KESTEVEN AND SLEAFORD HIGH SCHOOL

Physics Scheme of Learning

Year 11 – Term 4/P16 Space

Intent – Rationale

Space is the final topic in the AQA GCSE and is an opportunity to develop literacy skills with extended writing answers and tackle the understanding of command words within GCSE Physics. Students will learn about the solar system and everything in it, the formations of stars, solar systems and the origins of the universe. Students will go on a journey of discovery through the life cycle of a star, all the way from Nebula to potential endings of either a black dwarf or black hole. Students will learn to evaluate evidence supporting the theories for the origins of the universe and discover that there is much of the universe will still don not fully understand, such as dark energy and dark matter.

Sequencing – what prior learning does this topic build upon?	Sequencing – what subsequent learning does this topic feed into?
Topic 12 Phys Exploring Space **GCSE P7 Radioactivity** **GCSE P12 Waves** **GCSE P13 The Electromagnetic Spectrum**	• A level – Year 13 topic Space
What are the links with other subjects in the curriculum?	**What are the links to SMSC, British Values and Careers?**
• Base the content here on what you already know but there will be time in future to liaise further as part of our collaborative work	P16.1 Formation of solar system SP2 P16.2 Life cycle of stars SP3 P16.4 Red shift C1 C2 P16.5 Beginning and future of the Universe C1 C2
What are the opportunities for developing literacy skills and developing learner confidence and enjoyment in reading?	**What are the opportunities for developing mathematical skills?**
• Develop literacy skills with extended writing answers. • Develop the understanding of command words within GCSE Physics. FROM THE LIBRARY *A Brief History Of Time*-530 *Sight Light and Colour-530* *Stephen Hawkins Universe-530*	•

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Physics Scheme of Learning

Year 11 – Term 4/P16 Space

Intent – Concepts

What knowledge will students gain and what skills will they develop as a consequence of this topic?

Know

Draw a diagram to show the forces acting on a satellite in orbit around the Earth.
State there is still much about the universe that is not understood, for example dark mass and dark energy.
State the name of the element that makes up most of the mass of a star.

Apply

Describe how red-shift provides evidence of the Big Bang
Describe the absorption or emission spectrum of light from the Sun.
Describe what red-shift is.
Describe how a satellite can be accelerating but staying at the same speed.
Describe the similarities and differences between the lifecycles of small and large stars.
Describe how a star forms from a cloud of dust and gas called a nebula.
Describe the different objects in our solar system and their location within our solar system.
Describe how our solar system was formed.

Extend

Explain how light is shifted towards the red end of the spectrum as the light source is moving away from us as the movement makes the wavelength longer.
Explain why more distant stars would have a greater red-shift than nearby stars in terms of their speed.
Explain how the red-shift of distant stars and galaxies shows that they are moving away from us.
Explain how changing the speed of a satellite affects the orbital radius of the satellite.
Explain where in the solar system various groups of objects are likely to be found, e.g. the correct order of the planets, rocky dwarf planets and gas giants.
Explain how the star starts to fuse hydrogen atoms together in a process called nuclear fusion when the temperature of the protostar becomes high enough.
Explain how the Sun's size is kept in balance while two opposing forces are trying to make it bigger and smaller simultaneously.
Explain how the length of a star's life cycle is affected by the size of the star.

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What subject specific language will be used and developed in this topic?	What opportunities are available for assessing the progress of students?
Big Bang theory the theory that the universe was created in a massive explosion (the Big Bang), and that the universe has been expanding ever since **black dwarf** a star that has faded out and gone cold **black hole** an object in space that has so much mass that nothing, not even light, can escape from its gravitational field **centripetal force** the resultant force towards the centre of a circle acting on an object moving in a circular path **cosmic microwave background radiation (CMBR)** electromagnetic radiation that has been travelling through space ever since it was created shortly after the Big Bang **dark matter** matter in a galaxy that cannot be seen. Its presence is deduced because galaxies would spin much faster if their stars were their only matter **main sequence** the main sequence is the life stage of a star during which it radiates energy because of fusion of hydrogen nuclei in its core **neutron star** the highly compressed core of a massive star that remains after a supernova explosion **protostar** the concentration of dust clouds and gas in space that forms a star **red giant** a star that has expanded and cooled, resulting in it becoming red and much larger and cooler than it was before it expanded **red supergiant** a star much more massive than the Sun will swell out after the main sequence stage to become a red supergiant before it collapses **red-shift** increase in the wavelength of electromagnetic waves emitted by a star or galaxy due to its motion away from us. The faster the speed of the star or galaxy, the greater the red-shift is **supernova** the explosion of a massive star after fusion in its core ceases and the matter surrounding its core collapses on to the core and rebounds **white dwarf** a star that has collapsed from the red giant stage to become much hotter and denser	

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Intent – Concepts

Lesson title	Learning challenge	Higher level challenge	Suggested activities and resources
P16.1 Formation of solar system	Can I describe the different objects in our solar system and their location within our solar system? Can I describe how our solar system was formed?	Can I explain where in the solar system various groups of objects are likely to be found, e.g. the correct order of the planets, rocky dwarf planets and gas giants?	
P16.2 Life cycle of stars	Can I state the name of the element that makes up most of the mass of a star? Can I describe how a star forms from a cloud of dust and gas called a nebula? Can I describe the similarities and differences between the lifecycles of small and large stars?	Can I explain how the length of a star's life cycle is affected by the size of the star? Can I explain how the Sun's size is kept in balance while two opposing forces are trying to make it bigger and smaller simultaneously? Can I explain how the star starts to fuse hydrogen atoms together in a process called nuclear fusion when the temperature of the protostar becomes high enough?	
P16.3 Planets, satellites & orbits	Can I describe how a satellite can be accelerating but staying at the same speed? Can I draw a diagram to show the forces acting on a satellite in orbit around the Earth?	Can I explain how changing the speed of a satellite affects the orbital radius of the satellite?	
P16.4 Red shift	Can I describe the absorption or emission spectrum of light from the Sun? Can I describe what red-shift is?	Can I explain how light is shifted towards the red end of the spectrum as the light source is moving away from us as the movement makes the wavelength longer? Can I explain why more distant stars would have a greater red-shift than nearby stars in terms of their speed?	
P16.5 Beginning and future of the Universe	Can I state there is still much about the universe that is not understood, for example dark mass and dark energy? Can I describe how red-shift provides evidence of the Big Bang?	Can I explain how the red-shift of distant stars and galaxies shows that they are moving away from us?	