

Science KS4: Blended Learning Booklet

P8 Space

Name:

Form:

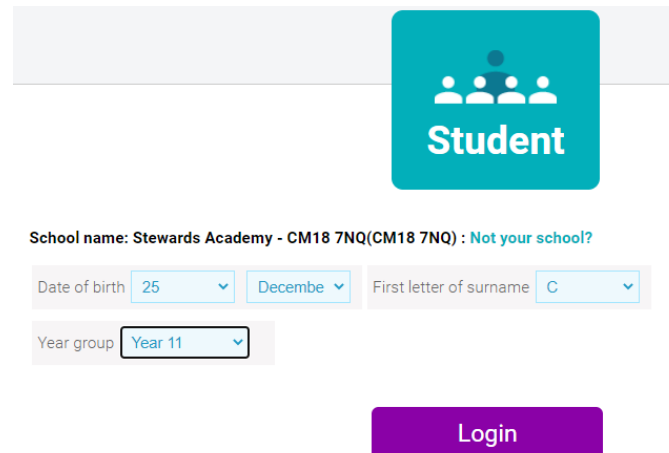
Aim to complete four lessons each week. Watch the videos and follow the four part lesson plan

All video clips are online using the ClassCharts link. Upload all work onto ClassCharts for feedback.

The online textbook has all the key information and vocabulary to help you with this unit

To log on to the online textbook:

- <https://connect.collins.co.uk/school/portal.aspx>
- Type in “stewards” and select Stewards Academy
- Login using your date of birth, initial of your surname and your academic year



School name: Stewards Academy - CM18 7NQ(CM18 7NQ) : [Not your school?](#)

Date of birth First letter of surname

Year group

Login



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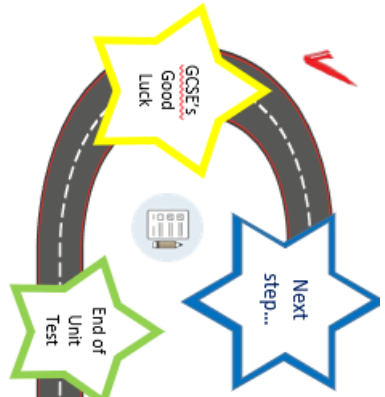
Knowledge organiser (T)

SAL (T)

(T) = Triple scientists only



Big Picture – Year 11 Overview Science



I will be able to explain how our solar system is organized and how its existence is affected by the lifecycle of a star (T). I will be able to explain how objects move in space and how space itself is ever increasing in size (T). I will be able to explain the importance of red-shift as evidence for the Big Bang theory (T). I will be able to describe the importance of the role of gravity in space (T).

Space



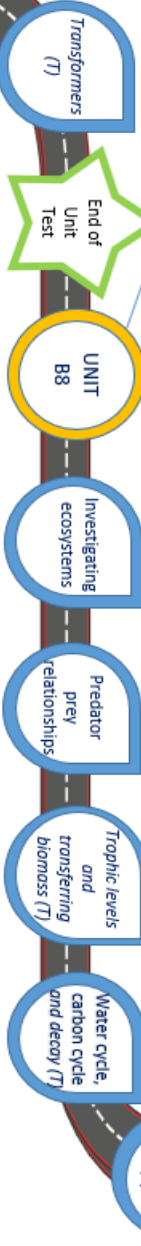
I will be able to describe the processes required to make water potable and also process required to treat sewage and waste water. I will be able to describe methods for reducing resource waste and lessening the environmental impact of removing resources from the Earth. I will be able to describe alternative methods of extracting metals. Finally, I will be able to describe the importance of fertilisers in maintaining food security (T)

Sustainability



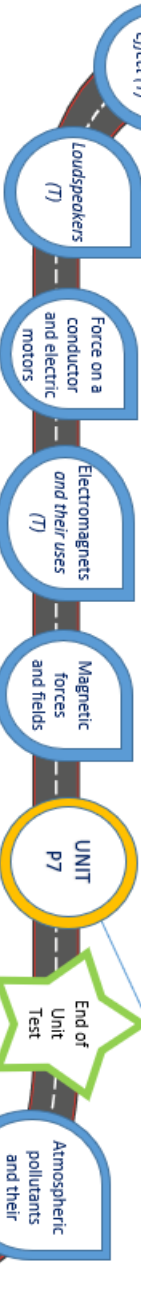
I will be able to describe the factors that affect living organisms within a habitat. I will be able to explain how plants and animals interact within a habitat. I will be able to explain how human activities impact biodiversity. I will be able to explain how carbon and water are recycled and also which factors affect the rate of decay (T)

Ecology



I will be able to describe the shape of the magnetic field that surrounds a magnet. I will be able to explain how an electric current can be used to generate a magnetic field and give some example of the uses of electromagnets (T). I will be able to explain how a motor works. I will be able to explain how a transformer works and how this links to supplying electrical energy efficiently.

