture programme from Brighton Astronomical and Scientific Society. We are always glad to receive such information and, if space is available, to publish it in this Newsletter. Some extracts from the Societies mentioned above appear in this issue. Please remember that *Gnomon* appears quarterly, approximately at the equinoxes and the solstices, and copy deadline is six weeks before these dates.

★ ★ ★

Reading through an Italian astronomical journal recently, I was intrigued to see that what we call the Galilean Moons of Jupiter (Io, Europa, Callisto and Ganymede) the Italians refer to as the *Medicei* moons (despite the fact that it was Galileo, an Italian, who first discovered the Moons (telescopically)).

★ ★ ★

The issuing dates of the ASP publication 'The Universe in the Classroom' do not always coincide with the deadlines for *Gnomon*. When this happens we try to fit in older issues, not previously included in *Gnomon*. Thus, in this edition we are reproducing the ASP publication for 1987. Please do not think it is out of date – it still contains a lot of interesting information.

This issue of 'Gnomon' has been sponsored by The Royal Astronomical Society

This enables the newsletter of the Astronomical Society of the Pacific, 'the Universe in the Classroom', to be included as pages 5–8 of this issue.

Subscription Rates:

Individual members £7.50
Retired Members 5.00
Corporate Members
(e.g. schools, colleges, etc.) 15.00

Corporate members will receive two 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.

Addresses for Correspondence

Secretary: Bob Kibble, 34 Acland Crescent, Denmark Hill, London SE5 8EQ – for all general enquiries. (Tel: 071–274 0530)

Treasurer: Nik Steggall, 38 Victoria Crescent, Birkdale Road, Dewsbury, West Yorkshire WF13 4HJ – for all financial and subscription enquiries. (Tel: 0924–454718)

Editor: Eric Zucker, 35 Gundreda Road, Lewes, East Sussex BN7 1PT – for all enquiries concerning the Newsletter. (Tel: 0273–474347).

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.

Local Astronomical Society News

We have news from Liverpool for January 1992 (too late for this issue). One headline in its newsletter reads: THERE IS NO PLANET X. A little earlier, a headline in the *Daily Telegraph* read: STARGAZERS FEEL PULLING POWER OF PLANET X.

The Brighton Astronomical and Scientific Society sent its lecture programme for April to June 1992. Details are:

- 2 April:** Solar Activity and Long Range Weather Forecasting (Piers Corbyn, Polytechnic of the South Bank)
- 30 April:** Observing with large telescopes (Dr Robert Smith, University of Sussex)
- 28 May:** The Big Bang (Dr Peter Thomas, University of Sussex)
- 25 June:** Inside the Earth (Professor Stuart Malin, formerly National Maritime Museum)

Meetings are open to everyone (small charge for non-members)
Telephone 0273–581553 or 0273–454347 for further details.

INSIDE THIS ISSUE

* 2 Exciting Competitions for Young Astronauts * Free Gift (Planisphere)

Outstanding Offer to Aspiring Young Space Scientists

From Rodney Buckland, the Director of the Space School, Brunel University

Young Astronauts Conference, Moscow, 2–10 August 1992

Following a visit to Moscow by a thirty-strong delegation of Space School students and staff last September, we have been invited to form the British delegation to the 1992 Young Astronauts Conference.

The invitation comes from Soyuz, the leading space education organisation in the Commonwealth of Independent States (CIS).

Space School plans to select a delegation of fifty 15–17 year olds from members of the Space School Association and other partner organisations. The programme in Moscow will consist of lectures from leading space personalities (in English), visits to centres of Russian space excellence, social gatherings and sightseeing in the Moscow Region.

Space School cannot guarantee that this visit will take place due to the rapidly changing environment in which Soyuz has to work. I am confident that Soyuz will do everything possible to hold the event as planned.

Space School delegates will have to pay for return airfares, insurance, visas, administration costs and a conference fee that will cover accommodation, meals and transport in Moscow. Based on last year's experience, we should be able to keep the cost below £500.

European Space School IV, Brunel University, 12–20 August 1992

This premier event in the Space School calendar is designed to give sixth formers a thorough introduction to courses and careers in the space field. The nine-day programme consists of lectures, debates, laboratory and project work, visits to a research lab and space industry, individual course and career counselling and social gatherings.

The summer school is fully residential and costs £385.00.

Space School has set forth the following requirements to guarantee its standards:

1. Academic achievement: we are looking for 16–18 year olds with good academic results and the potential to go on to further studies at University or Polytechnic.
2. Leadership: we are seeking the future leaders of the British space community who will shape our space activities well into the 21st century.
3. Commitment: we are looking for students with a strong interest in space science, exploration, engineering or applications arising from school work or spare time activities.

AAE STUDENT SPONSORSHIP TO THE EUROPEAN SPACE SCHOOL AND TO THE YOUNG ASTRONAUTS CONFERENCE, MOSCOW

The AAE would like to sponsor a number of students to both the European Space School at Brunel University (Uxbridge, Middlesex), and to the Young Astronauts Conference (Moscow). The details of both these events are given below. The competition is open to all students within the appropriate age range.

