

OCR A Physics GCSE

8.3 - Beyond Earth

Flashcards

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How many planets make up our solar system?



How many planets make up our solar system?

Eight (plus the dwarf planets).



What do the planets in our solar system orbit around and what type of body is it?



What do the planets in our solar system orbit around and what type of body is it?

- The planets orbit around the sun.
 - The sun is a star.



What type of force pulled together the cloud of dust and gas to form the Sun?



What type of force pulled together the cloud of dust and gas to form the Sun?

A gravitational force of attraction.



What word is used to describe a cloud of dust and gas?



What word is used to describe a cloud of dust and gas?

A nebula.



What type of reactions take place at the start of a star's life cycle as dust and gas is drawn together?



What type of reactions take place at the start of a star's life cycle as dust and gas is drawn together?

Fusion reactions.



What factor determines the type of lifecycle a star undergoes?



What factor determines the type of lifecycle a star undergoes?

The size of the star.



Which two phases do all stars of the same or greater size than the sun undergo?



Which two phases do all stars of the same or greater size than the sun undergo?

1. Protostar phase.
2. Main sequence phase.



What do stars like the sun become at the end of their life-cycle?



What do stars of a like the sun become at the end of their life-cycle?

A black dwarf.



What two things can stars much bigger than the sun become at the end of their lifecycle?



What two things can stars much bigger than the sun become at the end of their lifecycle?

1. Neutron star
2. Black hole



What two phases do stars of similar size to the sun go through between being a main sequence star and a black dwarf?



What two phases do stars of similar size to the sun go through between being a main sequence star and a black dwarf?

1. Red giant
2. White dwarf



What two phases do stars of greater size than the sun go through between being a main sequence star and a neutron star/black hole?



What two phases do stars of greater size than the sun go through between being a main sequence star and a neutron star/black hole?

1. Red supergiant
2. Supernova



What is produced during the fusion processes in a star?



What is produced during the fusion processes in a star?

Atoms of all of the naturally occurring elements.



What condition is required for fusion reactions to occur in a star?



What condition is required for fusion reactions to occur in a star?

Very high temperatures and pressures.



Where are elements heavier than iron produced?



Where are elements heavier than iron produced?

In a supernova.



What type of nuclei fuse together first in a star?



What type of nuclei fuse together first in a star?

Hydrogen nuclei fuse to form heavier elements.



How are elements distributed throughout the universe?



How are elements distributed throughout the universe?

Through the explosion of a massive star (supernova).



What does massive mean?



What does massive mean?

Heavy.

Massive = lots of mass



What allows planets and satellites to maintain circular orbits?



What allows planets and satellites to maintain circular orbits?

- Gravity provides gravitational force, which acts as the centripetal force.
- The presence of a centripetal force allows for the object to maintain its circular orbit.



What type of satellite can a planet's moon be described as?



What type of satellite can a planet's moon be described as?

A natural satellite.



Give two examples of artificial satellites.



Give two examples of artificial satellites.

1. TV satellites.
2. Satellites used for satellite imaging.



What is red-shift?



What is red-shift?

An observed increase in the wavelength of light due to the source moving away from the observer.



What two things can be said about the motion and wavelength of emitted light from a galaxy, the further away it is?



What two things can be said about the motion and wavelength of emitted light from a galaxy, the further away it is?

- The further away a galaxy is, the faster it is moving.
- The further away a galaxy is, the greater the observed increase in wavelength.



What does red-shift provide evidence for?



What does red-shift provide evidence for?

- The universe is expanding.
- The Big Bang theory.



What does the Big Bang theory suggest?



What does the Big Bang theory suggest?

The entire universe started from a very small, hot and dense region in space.



Compare the observed red-shift of two galaxies, one further away than the other.



Compare the observed red-shift of two galaxies, one further away than the other.

- The galaxy that is further away is travelling faster.
- The observed red-shift is greater the further away it is.



What did scientists observe to provide evidence that the universe is expanding at an ever faster rate?



What did scientists observe to provide evidence that the universe is expanding at an ever faster rate?

Supernovae.



