



Curriculum Map

Subject: Astronomy

Year group: 10 & 11

Timings may change slightly.

Time period	Autumn 1 (Year 10)	Spring 1 (Year 10)	Summer 1 (Year 10)	Autumn 2 (Year 11)	Spring 2 (Year 11)
Content <i>Declarative Knowledge</i> — <i>'Know What'</i>	Topic 1: Planet Earth Demonstrate knowledge, understanding and application of: <ul style="list-style-type: none"> - The shape of the Earth - The mean diameter of the Earth - The internal divisions of the Earth and their features - The longitude and latitude coordinate system - The latitudes of astronomical significance - The effects of the Earth's atmosphere on astronomical observations Topic 9: Exploring the Moon Demonstrate knowledge, understanding and application of: <ul style="list-style-type: none"> - The Moon's major internal divisions - The differences between the near and far side of the moon - How information has been gathered about the far side of the Moon - Origin theories 	Topic 4: Time and the Earth-Moon-Sun System Demonstrate knowledge, understanding and application of: <ul style="list-style-type: none"> - Sidereal and Synodic days, months and time - Times of sunrise and sunset - Equinoxes, Solstices and the Sun's apparent motion - Use of Trial Photographs - Apparent Solar Time (AST) - Mean Solar Time (MST) - The Equation of Time and its annual variation - The use of shadow sticks and Sundials - The relationship between local time and longitude - The use of time zones - Greenwich Mean Time (GMT) - The principles of determination of longitude - The lunar phase cycle Topic 7: Early Models of the Solar System	Topic 12: Formation of Planetary Systems Demonstrate knowledge, understanding and application of: <ul style="list-style-type: none"> - The operation of gravitational forces, collisions and solar wind in our Solar System - The operation of gravitational focus of planets and moons - The main theories for the formation and positioning of gas giants - The methods for discovering exoplanets - The requirements for life, including the Goldilocks zone and Drake equation - The search for extra-terrestrial life Topic 5: Solar System Observation Demonstrate knowledge, understanding and application of: <ul style="list-style-type: none"> - The observed motion of the Sun along the ecliptic 	Topic 6: Celestial Observation Demonstrate knowledge, understanding and application of: <ul style="list-style-type: none"> - Celestial phenomena visible to the naked eye and their appearances - The cause of meteors and meteor showers, including the determinant of the radiant - The recognition of constellations, asterisms and pointer stars - The difference of constellations, asterisms and star names in different cultures - The Celestial sphere - The equatorial coordinate system - The horizon coordinate system - Local sidereal time and the hour angle - The importance of cardinal points, culmination, meridian, zenith, circumpolarity and the observer's latitude during observations 	Topic 15: Our place in our Galaxy Demonstrate knowledge, understanding and application of: <ul style="list-style-type: none"> - The appearance of the Milky way as seen with the naked eye, binoculars and small telescopes - The location of key features of the Milkyway - The use of 21cm waves to determine the structure and rotation of the Milkyway - The composition and scale of the Local Group - The classification of galaxies using the Hubble classification system and tuning fork diagram - The emission of radiation from galaxies - Active Galactic Nuclei and types of active galaxies - The main theories for the formation and evolution of galaxies Topic 16: Cosmology