- who attend a school or institution affiliated to the AAE.

or whose application is endorsed by:

- a member of the AAE, or
- the AAE contact within an affiliated school or institution.

Unfortunately, we are not able to fund the entire costs of successful candidates to these exciting events but it is past experience that such sponsorship can be used locally to raise further monies. It should be noted that the costs of the Moscow Conference are uncertain at this time. The figure of £500 that is quoted is given as the likely upper limit.

The sponsorship we offer is:

Space School, one place	£200
Moscow Conference, three places	£100 each

Selection for students for these awards is by essay competition. The competitors should submit an essay of around 500 words, typed or clearly written, to the Secretary of the AAE, on the subject of 'Astronomy from Space'. Eligible candidates may enter the same essay for consideration for both Space School and Moscow Conference, although only one award will be made to any successful candidate.

Submitted essays should be accompanied by:

- an application form
- a short written reference from the candidate's teacher
- written parental permission to attend the Space School or Young Astronauts Conference, if successful
- the endorsement by AAE member or other as specified elsewhere on this page.

The closing date for receipt of entries is Friday, 8 May 1992

The winners will be announced at the AGM of the Association on Saturday, 23 May.

The decision of the judges, appointed by the AAE Council, will be final.

Application forms may be obtained from:

*Mr R. Kibble
Secretary
The Association for Astronomy Education
34 Acland Crescent
Denmark Hill
London SE5 8EQ*

Astronomy in the National Curriculum – The New Orders

On December 20th 1991, new orders were passed in Parliament amending the National Curriculum for Science. The 17 Attainment Targets have now been reduced to just four:

- AT1 Scientific Investigation
- AT2 Life and Living Processes
- AT3 Materials and their Properties
- AT4 Physical Processes

Each is sub-divided into 'strands', and the astronomy content now appears as one of the five strands of AT4, called 'The Earth's Place in the Universe'. The specified programme of study for this strand has most of the items in the previous version of the National Curriculum, but with some minor rearrangement and with one or two very small changes in the wording.

The emphasis at Key Stages 1, 2 and 3 is still very much on direct observation. One of the most fundamental changes is that seasons, eclipses and phases of the

Moon now all appear at Key Stage 2, rather than later on in Key Stage 3. These concepts seem rather complex for the average 7/11 year olds to understand, and may need to be revisited when they are a little older. Let us know what you think!

The non-statutory examples of activity have appeared alongside each Statement of Attainment. The Orders stress that these are not to be regarded as complete, covering everything that children should do, but rather as helpful suggestions or as illustrations. Some only refer to a part of a particular Statement. Personally, I do find these helpful in interpreting the Statements and in indicating to what depth children are expected to delve into each topic. For instance, to gain Level 2, children have to 'know that the Earth, Sun and Moon are separate spherical bodies'. The example elucidates: 'Imagine they are on a spacecraft

looking out of the windows and draw the Earth, Sun and Moon as they would see them from space'. Hopefully, they will draw some circles!

So astronomy is still retained in this new version, largely unchanged, but having lost its identity as a separate AT. The link with the Earth Sciences has also been lost; the strand on 'The Earth and its Atmosphere' now appears under AT3 with the other chemistry strands. This does seem a pity since the two strands should overlap a little, each having something to offer the other. It will now be more difficult to teach the material in that way.

This new version is to come into force on 1st August 1992 for all pupils except those who are turning 11 (or turning 16) this year.

Dr Anne Cohen
Chairman
AAE Education Group

The 1992 Annual General Meeting

The Annual Meeting will take place at the Institute of Astronomy, University of Cambridge, on Saturday, May 23rd. You will find a reply slip in this edition of *Gnomon*.

A major item at the Annual Business Meeting will be the election of Council for 1992/93. All Officer posts are elected annually at the ABM. However, this year a number of Officers come to the end of their four year maximum term. This is an ideal opportunity for other members to become more actively involved with the management of the Association.

You can be nominated from the floor at the ABM or by post to the Secretary in advance of the meeting. If you would like to join Council but do not have a nomination, please write to me before the meeting.

Council Officers' posts are:

		First elected
President	J Ravest	1990
Vice President	D. Gold	1989
	D. Hughes	1988*
	Vacant	
Secretary	B. Kibble	1988*
Assistant Secs	T. Grafton	1988*
	E. Hans	1988*
	Vacant	
Treasurer	N. Steggall	1988*
Resource Centre Representatives	M. Suggett	1988*
	I. Griffin	1991
	S. Chaplin	1989
Members	J. Flynn	1991
	Vacant	

Please note that the post of Editor is chosen by the Council, not by election at the AGM. The Editor automatically becomes a member of Council.

* indicates Officers whose period of office terminates this year.

Bob Kibble, Secretary

Conference on Astronomical Education

Brno (Czechoslovakia)

30 June – 3 July 1992

The AAE has received the following information

First Announcement

Scope of Conference

The Conference, which is held in the year of the 400th anniversary of the birth of the great pedagogue, Jan Amos Komenský, will be concerned with various aspects of *astronomical education*. Emphasis will be laid on studies involving classroom teaching of astronomy, astronomical education in institutions, such as observatories and/or planetaria, and education of gifted pre-college students.

