Edexcel GCSE in Astronomy (2AS01)

Key skills development suggestions

Here are the key skills development suggestions as mentioned on *page 53* of the specification.

Key skill (Level 2) Application of number		Unit	Opportunities for development or internal assessment
N2.1	Interpret information from a suitable source.	Unit 1	Students are required to obtain and use the information required, selecting appropriate methods to achieve the required results. Suitable subjects are: • calculating the circumference of the Earth (1.1) • interpreting Butterfly Diagrams of sunspots (1.3) • relative durations of eclipses (1.4) • the equation of time (1.4) • seasonal variations in the rising and setting of the Sun (1.4) • interpreting the motion of planets on star maps (2.1) • the scale of the Solar System (2.1) • locating Messier objects on a star chart (3.2) • interpreting star trails on long-exposure photographs (3.2) • using the Hertzsprung-Russell diagram (3.3) • interpreting spectra of galaxies (4.3).
		Unit 2	This whole key skill may be addressed through the means of a practical investigation. Suitable subjects for a practical investigation are: • interpreting meteor shower data (A2, B2) • determining longitude from shadow stick data (A6) • interpreting the light curve of a variable star (A9, B9).

Key skill (Level 2) Application of number		Unit	Opportunities for development or internal assessment
N2.2	Use your information to carry out calculations to do with: a amounts or sizes b scales or proportion c handling statistics d using formulae.	Unit 1	Students must carry out their calculations, which could relate to volumes, ratios, averages, formulae etc, and show their methods of working. They must show how they have checked results and corrected their work as necessary. Suitable subjects are: • calculating the circumference of the Earth (1.1) • interpreting Butterfly Diagrams of sunspots (1.3) • relative durations of eclipses (1.4) • the equation of time (1.4) • interpreting Kepler's 3rd law of planetary motion (2.3) • interpreting the Drake Equation (2.4) • calculation involving declination and latitude (3.2) • apparent and absolute magnitude calculations (3.3) • stellar distances (3.3) • using the Hertzsprung-Russell diagram (3.3) • dependence of the intensity of light on distance (3.3) • calculation using redshift (4.3) • Hubble law calculations (4.3).
		Unit 2	This whole key skill can be addressed through the means of a practical investigation. Suitable subjects for a practical investigation are: • determining longitude from shadow stick data (A6) • interpreting the light curve of a variable star (A9, B9).

Key skill (Level 2) Application of number		Unit	Opportunities for development or internal assessment
N2.3	Interpret the results of your calculations and present your findings.	Unit 1	Based on their findings, students must select effective methods of presentation using, as appropriate, tables, graphs, charts and diagrams. Students should explain how the results of their calculations meet the purpose of the activity undertaken. Suitable subjects are: • calculating the circumference of the Earth (1.1) • interpreting Butterfly Diagrams of sunspots (1.3) • relative durations of eclipses (1.4) • the equation of time (1.4) • interpreting Kepler's 3rd law of planetary motion (2.3) • interpreting the Drake Equation (2.4) • stellar distances (3.3) • using the Hertzsprung-Russell diagram (3.3) • dependence of the intensity of light on distance (3.3) • calculation using redshift (4.3) • Hubble law calculations (4.3).
		Unit 2	Additionally, this whole key skill can be addressed through the means of a practical investigation. Suitable subjects for a practical investigation are: • determining longitude from shadow stick data (A6) • interpreting the light curve of a variable star (A9, B9).