Curriculum Map

	<p>Topic 2: The Lunar Disc Demonstrate knowledge, understanding and application of:</p> <ul style="list-style-type: none"> - The shape of the Moon - The mean diameter of the Moon - The principal naked-eye lunar surface formations, including their structure and origins - The major features of the lunar surface - Rotation and revolution periods of the Moon - The synchronous nature of the Moon's orbit - Lunar libration <p>Topic 10: Solar Astronomy Demonstrate knowledge, understanding and application of:</p> <ul style="list-style-type: none"> - The Sun's major internal divisions and their role in energy production and transfer - The proton-proton cycle of fusion - The Sun's major atmospheric divisions - Solar wind and its principle effects - The Earth's magnetosphere and Van Allen belts - Methods to view the Sun safely 	<p>Demonstrate knowledge, understanding and application of:</p> <ul style="list-style-type: none"> - The use of detailed observations of solar and lunar cycles by ancient civilisations - The celestial alignment of ancient monuments - The Geocentric model - The advantages of epicycles - The contribution of the observational work of Brahe - The contribution of the mathematical modelling of Copernicus and Kepler - The importance of Galileo's telescopic observation <p>Topic 11: Exploring the Solar System Demonstrate knowledge, understanding and application of:</p> <ul style="list-style-type: none"> - Using data about the names and locations of planets, dwarf planets and small solar system objects. - The principal characteristics of a planet - The structure of comets - The orbits of short and long period comets - The Kuiper Belt, Oort Cloud and Heliosphere 	<ul style="list-style-type: none"> - The terms First Point of Aries and First Point of Libra - The observed motion of the planets and retrograde motion <p>Topic 8: Planetary Motion and Gravity Demonstrate knowledge, understanding and application of:</p> <ul style="list-style-type: none"> - Elliptical orbits - Kepler's laws, including mathematical - Newton's law of Gravitation 	<ul style="list-style-type: none"> - Diurnal motion - The use of star charts, planispheres and computer programs to identify objects in the night sky - Naked eye techniques and the factors affecting visibility <p>Topic 14: Stellar Evolution Demonstrate knowledge, understanding and application of:</p> <ul style="list-style-type: none"> - The use of the Messier and New General Catalogue - The interaction between radiation pressure, electron pressure and gravity for small mass stars - The interaction between radiation pressure, neutron pressure and gravity for large mass stars - The principal stages and timescales of stellar evolution for different mass stars - The Chandrasekhar limit <p>Topic 13: Exploring Starlight Demonstrate knowledge, understanding and application of:</p> <ul style="list-style-type: none"> - The astronomical magnitude scale - The Bayer system - The use of spectral lines and what can be obtained from them 	<p>Demonstrate knowledge, understanding and application of:</p> <ul style="list-style-type: none"> - Red shift in relation to observations of galaxies - Evidence of the expanding Universe - The use of Hubble's Law in determining the age and size of the Universe - The expansion of the universe as evidence for both the Big Bang Theory and Steady State theory - The major observational evidence in favour of the Big Bang theory - Fluctuations in the CMBR and its significance - The different predictions for future evolutionary paths - The significance of dark matter and dark energy
--	---	---	---	---	--



Curriculum Map

	<ul style="list-style-type: none"> - Sunspots and solar rotation period - The solar cycle <p>Topic 3: The Earth-Moon-Sun System Demonstrate knowledge, understanding and application of:</p> <ul style="list-style-type: none"> - The relative sizes of and distances between the Earth, Moon and Sun - How Eratosthenes and Aristarchus used observations of the Moon and Sun to determine diameters and distances - The mean diameter of the Sun - The relative effects of the Sun and Moon in tides - Precession of the Earth - Eclipses and the effect they have on the appearance of the Sun and Moon 	<ul style="list-style-type: none"> - The main theories for the origin of water on Earth - Meteoroids and Meteorites - The scale of the solar system including units and the ecliptic - The use of transits of Venus - The human eye and astronomical observations - The Different types of telescopes and their design including advantages and disadvantages - Key parts of a telescope - Magnification of a telescope - How telescopes alter the appearance of celestial objects - The major types of space orbit - Types of space probe - Earth's escape velocity - Advantages and Disadvantages of manned missions - The Apollo program 		<ul style="list-style-type: none"> - Star classification - The relationship between colour, spectral type and surface temperature - The HR diagram and light curves - The inverse square law between distance and intensity - The units degree, arcmin and arcsec - The parsec and parallax - The use of Cepheid Variables in distance measurements - Binary stars and clusters - The effect of the Earth's atmosphere on different wavelengths of light - The workings of simple radio telescopes and infrared telescopes - The discoveries of radio and infrared telescopes - The ideal location of different types of telescope - The advantages and disadvantages of space telescopes and detectors - The use of gamma ray, Xray and UV astronomy - The appearance of different celestial objects in different wavelengths 	
--	--	---	--	---	--