Organisers and Sponsors

N. Copernicus Observatory and Planetarium in Brno
Department of Theoretical Physics and Astrophysics, Faculty of Science of the Masaryk University
Pedagogical Section of the Czech Astronomical Society

Conference Scheme

Each of the five sessions will be introduced by means of an invited review lecture. Contributed papers will be presented as posters (with brief oral introduction during the session). An hour's break for poster presentation and individual discussions will be followed by general discussion.

Short summaries of posters will be published in a booklet prior to the conference (deadline for submitting poster abstracts is 15th May 1992).

Locality, Accommodation etc.

The Conference will take place in a new planetarium building of the N. Copernicus Observatory and Planetarium in Brno. Accommodation will be provided in the Student Halls of Residence or in a hotel.

One or two sessions will be held fully in English; all the invited review lectures will be translated into English (if they are in Czech or Slovak).

Please return this preliminary registration form, as soon as possible, to the Organising Committee (the address is given below), no later than 31 January 1992, if possible. A second Announcement containing further details will be sent in March 1992 to all those who have pre-registered.

Please bring this information to the attention of any others, who may be interested in attending the Conference. Our mailing list is not complete. Please feel free to copy the pre-registration form as necessary.

Dr Zdeněk Mikulášek
Director of the N. Copernicus Observatory and Planetarium.

Pre-registration form available from the AAE Secretary, Bob Kibble, 34 Acland Crescent, Denmark Hill, London SE5 8EQ.

Members who may be interested in going to this conference should apply to the AAE Secretary for a registration form.

Contact Address:

N. Copernicus Observatory and Planetarium
c/o Dr Zdeněk Pokorný
Chairman of the Organising Committee
Krávli hora
616 00 BRNO
Czechoslovakia
Phone No: +42 5 744374

AAE Poster Resource Pack

The poster pack consists of eleven posters outlined below and will be sent rolled in a stout tube for protection. The posters are 16" x 23" in size. The pack is priced at £10.00.

- Solar System Chart
- Saturn Encountered
- Shuttle Launch 51-F
- Radio Map of the Milky Way
- The Blir Telescope
- Mars. The Search for Life
- Landsat. View of the British Isles
- Landsat. View of Europe
- Halley's Comet
- The Phases of the Moon
- The Four Seasons

AAE A4 Activity Resource Pack

The A4 activity pack is priced at £10.00 and consists of the resource items outlined below.

- A Playground Sundial. (How to make a simple sundial for playground or grassy areas)
- A Cola Can Sundial. (How to make a simple sundial)
- Buying Binoculars or Telescopes for Astronomy by Martin Suggett
- Perpetual Calendar of the Major Planets from Paisley College
- Make Your Own Star Finder
- Make Your Own Sundial
- Make Your Own Nocturnal. (How to tell the time at night)
- The Daily Telegraph Night Sky Map
- The Stars and Planets by the Liverpool Museum (An Information Booklet for Children)
- Misconceptions About Space by the Liverpool Museum
- 25 Glow in the Dark Stars
- Book Mark 'Solar System'
- Book Mark 'Terrestrial Planets'
- Book Mark 'Gas Giant Planets'
- Book Mark 'Newtonian Telescope'
- Book mark 'Reflector Telescope'

THE SECOND NATIONAL ASTRONOMY AND SPACEFLIGHT SHOW will be held at Birmingham on September 12th, 1992

Members Lists

Many members have asked if an AAE members list is available. I intend to provide this service as from May 1st this year.

If you are a member but do not wish other members to be given your name and address, please let me know in writing before April 30th.

If you would like a copy of the list of AAE members, please send me stamps to the value of 50p, together with your address.

Visiting Speakers

I now have a list of members who have agreed to offer their services as lecturers/speakers on topics astronomical. This list is available from me on request and a 50p stamp.

May I thank all those who have volunteered their time and services to support this initiative.

Bob Kibble, Secretary

Calling all Telescopists

I am interested in buying a telescope for personal use to update my old home-made reflector, now relegated to a teaching aid in College. I have been researching the market but cannot find any independent references to the makes, mounts etc available. Is there a 'which' guide to telescopes?

Perhaps members can help out by sharing with me their own experiences. My target is a 200mm reflector or 100mm refractor, equatorially mounted with d.c. RA drive. The instrument will be transported by car and used for general observing, piggy back photography and occasional deep sky photos. Issues arising are:

1. Reflector or refractor?
2. Super Polaris mount? Are there good/better alternatives?
3. Tripods - wood or aluminium?
4. Second-hand C8, new Orion Optics reflector, new Vixen refractor, second-hand Televue genesis or what? Budget limit is about £700.

I would appreciate hearing from members who have experienced and resolved this dilemma or who can share their experience and advice.

Many thanks.