Key skill (Level 2) Communication	Unit	Opportunities for development or internal assessment
C2.1a Take part in a group discussion.	Unit 1	Many of the topics in this specification are suitable as the basis of a group discussion. The discussion should be about a straightforward subject. This may be a subject often met in their studies and the vocabulary will be familiar. During the discussion, students should make clear and relevant contributions, listen and respond to others, and help to move the discussion forward. This whole key skill may be addressed via a project. Suitable subjects for a project are: • Eratosthenes' determination of the Earth's circumference (1.1) • the relative merits of refracting and reflecting telescopes (1.1) • the Apollo space programme (1.2) • the origin of the Moon (1.2) • aurorae (1.4) • exploration of the Solar System (2.1) • collisions and impacts in the Solar System (2.2) • the nature and location of comets (2.2) • the discoveries of Ceres and/or Pluto (2.3) • the astronomical discoveries of Galileo (2.3) • the detection of exoplanets (2.4) • is there life elsewhere in the Universe? (2.4) • stellar evolution (3.4) • the discovery of CMB radiation (4.3) • the fate of the Universe (4.3).
	Unit 2	This whole key skill may also be addressed through the means of a practical investigation. Suitable subjects for a practical investigation are: • the surface features of the Moon (A1, B1) • lunar and solar eclipses (A3, B3) • light pollution and its problems to astronomers (A7, B7) • highlights of the Messier Catalogue (B10).

Key skill (Level 2) Communication	Unit	Opportunities for development or internal assessment
C2.1b Give a talk of at least four minutes.	Unit 1	Following a period of research, students could be given the opportunity to give a short talk to the rest of their group. During the talk, students should speak clearly in a way that suits the subject and situation. They should keep to the subject. The structure of the talk should help listeners follow points made. The talk should include an image to illustrate the main points clearly. Images could include charts, graphs, diagrams of apparatus and processes, pictures and photographs. This whole key skill may be addressed via a project. Suitable subjects for a project are: • Eratosthenes' determination of the Earth's circumference (1.1) • the effects of the Earth's atmosphere on electromagnetic waves (1.1) • the Apollo space programme (1.2) • the origin of the Moon (1.2) • aurorae (1.4) • the scale and size of the Solar System (2.1) • exploration of the Solar System (2.1) • collisions and impacts in the Solar System (2.2) • the nature and location of comets (2.2) • the astronomical discoveries of Galileo (2.3) • is there life elsewhere in the Universe? (2.4) • an introduction to the night sky (3.1) • constellations (3.1) • the Hertzsprung-Russell Diagram (3.3) • stellar evolution (3.4) • the Local Group of galaxies (4.1) • the fate of the Universe (4.3).
	Unit 2	This whole key skill can also be addressed through the means of a practical investigation. Suitable subjects for a practical investigation are: • the surface features of the Moon (A1, B1) • lunar and solar eclipses (A3, B3) • light pollution and its problems to astronomers (A7, B7) • highlights of the Messier Catalogue (B10).

Key skill (Level 2) Communication		Unit	Opportunities for development or internal assessment
C2.2	Read and summarise information from at least **two** documents about the same subject. Each document must be a minimum of 500 words long.	Unit 1	Students will have a number of opportunities to read and synthesise information from two extended documents. Extended documents may include textbooks, articles in periodicals such as *BBC Sky at Night magazine* and *Astronomy Now*, and reports and articles of more than three pages. At least one of these documents should contain an image from which students can draw appropriate and relevant information. Students will need to select and read relevant material. From this information they will need to identify accurately the lines of reasoning and main points from the text and images. Students will then need to summarise this information in a form that suits the purpose, for example for a talk, discussion or presentation. This whole key skill may be addressed via a project. Suitable subjects for a project are: • the effects of the Earth's atmosphere on electromagnetic waves (1.1) • the origin of the Moon (1.2) • lunar and solar eclipses (1.4) • the scale and size of the Solar System (2.1) • exploration of the Solar System (2.1) • collisions and impacts in the Solar System (2.2) • the nature and location of comets (2.2) • the astronomical discoveries of Galileo (2.3) • the detection of exoplanets (2.4) • is there life elsewhere in the Universe? (2.4) • constellations (naming or cultural differences) (3.1) • stellar evolution (3.4) • the fate of the Universe (4.3).