Curriculum Map

<p>Skills</p> <p><i>Procedural Knowledge</i></p> <p>—</p> <p><i>'Know How'</i></p>	<p>Observational Skills (Design, Make, Analyse and Evaluate observations):</p> <ul style="list-style-type: none"> - Use scientific theories and explanations to develop hypotheses - Plan observations to test hypothesis, check data or explore phenomena - apply knowledge of a range of techniques, instruments and apparatus to select those appropriate to the observation - understand how to carry out observations appropriately with due regard to the correct manipulation of equipment, the accuracy of measurements, and health and safety considerations - understand how to make and record observations and measurements using a range of apparatus and methods - evaluate methods and suggest possible improvements and further iterations. <p>Apply the cycle of collecting, presenting and analysing data, including:</p> <ul style="list-style-type: none"> - presenting observations and other data using appropriate methods - translating data from one form to another - carrying out and representing mathematical and statistical analyses - representing distributions of results and making estimations of uncertainty - interpreting observations and other data (presented in verbal, diagrammatic, graphical, symbolic or numerical form), including identifying patterns and trends, making inferences and drawing conclusions - presenting reasoned explanations including relating observations and data to hypotheses - being objective, evaluating data in terms of accuracy, precision, repeatability and reproducibility, and identifying potential sources of random and systematic error - communicating the scientific rationale for observations, methods used, findings, and reasoned conclusions through paper-based and electronic reports, and presentations using verbal, diagrammatic, graphical, numerical and symbolic forms. <p>Develop scientific vocabulary and use quantities, units, symbols and nomenclature:</p> <ul style="list-style-type: none"> - use scientific vocabulary, terminology and definitions - recognise the importance of scientific quantities and understand how they are determined - use SI units and related derived units (e.g. kg, km, l.y., pc, AU) - use prefixes and powers of ten for orders of magnitude (e.g. tera, giga, mega, kilo, centi, milli, micro and nano) - interconvert units - use an appropriate number of significant figures in calculation. 				
<p>Key Questions</p>	<p>What are the structures of the Earth, Moon and Sun?</p> <p>How do their interactions produce many of the astronomical cycles and phenomena of our natural world?</p>	<p>What is the Earth's place within the Solar System and the Universe?</p>	<p>What forces have shaped our own, and other, planetary systems?</p>	<p>How do stars and other celestial objects appear in the night sky?</p> <p>What forces govern the life cycles of stars?</p> <p>What are the challenges inherent in making observations in astronomy and how has technology aimed to overcome them?</p>	<p>How did astronomers discover the Earth's position within our galaxy?</p> <p>What are the current theories for the evolution of the Universe?</p>



Curriculum Map

Assessment	<p>End of Topic Tests for each topic.</p> <p>Synoptic End of Half Term Test - October and December</p> <p>Objective question tests for each topic.</p> <p>Assessed Observational skills - one aided, one unaided throughout course.</p>	<p>End of Topic Tests for each topic.</p> <p>Synoptic End of Half Term Test - February and April</p> <p>Objective question tests for each topic.</p> <p>Assessed Observational skills - one aided, one unaided throughout course.</p>	<p>End of Topic Tests for each topic.</p> <p>Synoptic End of Half Term Test - May</p> <p>Objective question tests for each topic.</p> <p>Assessed Observational skills - one aided, one unaided throughout course.</p> <p>Year 10 Mocks</p>	<p>End of Topic Tests for each topic.</p> <p>Synoptic End of Half Term Test - October</p> <p>Objective question tests for each topic.</p> <p>Assessed Observational skills - one aided, one unaided throughout course.</p> <p>Year 11 December Trials</p>	<p>End of Topic Tests for each topic.</p> <p>Synoptic End of Half Term Test - February and April TBC</p> <p>Objective question tests for each topic.</p> <p>Assessed Observational skills - one aided, one unaided throughout course.</p> <p>Year 11 March Mocks TBC</p>
Literacy/Numeracy/SMSC/Character	<p>Mathematics Skills: Students are not required to recall any equations but instead are provided with a formulae and data sheet for each examination.</p> <ul style="list-style-type: none"> - Arithmetic and numerical computation - The handling of data - Algebra - Graphs - Geometry and Trigonometry <p>Literacy:</p> <ul style="list-style-type: none"> - Interpretation of methods - Research of key scientific ideas, techniques and procedures - Make judgments and draw conclusions - Develop and improve written observational procedures <p>SMSC and Character:</p> <ul style="list-style-type: none"> - Development of communication skills through teamwork, adaptability, self-management and self-development and resilience - Development of confidence to progress to further and higher educational course in the fields of astronomy or physics - Development of an awareness that the study and practice of astronomy are subject to limitations for example by economic, technical, ethical and cultural influences 				