

Physics - Key Stage 4
Space

The solar system

Student's downloadable resources

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OAK
NATIONAL
ACADEMY

Question slides from video



Complete the definitions if you are confident, or use the next slide to match up

UNIVERSE	
GALAXY	
NEBULA	
SOLAR SYSTEM	
STAR	
PLANET	
DWARF PLANET	
MOON	



Match the definitions to the celestial objects.

UNIVERSE	A large cloud of gas and dust
GALAXY	A massive body that gives off light (and other electromagnetic radiation) due to fusion of hydrogen
NEBULA	A body in orbit around a star which has not cleared its orbit and is mostly spherical
SOLAR SYSTEM	All that can be observed in the cosmos; all of space and time.
STAR	A rocky/gaseous body in orbit around a planet
PLANET	A star orbited by planets (like our Sun) and other bodies
DWARF PLANET	A body in orbit around a star which has cleared its orbit and is mostly spherical
MOON (natural satellite)	A group of millions or billions of stars held together by gravitational attraction



Standard form - useful for huge quantities

Some quick maths practice (4 minutes):

- (1) What is 100 billion in standard form to 1 significant figure?
- (2) How far is 1 light year in metres? Use the data below, your calculator and the correct equation that links speed, distance and time to calculate it to 2 significant figures in standard form.

Speed of light = 3.0×10^8 m/s

1 year = 3.2×10^7 s



Independent task

- (1) Name the **large cloud of gas and dust** where stars are formed.
- (2) Name the **process** by which stars emit radiation (like light and heat).
- (3) Name the **force** responsible for pulling matter together to make a star.
- (4) Name the **force** responsible for making stars tend to collapse.
- (5) Name the **force** responsible for making stars tend to expand.
- (6) Name **any of the smallest nuclei** that are fused in the cores of stars to produce energy in the stable periods of their lives.



EXAM STYLE QUESTIONS

- a) Briefly describe how a star like the Sun is formed. (2 marks)

- b) Nuclear fusion is the reaction by which stars release energy.
 - i) Explain how nuclear fusion releases energy. (3 marks)
 - ii) Describe the conditions for a star to reach stable equilibrium. (3 marks)



Answers



Matching exercise - SOLUTIONS

UNIVERSE	All that can be observed in the cosmos; all of space and time
GALAXY	A group of millions or billions of stars held together by gravitational attraction
NEBULA	A large cloud of gas and dust
SOLAR SYSTEM	A star orbited by planets (like our Sun) and other bodies
STAR	A massive body that gives off light (and other electromagnetic radiation) due to fusion of hydrogen
PLANET	A body in orbit around a star which has cleared its orbit and is mostly spherical
DWARF PLANET	A body in orbit around a star which has not cleared its orbit and is mostly spherical
MOON (natural satellite)	A rocky body in orbit around a planet



Standard form - SOLUTIONS

(1) What is 100 billion in standard form to 1 significant figure?

1 billion = 10^9 , so 100 billion will be 2 more powers of ten

$$\mathbf{100 \times 10^9 = \underline{1 \times 10^{11}}.}$$

(2) How far is 1 light year in metres?

distance = speed x time

$$\mathbf{distance = (3.0 \times 10^8) \times (3.2 \times 10^7) = \underline{9.6 \times 10^{15}m}}$$



Independent task - SOLUTIONS

- (1) Name the large cloud of gas and dust where stars are formed. **NEBULA**
- (2) Name the process by which stars emit radiation (like light and heat).
(NUCLEAR) FUSION
- (3) Name the force responsible for pulling matter together to make a star.
GRAVITY
- (4) Name the force responsible for making stars tend to collapse. **GRAVITY**
- (5) Name the force responsible for making stars tend to expand.
RADIATION PRESSURE
- (6) Name any of the smallest nuclei that are fused in the cores of stars to produce energy in the stable periods of their lives. **HYDROGEN/
DEUTERIUM/ HYDROGEN-2/ TRITIUM/ HYDROGEN-3**



EXAM STYLE QUESTIONS - SOLUTIONS

(a) Briefly describe how a star like the Sun is formed. (2 marks)

Dust and gas / in a nebula (1)

are pulled together by gravitational attraction/gravity (1)

(b) Nuclear fusion is the reaction by which stars release energy.

i) Explain how nuclear fusion releases energy. (3 marks)

Small nuclei / hydrogen nuclei (1)

join to form larger nuclei/helium nuclei (1)

and a small quantity of mass is converted into energy/mass-energy of the reactants is greater than the mass-energy of products (1)

ii) Describe the conditions for a star to reach stable equilibrium. (3 marks)

Two forces are equal in magnitude and in opposition (1)

due to radiation pressure outwards (1)

and gravitational collapse/force/gravity inwards (1)