Key skill (Level 2) Communication		Unit	Opportunities for development or internal assessment
C2.3	Write **two** different types of documents each one giving different information. One document must be at least 500 words long.	Unit 1	Students are required to produce two different types of document. At least one of these should be an extended document, for example a report of more than three pages. The document should present relevant information in an appropriate form. At least one of the documents should include an appropriate image that contains and effectively conveys relevant information. The information in the document should be clearly structured, for example through the use of headings, paragraphs, etc. Students should ensure that the text is legible and that spelling, punctuation and grammar are accurate. The two types of document could be the basis of a presentation to the class or a project work write-up presented to the teacher. This whole key skill may be addressed via a project. Suitable subjects for a project are: • the effects of the Earth's atmosphere on electromagnetic waves (1.1) • the origin of the Moon (1.2) • lunar and solar eclipses (1.4) • the scale and size of the Solar System (2.1) • exploration of the Solar System (2.1) • collisions and impacts in the Solar System (2.2) • the nature and location of comets (2.2) • the astronomical discoveries of Galileo (2.3) • is there life elsewhere in the Universe? (2.4) • constellations (naming or cultural differences) (3.1) • stellar evolution (3.4) • the fate of the Universe (4.3).

Key skill (Level 2) Information and communication technology		Unit	Opportunities for development or internal assessment
ICT2.1	Search for and select information to meet your needs. Use different information sources for each task and multiple search criteria in at least **one** case.	Unit 1	Students will need to identify suitable sources of information and effectively search for information using multiple criteria. Information selected should be interpreted and students should decide what is relevant for their purpose. This key skill can be addressed along with the communication key skill by students undertaking research for a projector practical activity. The two purposes could be a presentation to the class or a practical or project write-up presented to the teacher. This whole key skill may be addressed via a project. Suitable subjects for a project are: • the Earth's rotation (1.1) • the Moon's surface features (differences between 'far side' and 'near side', or origin of seas and craters) (1.2) • characteristics of planets (2.1) • planetary orbits (2.3) • collisions in the Solar System and possible consequences of a collision between a PHO and Earth (2.2) • exoplanets (discovery methods or implications for life elsewhere in the Universe) (2.4) • constellations (naming or seasonal visibility) (3.1) • circumpolar stars (visibility from a given latitude or use to determine the Earth's rotation period) (3.2) • light curves of variable stars (3.3) • the Milky Way (appearance with the aid of different optical instruments) (4.1) • the discovery and significance of CMB radiation (4.3).
		Unit 2	This whole key skill can also be addressed through the means of a practical investigation. Suitable subjects for a practical investigation are: • the surface features of the Moon (A1, B1) • stellar densities (parallel with, and perpendicular to, the plane of the Milky Way) (B4) • light pollution and its problems to astronomers (A7, B7).

Key skill (Level 2) Information and communication technology		Unit	Opportunities for development or internal assessment
ICT2.2	Enter and develop the information to suit the task and derive new information.	Unit 1	Students are required to bring together information in formats, such as tables, that help development. The information should be explored by, for example, changing information in a spreadsheet model. Information should also be developed and new information derived as appropriate, for example through the use of headings, tables, charts and graphs. New information should be derived from, for example, comparing information from different sources, using formulae to perform calculations, or processes may be modelled using ICT. The two purposes could be a presentation to the class or a practical or project write-up presented to the teacher. Subjects in Section IT2.1 which are suitable for research are also suitable for this aspect of the key skill. The communication key skill can also be addressed alongside this aspect. This whole key skill can be addressed via a project. Suitable subjects for a project are: • the Earth's rotation (1.1) • characteristics of planets (2.1) • planetary orbits (2.3) • collisions in the Solar System and possible consequences of a collision between a PHO and Earth (2.2) • exoplanets (discovery methods or implications for life elsewhere in the Universe) (2.4) • constellations (naming or seasonal visibility) (3.1) • circumpolar stars (visibility from a given latitude or use to determine the Earth's rotation period) (3.2) • light curves of variable stars (3.3) • the Milky Way (appearance with the aid of different optical instruments) (4.1) • the discovery and significance of CMB radiation (4.3).

