OXFORD

INTERNATIONAL AQA EXAMINATIONS

Topic Test: OxfordAQA International GCSE Combined Science 9204 Physics

Space physics

Name: _____

Class: _____

Date: _____

Time: **29 minutes**

Marks: **29 marks**

Comments:

1 The Earth orbits a star called the Sun.

(a) Stars form when enough dust and gas are pulled together in space.

What force causes the dust and gas to be pulled together?

_____

(1)

(b) Name the process that releases energy in a main sequence star.

_____

(1)

(c) Why is a main sequence star stable?

_____

(1)

(d) In another part of their life cycle, stars form elements such as carbon, nitrogen and oxygen.

Which type of star forms these elements?

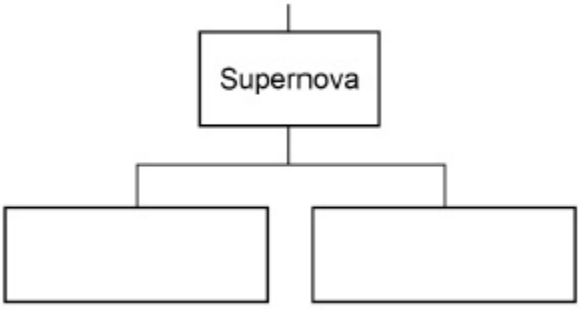
_____

(1)

(e) A supernova occurs when a large star explodes.

Complete **Figure 1** to show what remains after a supernova.

Figure 1

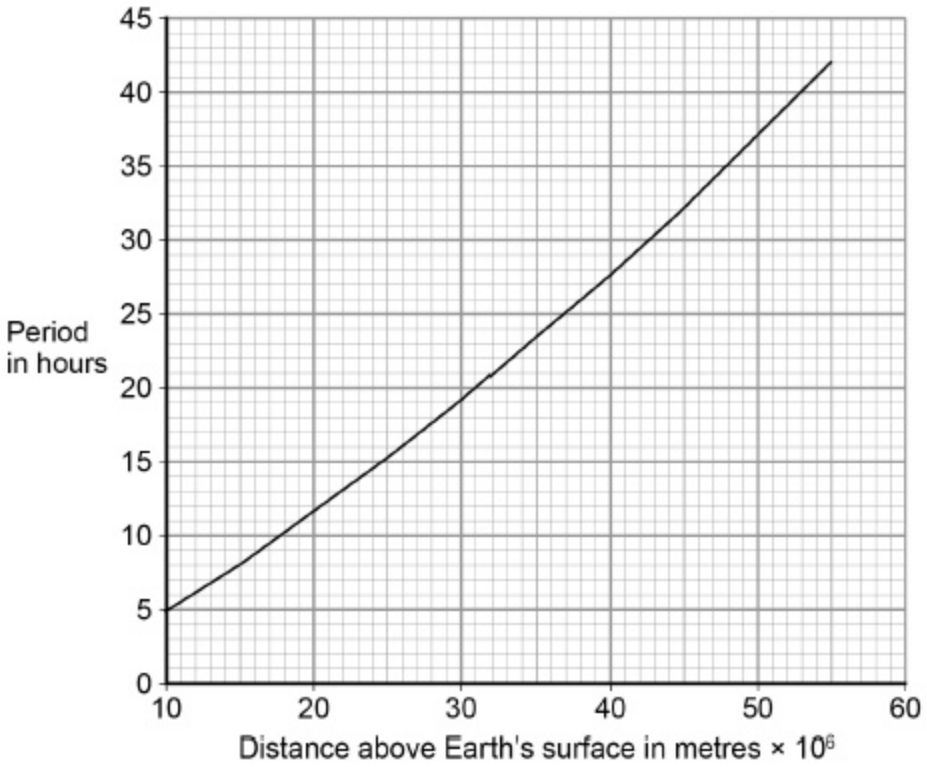


(2)

Stars can be observed using telescopes on satellites orbiting the Earth.

Figure 2 shows the period of satellites at different distances above the Earth's surface.

Figure 2



(f) What distance above the Earth's surface is used for a satellite in a geostationary orbit?

Give a reason for your answer.

Distance = _____ metres × 10^6

Reason _____

_____

_____

(2)

(g) A weather satellite is placed in a low polar orbit.

Explain why this orbit is used for a weather satellite.

(2)

(Total 10 marks)

2 Astronomers claim that there are about 300 billion stars in the Milky Way.

(a) Describe how stars are formed.

(3)

(b) Use the correct answer from the box to complete the sentence.

decay	**fission**	**fusion**

Energy is released in stars by the process of nuclear _____ .

(1)

(c) State why a star is stable during the 'main sequence' period of its life cycle.

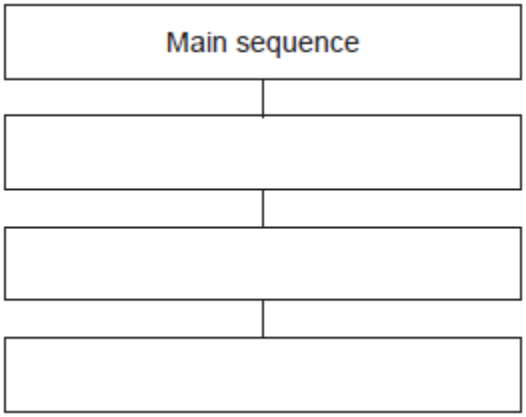
(1)

(d) The life cycle of a star after the 'main sequence' period depends on the size of the star.

A particular star is the same size as the Sun.

What are the stages, after the main sequence, in the life cycle of this star?