Bob Kibble, Secretary

CORPORATE MEMBERS OF THE AAE

At the time of going to press, the following is a list of *Corporate Members* (previously known as *Affiliated Members*). *Individual Members* are not shown on this list.

Aberdeen Technical College
Armagh Planetarium, Northern Ireland
Brighton Astronomical and Scientific Society
Brighton and Hove High School
Dean Close School Astronomy Society, Cheltenham
Dunsink Observatory, Dublin Institute for Advanced Studies
Glasgow College of Nautical Studies
Harvard College Observatory
Hertfordshire Science Centre
Institute of Physics
Jodrell Bank Science Centre
Kingswood School, Bath
Leeds Grammar School
London Planetarium
National Maritime Museum, including the Old Royal Observatory, Greenwich
North London Collegiate Junior School
Northamptonshire Science Centre
Penrhos Junior School, Colwyn Bay
Richmond and Kew Astronomical Society
Royal Astronomical Society
Royal Observatory, Edinburgh
South Tyneside College
St Edmund's School, Canterbury
St Phillip's College, Birmingham
Technique, Cardiff
The Haney Grammar School, Folkstone
The Thomas Alleyne School, Stevenage
The Institute of Astronomy, University of Cambridge
University of Kent at Canterbury
Ursa Astronomical Association, Helsinki, Finland
Wolverhampton Polytechnic

Other institutions may be in the pipeline. If other institutions would like to be added to this list, please contact the Treasurer at the address shown at the front of this Newsletter (the fee for corporate membership is £15).

External Bodies Represented on the AAE Council

The Royal Astronomical Society
The Junior Astronomical Society
The British Astronomical Association
The Federation of Astronomical Societies

SIC TRANSIT GLORIA MUNDI - For Newcomers

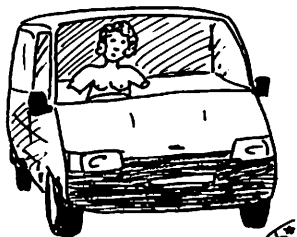
The word 'transit' in Astronomy has, generally speaking, two meanings. They both mean a *crossing* of some kind. First of all, when a star or other celestial object crosses the observer's prime meridian, that star is then said 'to transit' (verb) that meridian. The meridian may be thought of as a great arch drawn on the visible celestial hemisphere, starting at the north point on the horizon and up to the zenith (the point immediately overhead), then down to the south point on the horizon. The arch should be thought of as fixed, and, as the Earth rotates, giving rise to the feeling that the stars are moving, various stars in the sky will cross the meridian, that is 'transit' the meridian.

Stars rise near the east and set near the west, and reach their highest point when they cross the meridian.

Another meaning of 'transit' is the passage of either of the two inner planets, Mercury and Venus, across the face of the Sun. If the orbits of the Earth, Mercury and Venus, were all in the same plane, then transits across the Sun's disc would occur frequently, but the planes of the orbits are inclined a little to each other, so that these transits are rather rare; the planet may move a little above, or a little below, the solar disc.

The next transit of Mercury, which will be seen as a tiny black speck on the face of the Sun, will occur on 1993 November 6. There will be another one on 1999 November 15. (The only safe way to observe this, of course, is by solar projection.)

Transits of Venus are rarer and go in pairs, and the next apparitions will take place on 2004 June 8 and 2012 June 6.



TRANSIT OF VENUS

Simplicimus

FREE GIFT TO AAE MEMBERS!

This issue of *Gnomon* contains two sheets of paper which, when connected in the manner described below, constitute an Astrolabic Planisphere. The package has been designed by Robert Mills – the star map is by Mike Swan. We regret that this gift is for members of AAE only, but non-members may apply to Robert Mills directly for a copy – there will be a small charge.

This Astrolabic Planisphere consists of two parts:

1. The Polar star map on a circular disc, the periphery of which is marked in Right Ascensions and also carries the date circle.
2. An altitude – Azimuth graticule marked with the 24 hours of Local Mean Time.

These two discs are connected by means of a drawing pin through the pole of each.

To set the Planisphere, rotate the top disc (2) so as to bring the LMT into coincidence with the date on disc (1). Disc (2)

is on tracing paper so that the altitude and azimuth of any star can now be read from the graticule. For example on December 25th at 21^h LMT the star Procyon will be seen bearing 105° at an altitude of 20°. The Local Sidereal Time at this moment is given by the South point of the meridian (180° azimuth) and will be seen to be 3^h 15^m on the disc (1). This means that a star of RA 3^h 15^m will be in transit of the meridian.

The overlay, or altazimuth graticule, is for latitude 51°N (London) but it can be used in latitudes further North by moving the pole of the graticule 0.6mm towards the Zenith for each degree above Latitude 51°N. For example, in latitude 56°N (Edinburgh) the pole should be moved 3mm towards the Zenith.

1. **To identify or find stars.** The graticule, when set, gives the bearing (azimuth) and altitude above the horizon of any celestial object that is on, or can be put on, the map. This obviates the necessity of having to hold the map over your head.

2. The azimuths shown provide a useful means of checking a compass or steering a boat, a time honoured practice among sailors.