Key skill (Level 2) Information and communication technology	Unit	Opportunities for development or internal assessment
ICT2.2 Enter and develop the information to suit the task and derive new information. *(continued)*	Unit 2	This whole key skill can also be addressed through the means of a practical investigation. Suitable subjects for a practical investigation are: • the surface features of the Moon (A1, B1) • stellar densities (parallel with, and perpendicular to, the plane of the Milky Way) (B4) • light pollution and its problems to astronomers (A7, B7).

Key skill (Level 2) Information and communication technology		Unit	Opportunities for development or internal assessment
ICT2.3	Present combined information such as text with image, text with number, image with number.	Unit 1	In presenting combined information students will need to select and use appropriate layouts in a consistent way through, for example, the use of margins, headings, borders, font size etc. Layouts etc should be refined to suit both the purpose and the needs of the audience (early drafts should be kept as portfolio evidence). The final piece of work should be suitable for its purpose and audience, for example a GCSE controlled assessment, OHTs/handouts for a presentation, etc. The document should have accurate spelling (use of spellchecker) and have been proofread. The two purposes could be a presentation to the class or a practical or project write-up presented to the teacher. This whole key skill may be addressed via a project. Suitable subjects for a project are: • the Earth's rotation (1.1) • characteristics of planets (2.1) • planetary orbits (2.3) • collisions in the Solar System and possible consequences of a collision between a PHO and Earth (2.2) • exoplanets (discovery methods or implications for life elsewhere in the Universe) (2.4) • constellations (naming or seasonal visibility) (3.1) • circumpolar stars (visibility from a given latitude or use to determine the Earth's rotation period) (3.2) • light curves of variable stars (3.3) • the Milky Way (appearance with the aid of different optical instruments) (4.1) • the significance of CMB radiation (4.3).
		Unit 2	This whole key skill may also be addressed through the means of a practical investigation. Suitable subjects for a practical investigation are: • the surface features of the Moon (A1, B1) • stellar densities (parallel with, and perpendicular to, the plane of the Milky Way) (B4) • light pollution and its problems to astronomers (A7, B7).

Key skill (Level 2) Improving own learning and performance		Unit	Opportunities for development or internal assessment
LP2.1	Help set targets with an appropriate person and plan how these will be met.	Unit 1	Students could draw up a plan to show how they intend to cover the assignments and tests.
		Unit 2	Controlled assessment and practice examination papers in their preparation for a test. They will set realistic dates and targets in consultation with their tutor. They will identify potential problems and suggest alternative courses of action.
LP2.2	Take responsibility for some decisions about your learning, using your plan to help meet targets and improve your performance.	Unit 1	Students will use their plan to meet targets and work effectively. This may involve prioritising tasks, managing their time effectively and amending their plan as necessary. Students will seek and use feedback from their tutor to help them improve their learning and performance. This may involve repeating a task or attempting a closely related one.
		Unit 2	Students may need to use different approaches to learning. These could include ICT-based tutorial material, pairing up with another student to review work, sharing tasks with other students or use of learning resource centres. If a controlled assessment activity that entails working over a long timescale is chosen, then this may also be used to contribute evidence for achievement at this whole key skill.
LP2.3	Review progress with an appropriate person and provide evidence of your achievements.	Unit 1	Students should review their own progress and the quality of their learning and performance.
		Unit 2	Students should be aware of the likely outcome if they are failing to meet targets or to make progress. Students may need to take remedial action and to seek help in an attempt to improve their performance. This may require an action plan to be drawn up and implemented. If a controlled assessment activity is chosen that entails working over a long timescale, then this may also be used to contribute evidence for achievement at this whole key skill.