Electromagnetism



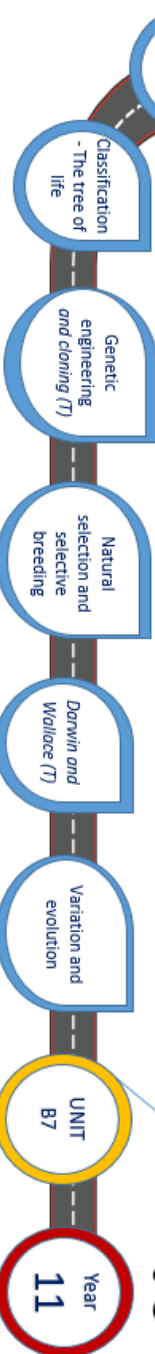
I will be able to describe what the early atmosphere was like and how and why it changed. I will be able to explain the consequences of the green house effect, how humans add to the impact of the green house effect and what we can do to reduce this. I will be able to describe how various atmospheric pollutants are formed and the effects that they have on the environment.

The Atmosphere



I will be able to explain what causes variation and its effects on the individual. I will be able to explain how variation contributes to natural selection and the evolution of new species. I will be able to describe the causes of extinction.

Variation & Evolution



ZOOM IN... MY LEARNING JOURNEY:

Subject: Space: Year: 11 Unit: P8

AIMS

Students will learn about the stars, the universe, what we can detect moving in space and the effects of gravity. This unit will provide an opportunity to understand the origin and life cycles of stars. Students will discover how we are able to state that the Universe is expanding at an increasing rate. They will investigate phenomena such as red-shift and the Big Bang. Students will learn about the role of gravity, linking this to the life cycle of stars. They will discover how and why our ideas about the Universe have developed over time

DEVELOPING COURAGE

- C In an emergency another planet/space station may provide a home for the human race
- O Understand how the universe was created
- U Work together describe the magnetic effect of a solenoid
- R To explain the evidence supporting the Big Bang
- A The vastness of the Universe
- G Share ideas and understanding
- E Exploring the awesomeness of space

PREVIOUS LEARNING

Students will know that our sun is a star and at the centre of our universe. They will know how the position and movement of the Earth affects our days and seasons. They will have some appreciation for the vast distances involved in measuring the universe. They will have some understanding with regard to the importance of gravity with regard to life on Earth and also in maintaining the order of the Solar System.

WHAT WE KNOW/ REMEMBER

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UP NEXT

- Course complete**
- Revision for GCSE

CAREERS

- Astronaut
- Ministry of defence
- Telecommunications
- Meteorologist



PERSONAL OBJECTIVES

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RECOMMENDED READING

1. Knowledge Encyclopedia Space!: The Universe as You've Never Seen it Before by DK,
2. Hello Is This Planet Earth by Tim Peake,
3. Space Atlas: Mapping the Universe and Beyond by James Trefil.



Connection

Have a look at the topic overview and the P8 zoom in.

Populate what you know and your personal objectives.

Lesson 1: P8.1 – The Solar System

Activation

LI: describe the orbits of planets and moons in the Solar System, distinguish between planets, dwarf planets and moons.

1. <https://www.youtube.com/watch?v=mQrlgH97v94>
2. https://www.youtube.com/watch?v=KsF_hdjWJjo
3. Make a note of the title and the LI
4. Read pages 276-277
5. Define “Planet”, “dwarf planet” and “natural satellite” using the glossary
6. List the planets in order and come up with a mnemonic to remember them by
7. Briefly describe the difference between the inner planets and outer planets

Consolidation

Complete and self-assess the relevant past paper question for this topic -
From the P8 DIP file

Demonstration

Attempt questions 1-8.
In 15 mins answer as many questions as you can.
Self-mark the questions you have done making any necessary corrections in blue pen

Extension

Make a note of one thing you think you understand well and one thing that you would like to ask your teacher

Challenge yourself to answer as many as you can:

- Green questions to GCSE Level 3
- Blue questions to GCSE Level 6
- Purple questions to GCSE Level 9

Answers: P8.1 – The solar system

Connection

- 1 NA
- 2 NA
- 3 NA

Demonstration

1. Mercury
2. The Sun would look very small and very dim (and just like a typical star looks from Earth) since Pluto is very far away from the Sun.
3. Because if they were drawn to the same scale as the orbits then they would be too small to see.
4. Jupiter
5. Pluto is a dwarf planet.
6. It could have a higher density / higher mass
7. They orbit the Earth or enter the atmosphere and burn up.
8. Pluto is very small; it is a very long distance away from the Earth; it is very dim (because Pluto is very far from the Sun).