3. The Sun can be marked on the map in pencil for any particular time and date, as it is at the point of intersection of the line from the pole to the date and the broken line of the ecliptic circle. Knowing this position of the Sun on the map, we can obtain its azimuth and altitude at the Sun time, or conversely, by observing the azimuth and altitude of the Sun, we can find the Local Sun Time.

4. By observing the time and the date on which a particular object descends into, or rises from, the horizon, we can obtain the bearing of the event. At this time, $\cos Az = \sin \delta / \cos \phi$ for those mathematically inclined. (δ = declination.) This relation does not involve the time or hour angle: no instrument is required and Nature provides the horizon circle, and so it is easy and fun to check.

LETTER TO THE EDITOR

Dear Sir,

Thank you for including the note about the availability of our space videos in the last issue of *Gnomon*.

I thought you might also like to know that, in support of the International Space Year '92, we are greatly expanding our videos to encompass a range of wide educational interests.

Examples of new videos added to our list in the last few months are as follows and many new titles are envisaged:

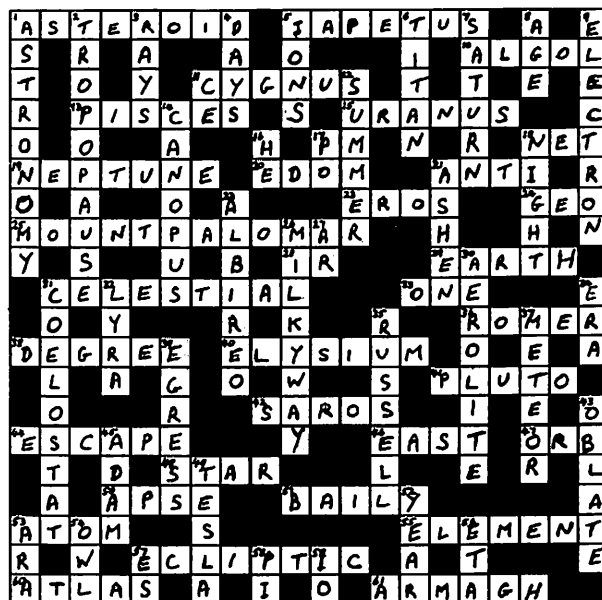
- Gemini III & IV
- Proud Conquest: Gemini VII & VI
- Gemini VIII: 'This is Houston, Flight'
- Gemini X Quick Look & Gemini XI
- Gemini XII Mission
- STS-37 Video Highlights

The British Interplanetary Society is also planning an Education Pack for free distribution to teachers. This will feature a number of booklets and other interesting literature. Booklets include a text on 'How Rockets Work' and a Series on the History of Astronomy and Space.

We are also seeking suggestions from teachers on further items which they would find particularly useful for inclusion in the Pack and are distributing a simple Questionnaire to help us in this task.

Yours sincerely,
L.J. Carter,
Special Projects Officer
The British Interplanetary Society

Solution to Crossword, Vol.11, No.2



Congratulations to the joint winners Fiona Vincent and Brian Kelly, both from Dundee. They win the book prize. If any reader would like a copy of the explanations of the clues, please send a SAE to the Editor requesting this information.

BOOK REVIEW – by Bob Kibble

Make a Sundial. Published by the British Sundial Society, price £5.00, 1991. ISBN 0 9518404 0 1.

Here is a valuable edition to every school library. Prepared by the Education Group of the British Sundial Society, *Make a Sundial* contains seventy pages of everything a teacher needs to bring sundials into the classroom. Starting with shadow sticks, the book leads on to show how to make horizontal, equatorial and polar dials using household objects. The bicycle wheel sundial and the playground analemmatic are whole-class activities, clearly explained with line drawings and photocopies of the real thing.

The book includes background notes to teachers, covering both the individual projects and the theory behind sundial design. A

useful glossary, booklist and contact addresses are included as appendices. The instructions are clear and concisely written in language accessible to the young reader and non-specialist teacher. Many of the A4 pages can be photocopied and used directly as class worksheets. It is here that the influence of experienced teachers on the Education Group shows.

I can recommend *Make a Sundial* without reservation. The British Sundial Society has done a fine job in producing a valuable addition to the sparse field of astronomical support material for the National Curriculum.



For the Newcomer

Astronomers, like specialists in any scientific discipline, use a lot of 'jargon'. They will tell you that they use it to be precise about their subject but it can be very forbidding to the newcomer. However, once you crack the code, things become much easier and fairly soon you'll be talking like an astronomer too. Let's begin by looking at some of the terrifying words I've just used in writing the spring 'Sky Diary'. First of all, there are the rather disconcerting EQUINOX and SOLSTICE.

Equinox means 'equal night'. On the day of the equinox every place on the Earth has 12 hours of darkness and 12 hours of light (ignoring the troublesome effect of twilight). The equinox, however, is not a day; it is an instant. It is the instant when the Sun is exactly on the celestial equator or when it appears exactly overhead at the Earth's equator.