Key skill (Level 2) Problem solving		Unit	Opportunities for development or internal assessment
PS2.1	Identify a problem, with help from an appropriate person, and identify different ways of tackling it.	Unit 1	As part of their programme of practical work, students could be given the problem to investigate. Students could suggest different ways of solving the problem. They would recognise that the problem is complex and that a simple solution might not be possible. They would select and use appropriate astronomical methods for exploring the problem and describe the main features. Students would have to agree the standards to be met to show that the problem had been addressed and analysed to the required degree of precision and accuracy. This whole key skill may be addressed via a project. Suitable subjects for a project are: • determining the Earth's size and/or rotation period (1.1) • observing the Sun and sunspots (1.3) • modelling the size and scale of the Solar System (2.1) • estimating magnitudes of stars (3.3) • determining distances to stars (3.3) • classifying galaxies (4.2).
		Unit 2	This whole key skill may also be addressed through the means of a practical investigation. Suitable subjects for a practical investigation are: • locating the radiant of a meteor shower (A2, B2) • determination of time using shadows (A6, B6) • using sunspots to determine the Sun's rotation (A8, B8) • determination of the period of an eclipsing binary star (A9, B9).

Key skill (Level 2) Problem solving		Unit	Opportunities for development or internal assessment
PS2.2	Plan and try out at least one way of solving the problem.	Unit 1	Students would be expected to generate at least two options for tackling the problem. They would compare the main features of each option including materials and apparatus requirements, timescales to carry out the exercise, and health and safety factors. Students would select the option that has the most realistic chance of success, and justify their choice. This whole key skill may be addressed via a project. Suitable subjects for a project are: • determining the Earth's size and/or rotation period (1.1) • observing the Sun and sunspots (1.3) • modelling the size and scale of the Solar System (2.1) • estimating magnitudes of stars (3.3) • determining distances to stars (3.3) • classifying galaxies (4.2).
		Unit 2	This whole key skill may also be addressed through the means of a practical investigation. Suitable subjects for a practical investigation are: • locating the radiant of a meteor shower (A2, B2) • determination of time using shadows (A6, B6) • using sunspots to determine the Sun's rotation (A8, B8) • determination of the period of an eclipsing binary star (A9, B9).

Key skill (Level 2) Problem solving		Unit	Opportunities for development or internal assessment
PS2.3	Check if the problem has been solved and identify ways to improve problem-solving skills.	Unit 1	For experiments or observation-based problems, students would have to draw up detailed plans for apparatus and quantities of materials. They could carry out a risk assessment before going ahead with their experiments or observations. Students would carry out their preliminary work, using support and feedback from their tutor. Progress would be reviewed. The plan may have to be revised as the experiment or observation progresses. This whole key skill may be addressed via a project. Suitable subjects for a project are: • determining the Earth's size and/or rotation period (1.1) • observing the Sun and sunspots (1.3) • modelling the size and scale of the Solar System (2.1) • estimating magnitudes of stars (3.3) • determining distances to stars (3.3) • classifying galaxies (4.2).
		Unit 2	This whole key skill may also be addressed through the means of a practical investigation. Suitable subjects for a practical investigation are: • locating the radiant of a meteor shower (A2, B2) • determination of time using shadows (A6, B6) • using sunspots to determine the Sun's rotation (A8, B8) • determination of the period of an eclipsing binary star (A9, B9).