Prior to observations of supernovae, what was believed about the rate of expansion of the universe and why?



Prior to observations of supernovae, what was believed about the rate of expansion of the universe and why?

- The rate of expansion was expected to be slower.
- It was thought that gravitational forces would cause this slowing down.



What ideas could explain the universe's ever increasing rate of expansion?



What ideas could explain the universe's ever increasing rate of expansion?

- The existence of energy and mass that we can't detect, known as dark matter and dark energy.
- These ideas are still being developed by scientists and are not yet fully understood.



What does CMBR stand for?



What does CMBR stand for?

Cosmic Microwave Background
Radiation



What does CMBR provide further evidence for?



What does CMBR provide further evidence for?

- The Big Bang Theory.
- It is believed that CMBR originates from radiation produced in the big bang.



How does the existence of CMBR support the expansion of the universe?



How does the existence of CMBR support the expansion of the universe?

- It is thought that gamma radiation was released in the Big Bang.
- The expansion of the universe has stretched this radiation, resulting in the microwave radiation present today.



Why does CMBR support the Big Bang Theory in particular?



Why does CMBR support the Big Bang Theory in particular?

- CMBR is present and detected in all directions.
- This supports the idea that the universe started from a single point, where all the radiation was produced, and then expanded.



What do all bodies (objects) emit and absorb?



What do all bodies (objects) emit and absorb?

Infrared radiation.



What happens to the quantity of infrared radiation emitted by an object as temperature increases?



What happens to the quantity of infrared radiation emitted by an object as temperature increases?

The hotter the object, the more infrared radiation it will emit.



What is a perfect black body?



What is a perfect black body?

An object that absorbs all of the radiation that is incident upon it.



How much radiation does a perfect black body reflect or transmit?



How much radiation does a perfect black body reflect or transmit?

None.



Why is a perfect black body the best possible emitter of radiation?



Why is a perfect black body the best possible emitter of radiation?

- It is a perfect absorber since it absorbs all radiation incident on it.
- A perfect absorber is also a perfect emitter.



Other than the intensity of radiation emitted, how does increasing the temperature of an object affect its emissions?



Other than the intensity of radiation emitted, how does increasing the temperature of an object affect its emissions?

The wavelength distribution of any emission is dependent on the object's temperature.



What can be said about the rates of emission and absorption for a body at constant temperature? (**Higher**)



What can be said about the rates of emission and absorption for a body at constant temperature?

(Higher)

The body is absorbing and emitting radiation at the same rate.



What can be said about the rates of emission and absorption for a body increasing in temperature? **(Higher)**



What can be said about the rates of emission and absorption for a body increasing in temperature?

(Higher)

The body is absorbing radiation faster than it is emitting it.



Give two factors that affect the temperature of the Earth. (Higher)



Give two factors that affect the temperature of the Earth. (Higher)

1. The Earth's rate of absorption and emission of radiation.
2. The amount of reflection of radiation into space.



State a difference between the mediums that P-waves and S-waves can travel through. **(Higher)**



State a difference between the mediums that P-waves and S-waves can travel through. (Higher)

- P-waves travel through both solids and liquids.
- S-waves only travel through solids (**not** liquids).



What can the detection of P and S waves tell us about the structure of the Earth? (Higher)



What can the detection of P and S waves tell us about the structure of the Earth? (Higher)

- That the Earth's core has both solid and liquid parts.
- The S-waves can't travel through the liquid part and so produce a 'shadow'.



Explain why for a stable orbit, the radius of orbit must change if the speed changes. **(Higher)**



Explain why for a stable orbit, the radius of orbit must change if the speed changes. (Higher)

- At higher speeds, the object requires a greater centripetal force.
- For a greater centripetal force, the gravitational force must increase.
- This is achieved by the radius of the orbit being reduced.



Explain how the force of gravity acting on a satellite affects its speed and velocity.
(Higher)



Explain how the force of gravity acting on a satellite affects its speed and velocity. (Higher)

- The force can alter its velocity since the direction is continually changing.
- The force acts at right angles to the motion.
- It can't cause a change of speed since there is no force component in the direction of motion.