There are two equinoxes each year; around the 21st of March and the 21st of September. The March equinox is known as the Vernal Equinox. It marks the first day of spring in the northern hemisphere. This is, of course, the first day of autumn in the southern hemisphere. (Have you noticed that Astronomers not only talk in jargon, they are also northern hemisphere chauvinists!) The September equinox is called the Autumnal Equinox – the first day of autumn for the north or the first day of spring for the south.

The March equinox occurs when the Sun is in the constellation of Pisces, whereas the September equinox happens when it is in Virgo. However, Astronomers call the equinoctial points the first point of Aries and the first point of Libra, respectively. This is because the names were given when the equinoxes did in fact occur with the Sun in these constellations. Due to the effect of precession – the wobble on the Earth's axis of rotation – the equinoctial points gradually move round the sky through the constellations of the Zodiac.

Solstice means the instant when the Sun is as far north (about June 21st) or as far south (about December 21st) on the sky as possible. The June solstice, called the summer solstice, is the instant when the Sun is directly overhead at the tropic of

Thanks to Eva Hans, Bob Kibble and Simplicimus for the articles appearing in this issue. We would like more readers to contribute to this section of *Gnomon*: please send in *your* contribution to the Editor (address on page 1).

Some of the articles in Curriculum Corner have been used successfully by schoolchildren, and they are reproduced here unabridged.

Sky Diary Spring 1992

Compiled by Eva Hans

Equinox: Mar 20^d 08^h 48^m
Solstice: June 21 03 14

MOON

<u>New Moon</u>	<u>First Quarter</u>	<u>Full Moon</u>	<u>Last Quarter</u>
Apr 3 ^d 05 ^h 01 ^m	Apr 10 ^d 10 ^h 06 ^m	Apr 17 ^d 04 ^h 42 ^m	Mar 26 ^d 02 ^h 30 ^m
May 2 17 44	May 9 15 43	May 16 16 03	Apr 24 21 40
June 1 03 57	June 7 20 47	June 15 04 50	May 24 15 53

MERCURY

Mercury is visible in the morning sky from April 3rd to May 24th when it will rise just before the Sun. After May 24th it will be too close to the Sun to observe but it will reappear in the evening sky from June 8th, when it will be low in the west after sunset. Mercury is at superior conjunction, that is it will be exactly behind the Sun, on May 31st.

VENUS

Venus, the brightest of the planets, is visible in the morning sky until the second week in May. Thereafter, it will be too close to the Sun to observe. Venus is at superior conjunction on June 13th. Mercury and Venus are in conjunction on April 5th, when Mercury will be 2°N of Venus (about 4 diameters of the full Moon).

MARS

Mars is a morning object and will be easier to observe towards the end of spring.

JUPITER

Jupiter is in the evening sky throughout the spring and should be the easiest of the planets to observe. Even a pair of binoculars will show the disc of the planet and its four largest moons. The moons appear as star-like points of light strung out in an almost straight line on either side of the planet. A series of observations will easily show their change in position as they move around Jupiter.

SATURN

Saturn is in the morning sky in the constellation of Capricornus.

ECLIPSE

There is a partial eclipse of the Moon on June 15th but this is not visible from the UK.

METEORS

The Lyrid meteor shower takes place between April 19th and 25th. It is not particularly rich, having an hourly rate of 15–25, although this is sometimes higher. The best night to observe is that of April 21st/22nd. The best direction is NE before midnight and E after midnight. However, as there is a waning, gibbous Moon that night, conditions will not be ideal.

Cancer. It marks the first day of summer in the northern hemisphere (the longest day) or the first day of winter in the southern hemisphere (the shortest day).

Conversely, the December solstice (winter solstice) is the instant when the Sun is directly overhead at the tropic of Capricorn. December 21st is the first day of winter, i.e. the shortest day for the northern hemisphere and the first day of summer, i.e. the longest day for the southern hemisphere.

The names of the tropics, of course, imply that the Sun is in these constellations when the solstices occur, but the effect of precession means that this is no longer so. The June solstice takes place

with the Sun in Gemini, whereas it is in Sagittarius at the December solstice.

These instants do not always fall precisely on the 21st of the relevant month because our year is not a whole number of days. The Earth goes round the Sun in approximately 365¹/₄ days and so we have to adjust our calendar by placing an extra day in February every 4th year (leap year). Thus the solstices and equinoxes can be as early as the 20th or as late as the 23rd.

Eva Hans

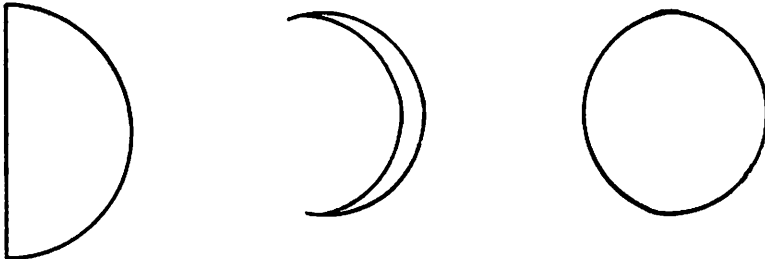
Curriculum Corner ►

P L A N E T S

(MAYBE FOR OLDER CHILDREN?)