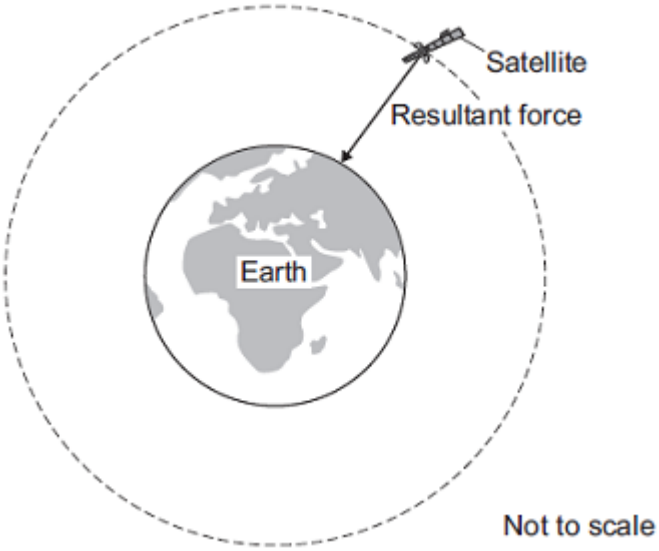
State them in order by writing in the boxes.



(3)

(Total 8 marks)

3 Man-made satellites can orbit the Earth, as shown in the figure below.



The satellite experiences a resultant force directed towards the centre of the orbit.

The resultant force is called the centripetal force

(a) What provides the centripetal force on the satellite?

_____

(1)

(b) State **two** factors that determine the size of the centripetal force on the satellite.

1. _____

2. _____

(2)

(c) The table below gives data for five different satellites orbiting the Earth.

Satellite	Average height above Earth's surface in kilometres	Time taken to orbit Earth once in minutes	Mass of satellite in kilograms
A	370	93	419 000
B	697	99	280
C	827	103	630
D	5 900	228	400
E	35 800	1440	2 030

(i) State the relationship, if any, between the height of the satellite above the Earth's surface and the time taken for the satellite to orbit the Earth once.

_____

_____

(1)

(ii) State the relationship, if any, between the time taken for the satellite to orbit the Earth once and the satellite's mass.

_____

_____

(1)

(d) Over 300 years ago, the famous scientist Isaac Newton proposed, with a 'thought experiment', the idea of satellites.

Newton suggested that if an object was fired at the right speed from the top of a high mountain, it would circle the Earth.

Why did many people accept Isaac Newton's idea as being possible?

Tick (✓) **one** box.

Isaac Newton was a respected scientist who had made new discoveries before. ☐

Isaac Newton went to university. ☐

It was a new idea that nobody else had thought of before. ☐

(1)

(Total 6 marks)

4 Read this statement from a website.

> Immediately after the 'big bang', at the start of the Universe, there were only atoms of the element hydrogen (H).
>
> Now there are over one hundred elements.
> Scientists think that all the elements on Earth are also present throughout the Universe.

(a) Explain how atoms of the element (He) are formed in a star.

_____

_____

_____

_____

(2)

(b) Explain how atoms of very heavy elements, such as gold (Au), were formed.

_____

_____

_____

_____

(2)

(c) Scientists have only examined a tiny fraction of the Universe.

What is the basis for scientists thinking that the elements found on Earth are present throughout the Universe?

_____

_____

(1)

(Total 5 marks)

1

(a) gravitational force

allow gravity

1

(b) (nuclear) fusion

1

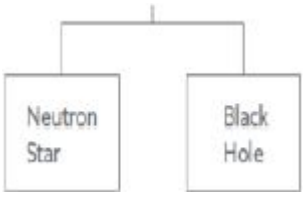
(c) the forces in the star are balanced

1

(d) red (super) giant

1

(e)



answers may be in either order

2

(f) 35.5

allow an answer between 35 and 36

1

so it has the same period as the Earth

allow so it takes 24 hours to orbit

1

(g) a low polar orbit takes a relatively short amount of time

allow the satellite orbits several times a day

1

so the satellite passes over the entire surface of the planet each day

1

[10]

2

(a) (enough) dust / gas (from space)

1

are pulled together

1

by gravitational attraction

1

(b) fusion

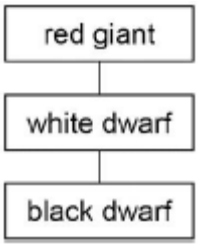
accept fusion circled in box

1

(c) forces within it are balanced

1

(d)



correct order only

1

ignore reference to planetary nebula

1

1

1

[8]

3

(a) gravitational attraction (between the satellite and the Earth)

allow gravity

allow weight of the satellite

1

(b) any **two** from:

- mass of satellite
- speed / velocity (of satellite)
- radius of orbit / circle

allow height above the Earth

radius / height alone is insufficient

2

(c) (i) increasing the height (above the Earth's surface) increases the time (for one orbit)

allow a positive correlation

allow as one gets bigger, the other gets bigger, or vice versa

ignore they are directly proportional

1

(ii) there is no relationship / correlation

1

(d) Isaac Newton was a respected scientist who had made new discoveries before

1

[6]

4

(a) fusion

*do **not** credit any response which looks like 'fission'*

1

of hydrogen / H (atoms)

credit only if 1st mark point scores

1

(b) fusion of other / lighter atoms / elements

reference to big bang nullifies both marks

1

during supernova / explosion of star(s)

1

(c) the (available) evidence: supports this idea

or

does not contradict this idea

or

can be extrapolated to this idea

or

(electromagnetic) spectrum from other stars is similar to sun

1

[5]