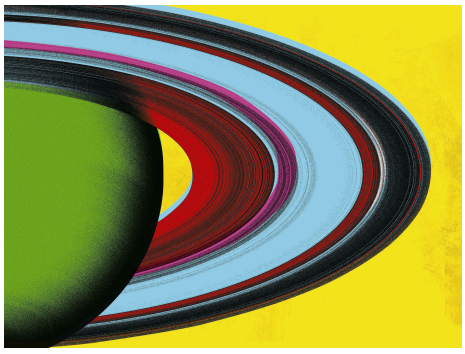
Key skill (Level 2) Working with others	Unit	Opportunities for development or internal assessment
WO2.1 Plan work with others.	Unit 1	Students should identify the objectives of working together in groups to plan the successful completion of a set activity. Students should also identify the tasks, resources and timescales required to meet these objectives. Information should be exchanged to clarify responsibilities, for example suggesting ways help can be given, asking what others can do, checking their own and others' responsibilities. The group needs to confirm working arrangements and responsibilities. A suitable activity could be a project or a practical observing session. This key skill can be combined with key skills in communication and ICT by including research and presentation as part of the activity, and application of number if the activity is a practical activity. If this is done, then students will need to have covered all aspects of all the key skills involved individually. This whole key skill can be addressed via a project. Suitable subjects for a project are: • producing a lunar chart (1.2) • constructing a model to demonstrate the likely origin of lunar craters (1.2) • observing and recording sunspots (1.3) • constructing a model to demonstrate lunar phases and eclipses (1.4) • using a shadow stick to determine longitude and the time of local noon (1.4) • constructing a scale model of the Solar System (2.1) • plotting the motion of planets on a star chart (2.1) • planning and carrying out an observing session (3.2) • using star trails to determine the Earth's rotation period (3.2) • producing a star chart (3.1, 3.2) • classifying galaxies to produce a 'Tuning Fork' chart (4.1).

Key skill (Level 2) Working with others		Unit	Opportunities for development or internal assessment
WO2.2	Work co-operatively towards achieving the identified objectives.	Unit 1	When working towards agreed objectives students could work in pairs or small groups for project work. Students will need to organise tasks so that responsibilities can be met, such as obtaining resources, completing tasks on time etc. For example, whilst one student is researching a project; another can be working on the presentation or proofreading an earlier draft. Tasks should be completed accurately and safely. Cooperative ways of working should be supported through, for example, anticipating the needs of others, avoiding actions that offend, etc. Advice from others, including group members, tutor etc should be sought when needed. Students will need to plan and organise their work effectively so that they meet agreed deadlines and maintain appropriate working relationships. This whole key skill can be addressed via a project. Suitable subjects for a project are: • producing a lunar chart (1.2) • constructing a model to demonstrate the likely origin of lunar craters (1.2) • observing and recording sunspots (1.3) • constructing a model to demonstrate lunar phases and eclipses (1.4) • using a shadow stick to determine longitude and the time of local noon (1.4) • constructing a scale model of the Solar System (2.1) • plotting the motion of planets on a star chart (2.1) • planning and carrying out an observing session (3.2) • using star trails to determine the Earth's rotation period (3.2) • producing a star chart (3.1, 3.2) • classifying galaxies to produce a 'Tuning Fork' chart (4.1).

Key skill (Level 2) Working with others		Unit	Opportunities for development or internal assessment
WO2.3	Review your contributions and agree ways to improve work with others.	Unit 1	Once completed the full group needs to review outcomes against the agreed objectives. In doing this they should identify what has gone well and what has gone less well. Students should listen and respond to progress reports from others and agree ways of improving work with others to help achieve objectives. Students should identify areas of the exercise that could be improved and should suggest ways in which the pair or group could have worked differently and perhaps more effectively. This whole key skill can be addressed via a project. Suitable subjects for a project are: • producing a lunar chart (1.2) • constructing a model to demonstrate the likely origin of lunar craters (1.2) • observing and recording sunspots (1.3) • constructing a model to demonstrate lunar phases and eclipses (1.4) • using a shadow stick to determine longitude and the time of local noon (1.4) • constructing a scale model of the Solar System (2.1) • plotting the motion of planets on a star chart (2.1) • planning and carrying out an observing session (3.2) • using star trails to determine the Earth's rotation period (3.2) • producing a star chart (3.1, 3.2) • classifying galaxies to produce a 'Tuning Fork' chart (4.1).

Contact us

If you have any questions please call us on 0844 576 0027 or use our Ask the Expert service. This online support service will put you in direct email contact with our senior subject experts. Go to www.edexcel.com/asktheexpert to ask a question.



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