Our solar system is made up of one star, the Sun, and nine planets which move round it. The path of a planet round the Sun is called its orbit. Most of the planets have moons moving round them. The four biggest planets also have rings.

We see planets because they reflect the light of the Sun to us. This means that like our moon, one half of a planet is lit up by the Sun, but the other half is dark. If a planet is farther away from the Sun than the Earth is, then we will always see its sunlit side. The planet will always look round like a full moon. However, if a planet is nearer to the Sun than the Earth, we will sometimes be able to see only part of its bright side. It might then look like a half moon, or be thinner, or fatter.



These changes in the amount of the day and night sides of a planet that we see are called its phases.

Mercury is the closest planet to the Sun. It is a small rocky planet with no air. It has craters on it like our Moon.

Venus is the nearest planet to the Earth. It is almost as big as the Earth. Venus has a solid surface but it is covered by thick clouds which we cannot see through.

Mars is about half the size of the Earth. It is known as the red planet because of the reddish brown rocks on its surface. Mars has two very small moons.

Jupiter is the largest planet in the solar system. It is made of gas. It has a thin ring system and a family of 16 moons. Its clouds are white, yellow, orange and red.

Saturn has a beautiful ring system round it. Like Jupiter it is made of gas. Its rings are made of rock and bits of ice moving round the planet. Saturn has 18 moons.

Uranus is another gas planet with a system of rings around it. It is greenish in colour and has 15 moons. Uranus is about one-third as big as Jupiter.

Neptune is very like Uranus but colder because it is farther from the Sun. It looks blue. It has a ring system and eight moons moving round it.

Pluto is the smallest planet in the solar system. It has one moon which is almost as big as itself. Pluto and its moon look like a double planet. They are very cold and icy.

When you have read about the planets try to answer these questions:

1. Describe our own planet as if you were seeing it from space.

Earth:

2. Where would the Earth come in the list of planets?
3. How many moons are there in the solar system?
4. Which planets have rings?
5. Which planets are made of gas?
6. Which planets could you walk about on?
7. What is the orbit of a planet?
8. Which planets show phases?

COSMOS II

For those AAE members in the North-East of England (or those who are adventurous enough to travel), Cleveland and Darlington Astronomical Society are organising 'Cosmos II' on Saturday, 25th April 1992, at Teesside Polytechnic, Middlesbrough, Cleveland. If it is as good as their previous 'Cosmos North-East', it will be well worth a visit.

The event runs from 9.30am to 6.30pm and speakers include our patron Prof. Arnold Wolfendale, the Astronomer Royal,

with a supporting cast of Dr Allan Chapman of Oxford University, Dr David Malin of the Anglo-Australian Observatory, and David Graham of the British Astronomical Association.

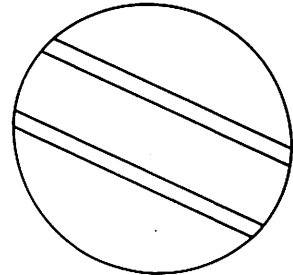
Don't be put off by thoughts of dry academic papers. This is a very friendly event and should be useful to all AAE members.

Full details are available from Mr Neil Haggath, 5 Fountains Crescent, Eston, Middlesbrough, Cleveland TS6 9DF (tel: 0642-454064).

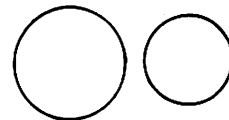
FOR VERY YOUNG CHILDREN

Which planet

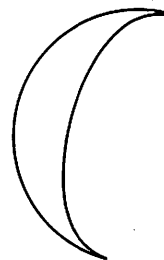
is biggest?



is smallest?



is nearest to the Earth?



has moons on?



Now colour the pictures of the planets.

SIMPLICIMUS ASKS:

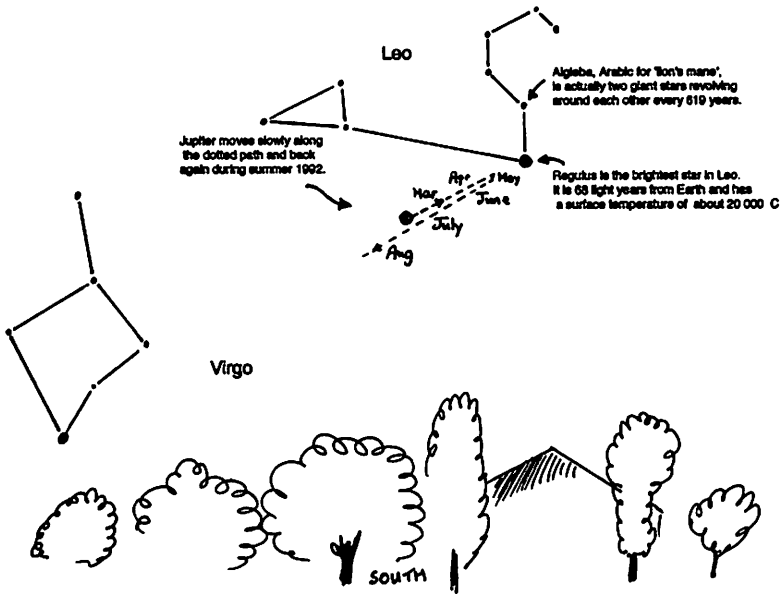
Thank you Eva Hans for explaining the meanings of the terms equinox, solstice, etc. Please excuse my ignorance, but when you say, for example, that the equinox is the instant the Sun lies on the equator, I am a bit confused as the Sun is not a point but a disc. Is it the centre of the disc which must lie on the equator, or the first instant of contact of the limb (i.e. edge) of the disc?