Lesson 2: P8.2 – Orbits of planets, moons and artificial satellites

Connection

- Q1. Name the 8 planets
- Q2. Describe the difference between the inner and outer planets
- Q3. Why is Pluto considered a dwarf planet?

Activation

LI: compare the orbital motion of moons, artificial satellites and planets in the Solar System describe what keeps bodies in orbit around planets and stars

1. <https://www.youtube.com/watch?v=tmNXXKqeUtJM>
2. <https://www.youtube.com/watch?v=sloKJ7DDgs>
3. Make a note of the title and the LI
4. Read pages 278-279
5. Define “orbit” and “artificial satellite” using the glossary
6. Copy the table that shows the distance of the planets from the sun and their orbit times
7. Draw and label figure 8.9

Consolidation

Complete and self assess the relevant past paper question for this topic -
From the P8 DIP file

Demonstration

Attempt questions 1-8.
In 15 mins answer as many questions as you can.
Self mark the questions you have done making any necessary corrections in blue pen

Extension

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Purple questions to GCSE Level 9

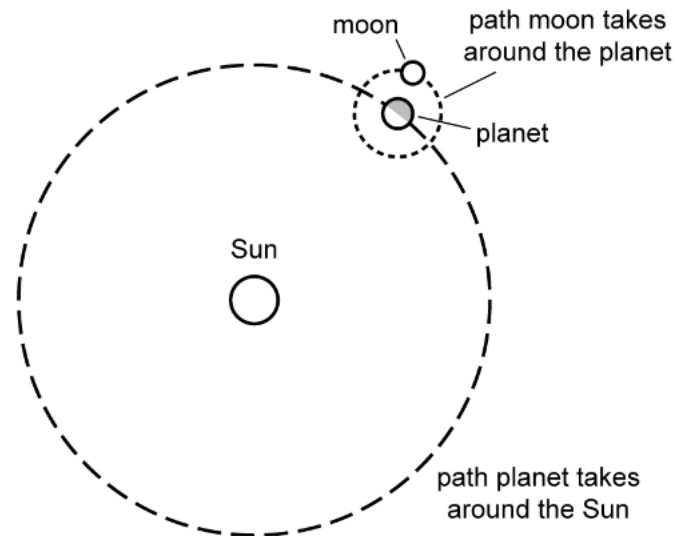
Answers: P8.2 – Orbits of planets, moons and artificial satellites

Connection

- 1 Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune
2. The inner planets are rocky and the outer planets are gas giants
- 3 Pluto doesn't have as strong gravitational field and so has not cleared its orbit of other material.

Demonstration

- 1 The force of gravity.
- 2 The further the distance, the longer it takes to orbit the Sun.
- 3 The distance the planet has to travel for a complete orbit around the Sun is larger the further away it is from the Sun – so it takes longer to make a complete orbit. Another reason is that the planets further out travel slower as the Sun's gravity is weaker.
- 4 The force of gravity.
- 5 a and b



- 6 Velocity has a magnitude and a direction. Since the direction is changing the velocity is changing.
- 7 The radius of its orbit and the speed it is going.
- 8 The faster the satellite is travelling, the closer it is to the surface of the Earth.

Lesson 3: P8.3 – The Sun and other stars

Connection

Q1. Why does the orbit of Neptune take longer than the orbit of mercury?

Q2. Name three reasons we use artificial satellites?

Q3. Why does the velocity of a satellite change but not its speed?

Activation

LI: describe how the Sun and other stars formed, describe the nuclear fusion reactions in the Sun.

1. <https://www.youtube.com/watch?v=3mnSDifDSxQ&t=611s>
2. Make a note of the title and the LI
3. Read pages 280-281
4. Define “galaxy”, “nebulae” and “protostar” using the glossary
5. Draw figure and label figure 8.13
6. Describe what solar flairs are, and copy the “DID YOU KNOW?” section about the Aurora Borealis

Consolidation

Complete and self assess the relevant past paper question for this topic -
From the P8 DIP file

Demonstration

Attempt questions 1-10.

In 15 mins answer as many questions as you can.

Self mark the questions you have done making any necessary corrections in blue pen

Extension

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Challenge yourself to answer as many as you can:

Green questions to GCSE Level 3

Blue questions to GCSE Level 6

Purple questions to GCSE Level 9

Answers: P8.3 – The Sun and other stars

Connection

1 Neptune needs to travel further to complete one orbit as compared to mercury

2 GPS, TV, communications

3 Velocity is vector whereas speed is a scalar. The direction of the velocity is changing to always point directly towards the earth.

