Name of the Student:_____
Max. Marks : 27 Marks **Time : 27 Minutes**

Mark Schemes

Q1.

(a) (force of) gravity

*do **not** allow weight*

1

fusion

1

(b) distance = speed × time

allow a correct re-arrangement

or

s = vt

*do **not** allow d = st*

1

(c) $1.5 \times 10^{11} = 3.0 \times 10^{8} \times t$

1

$t = \frac{1.5 \times 10^{11}}{3.0 \times 10^{8}}$

1

t = 500 (s)

1

(d) **Level 3**: Scientifically relevant facts, events or processes are identified and given in detail to form an accurate account.

5–6

Level 2: Scientifically relevant facts, events or processes are identified and their relevance is clear. The account is not fully accurate.

3–4

Level 1: Facts, events or processes are identified and simply stated but their relevance is not clear.

1–2

No relevant content

0

Indicative content:

- fusion (processes in stars) produce new elements
- cloud of gas / hydrogen **and** dust **OR** nebula

- pulled together by gravity
- causing increasing temperature (to start the fusion process)
- (to become a) protostar
- hydrogen nuclei fuse to form helium nuclei
- and the star becomes main sequence
- hydrogen begins to run out
- helium nuclei fuse to make heavier elements
- up to iron
- the star expands (to become a)
- red super giant
- (the star collapses rapidly) and explodes
- called a supernova
- creating elements heavier than iron
- and distributing them throughout the universe
- leaving behind a neutron star
- or a black hole.

(e) Temperature

1

[13]

Q2.

(a) gamma rays

1

(b) can travel through the atmosphere

1

(c) explosion of a red super giant
or
a supernova

1

(d) 1.2×10^9 Hz

1

(e) $3.0 \times 10^8 = 1.2 \times 10^9 \times \lambda$

*an answer of 0.25 (m) scores **3** marks*

*allow ecf from **(d)***

1

$$\lambda = \frac{3.0 \times 10^8}{1.2 \times 10^9}$$

1

$\lambda = 0.25$ (m)

1

(g) same as the radio wave

1

(f) expansion due to fusion energy

1

in equilibrium with gravitational collapse

*forces acting inwards equal forces acting outwards gains **1** mark*

1

(h)

Level 2: Scientifically relevant facts, events or processes are identified and given in detail to form an accurate account.	3-4
Level 1: Facts, events or processes are identified and simply stated but their relevance is not clear.	1-2
No relevant content	0
Indicative content • Sun goes from main sequence to red giant • then from red giant to white dwarf • when the Sun changes to a red giant the surface temperature will decrease • and the relative luminosity will increase • when changing from a red giant to a white dwarf the surface temperature increases • and the relative luminosity decreases	

4

[14]