Mark schemes

Q1.

(a) planets

1

dwarf planets

1

moons
or
natural satellites

allow asteroids / meteors / meteoroids / meteorites

allow comets

1

[3]

Q2.

(a) satellite

allow moon

1

(b) 12.5 cm = 0.125 m

1

$3 \times 10^8 = f \times 0.125$

this mark may be awarded for an incorrectly / not converted value for wavelength

1

$$f = \frac{3 \times 10^8}{0.125}$$

this mark may be awarded for an incorrectly / not converted value for wavelength

1

$f = 2\,400\,000\,000$ (Hz)

this mark may be awarded for an incorrectly / not converted value for wavelength

1

$f = 2.4 \times 10^9$ (Hz)

this mark may be awarded for an incorrectly calculated value for frequency in standard form using the given data

1

(c) gravitational force causes the Hubble Space Telescope to accelerate towards the Earth

1

this changes the direction of motion (but not the speed)

1

so changes the velocity of the Hubble Space Telescope

if no other marks awarded, allow 1 mark for gravitational force maintains circular orbit

1

[9]

Q3.

(a) **Level 2:** Scientifically relevant features are identified; the way(s) in which they are similar/different is made clear and (where appropriate) the magnitude of the similarity/difference is noted.

4–6

Level 1: Relevant features are identified and differences noted.

1–3

No relevant content

0

Indicative content

all stars:

- form in a cloud of gas and dust (nebula) by gravity – mostly hydrogen
- forms a protostar
- fusion begins
- fusion of small nuclei into larger nuclei (hydrogen into helium)
- main sequence star – stable period where gravitational forces (inwards) balance forces (outwards) due to fusion processes

comparisons:

- stars about the same size as the Sun expand to become a red giant, stars much bigger than the Sun expand to become a red super giant
- stars about the same size as the Sun contract (and temperature increases) to become a white dwarf, stars much bigger than the Sun explode in a supernova
- stars about the same size as the Sun (cool to) become a black dwarf, stars much bigger than the Sun become either a neutron star or black hole

[6]