Also, and perhaps you will explain this in a later issue of *Gnomon*, we know that we make use of an artificial Sun for solar time-keeping, because our true Sun does not appear to move uniformly across the sky: the artificial Sun is sometimes a little ahead, sometimes a little behind. Bearing this in mind, do the times of the equinoxes agree with the true Sun or the artificial Sun?

Curriculum Corner ►

SKY SPY: JUPITER

Jupiter is well placed for school observations during the spring. You will find it in the south not far above the trees or houses. Jupiter is just below the constellation Leo and is an easy target for all young, and old, sky watchers.



During the Spring and Summer months, Jupiter will slowly move closer to the bright star Regulus and then slowly retreat. A classroom chart will help pupils to record this gradual change. It is a fine opportunity to practise and assess observation and recording skills. No instruments are needed, just a clear night.

The nearby constellations, Leo and Virgo, are also targets for evening sketching.

Star Trail

Teachers may like to make use of this word game with their classes.

In this word search you should be able to find the names of all the planets plus:

- SOLAR SYSTEM
- MOON
- COMET
- SUN
- MARIA
- METEOR

Start

S	A	T	U	R	N	S	O	L	A	R	S
T	Z	Y	R	P	Y	U	R	I	S	T	Y
A	N	O	A	L	M	D	S	G	U	E	S
R	J	J	N	U	O	Z	L	A	N	L	T
S	U	N	U	T	N	F	N	G	E	E	E
M	P	E	S	O	O	C	B	A	V	S	M
O	I	B	M	E	R	O	C	U	R	Y	C
O	T	U	Q	T	T	H	R	I	M	O	R
N	E	L	S	R	S	Z	K	N	J	P	I
S	R	A	M	N	A	P	O	R	U	E	A
M	E	T	E	O	R	O	E	A	R	T	H
T	E	M	O	C	N	E	P	T	U	N	E

End

List the planets in order starting with the one nearest to the sun.

.....

.....

.....

Write one sentence about each of the following:

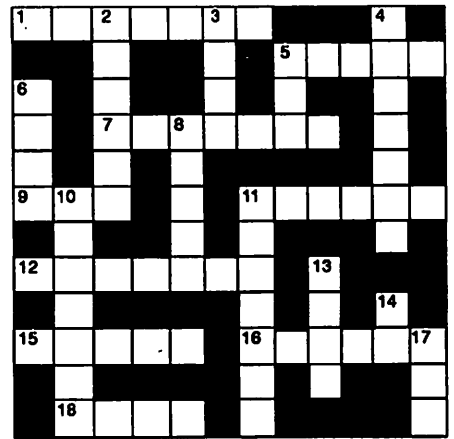
MARIA

COMETS

METEORS

You can also use the word search as a 'star trail'. Start at the top left and follow the astronomical words or phrases to the bottom right. The last letter in one word or phrase is the first in the next. (You will have to find some extra words.)

Children's Crossword



Across

1. Largest planet.
5.Sisters.
7. Planet with 8 moons.
9. Stars in the west.
11. Planet with most moons.
12. Phase of the Moon which cannot be seen.
15. The fastest thing in the universe.
16. Part of the Great Bear.
18. Capricornus.

Down

2. The earth is a
3. Stars rise in the
4. Fastest planet.
5. Our nearest star.
6. Red planet.
8. Smallest planet.
10. Venus is sometimes called the star.
11. Magnetic storm on the Sun.
13. When the Sun is due south.
14. Initials of the first man in space.
17. The Sun is made of gas.

Solutions will be sent to anyone on receipt of a SAE

SUNDIAL SURVEY

Is there a sundial near where you live? Is there one in your school? Where can you find a sundial?

Searching for sundials is good fun. It is a chance for you and your friends to look more closely at the area where you live. Try the local church, look at the walls as well as the gardens. What about the gardens near your home? Sometimes a house or an old building will have its own sundial built into one of the walls (look above your head height). Some sundials are found on signposts or towers. Some modern sundials are used as sculptures or works of art.



What do sundials have in common? If you take some photographs or make sketches you can combine your research with friends to make a whole class display. How does each sundial work? Which way do they face? Are they accurate - check with your watch. How is the shadow cast? Can you copy a design and make your own school sundial? Where would it go? Can it be placed anywhere?