Demonstration

1 planet, star, Solar System, galaxy

2 Hydrogen, some helium and a small amount of the heavier elements.

3 The gravitational force.

4 Protostars are formed from clouds of dust and gas which are very spread out. The gravity that makes the clouds to contract is very weak.

5 The gravitational force pulls the cloud of gas and dust inwards. This heats up the centre of the cloud and a protostar is formed. As the temperature increases it eventually becomes so hot that nuclear fusion reactions occur at the centre. The pressure produced from the heat emitted from the fusion reactions balances out the inward force of gravity and the star becomes stable.

6 Hydrogen

7 The nuclei repel each other due to their positive charges. Therefore, they need a lot of energy to overcome the repulsion so they become close enough to fuse.

8 Small nuclei (such as hydrogen) join together to form larger nuclei (such as helium).

9 There is a small amount of helium, but this was the helium that was there originally rather than helium formed from fusion reactions. 10 When something is burned, it is reacting with oxygen chemically. This is not happening in the Sun.

Lesson 4: P8.4 – Main sequence of a star

Connection

Q1. What are stars mostly made from?

Q2. What do scientists think is at the centre of the milky way?

Q3. Why does fusion only occur at high temperatures?

Activation

LI: describe the main sequence stage of a star's life cycle, identify the forces that are in equilibrium in a stable star.

1. <https://www.youtube.com/watch?v=J0ldO87Pprc>
2. Make a note of the title and the LI
3. Read pages 282-283
4. Define “main sequence” and “equilibrium” using the glossary
5. Draw and label figure 8.17
6. Copy the table from the next slide
 - a) Draw a graph of mass (on the x-axis) against surface temperature (on the y-axis).

Consolidation

Complete and self assess the relevant past paper question for this topic -
From the P8 DIP file

Demonstration

Attempt questions 1-8.
In 15 mins answer as many questions as you can.
Self mark the questions you have done making any necessary corrections in blue pen

Extension

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Star	85 Ceti	Eta Aurigae	Gliese 758	Kepler 42
Mass (solar masses)	2.4	5.0	0.97	0.13
Surface temperature (K)	8810	17 201	5424	3068

Answers: P8.4 – Main sequence of a star

Connection

- 1 Hydrogen and Helium
- 2 A black hole
- 3 The particles need a large amount of energy to overcome the repulsion between the particles.

Demonstration

- 1 It is a star in the stable phase of its life.
- 2 Stars spend most of their lifetime as main sequence stars; the other stages of their lives are much shorter. Therefore, there is a greater chance that a particular star is currently at its main sequence stage.
- 3 They are balancing out so that there is no resultant force.
- 4 The star is stable so its energy output does not vary by a large amount. The force of gravity which is acting to compress the star is matched by the force from the radiation pressure which is acting to expand the star.
- 5 Our Sun is making lots of Helium gas at the moment.
- 6 The force of gravity and the force from the nuclear fusion reactions are balancing out so there is resultant force acting to compress or expand the star.
- 7a When it is a protostar and at the end of its life when its core contracts.
- 7b During its main sequence phase.
- 8a The larger the mass, the higher the surface temperature.
- 8b If there is a large mass then the force of gravity is very strong. Therefore, the temperature needs to be high so the pressure expanding the star is large enough to balance out the strong force of gravity.
- 8c Gliese 758 is very close to the mass of the Sun. Therefore, the surface temperature of the Sun would be expected to be slightly higher than 5242 K. So a sensible estimate would be 6000 K (to the nearest 1000 K).

Lesson 5: P8.5 – Life cycles of stars

Connection

- Q1. What is a main sequence star?
- Q2. What two forces must be balanced for a star to be stable?
- Q3. How does the surface temperature of a star depend on mass?

Activation

LI: describe the life cycles of a star like the Sun and a massive star.

1. <https://www.youtube.com/watch?v=cRYu8pMg9zQ>
2. Make a note of the title and the LI
3. Read pages 284-285
4. Define “supernova” using the glossary
5. Draw and label figure 8.19
6. Draw and label figure 8.21
7. Describe what route our own star will take and why?



Consolidation

Complete and self assess the relevant past paper question for this topic -
From the P8 DIP file

Demonstration

Attempt questions 1-7
In 15 mins answer as many questions as you can.
Self mark the questions you have done making any necessary corrections in blue pen



Extension

Make a note of one thing you think you understand well and one thing that you would like to ask your teacher

Challenge yourself to answer as many as you can:
Green questions to GCSE Level 3
Blue questions to GCSE Level 6
Purple questions to GCSE Level 9

