IGCSE (EDEXCEL) Physics : Stars answers

Q1. (a)(i) all four stars in the correct positions = 3 marks
any two stars in the correct positions = 2 marks
any 1 star in the correct position = 1 mark

Coolest			Hottest
Antares A	61 Cygni A	Vega	Sirius B

(ii) Antares (A)

(b) any three from:

- MP1. nebula is (cold) cloud of dust/gas;
- MP2. gravity causes cloud to collapse/eq;
- MP3. temperature of cloud increases/eq;
- MP4. creating a protostar;
- MP5. idea that (main sequence star created when) fusion starts;

(c) any four from:
MP1. idea that hydrogen fusion stops (in core);
MP2. core collapses;
MP3. core temperature of star increases;
MP4. (star expands to) become a red (super) giant;
MP5. surface temperature of star decreases (during red giant phase)
MP6. helium fusion begins;
MP7. white dwarf formed when helium fusion stops (in core);
MP8. idea of rest of star released (as a planetary nebula);

Q2. (a) D;
A cannot be correct as this is a description of fission
B cannot be correct as this is a description of gamma decay
C cannot be correct as this is a description of beta decay

(b) (nuclei are) positively charged; like charges repel;

(c) high temperature; high pressure;

Q3. (a) D (b) D (c) B

Q4.(a) (i) substitution into given equation; rearrangement;
correct evaluation of wavelength change
correct answer: 8.1×10^{-8} (m)
e.g. (change in wavelength / 6.2×10^{-7})= (3.9×10^{4} / 3.0×10^{5})
change in wavelength = $6.2 \times 10^{-7} \times (3.9 \times 10^{4} / 3.0 \times 10^{5})$
change in wavelength = 8.1×10^{-8} (m)

(ii) candidate's answer to (i) + 6.2×10^{-7} (m);
e.g. $8.1 \times 10^{-8} + 6.2 \times 10^{-7} = 7.0 \times 10^{-7}$(m)

(b) Any THREE from:
MP1: the further the galaxy is from Earth, the greater the red-shift;
MP2: the greater the red-shift, the faster the galaxy is moving away;
MP3: speed of galaxies increases with increased distance;
MP4: the speed and distance are directly proportional;
MP5: relationship between speed and distance implies expansion;
MP6: expansion implies there was a single point in the past;

Q5. idea that universe is expanding / getting larger; idea that universe is cooling;

Q6.(a) a (large) collection of (billions of) stars;

(b) D (the universe);

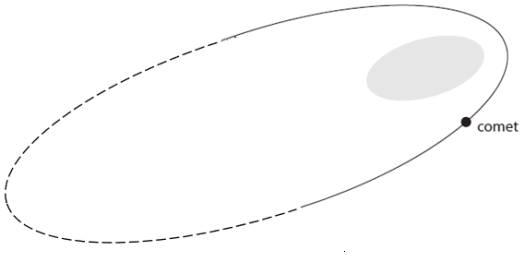
(c) (i) galaxy A is moving towards Earth; galaxy B is moving away from Earth; galaxy B is moving faster than galaxy A

(ii) correct evaluation of $\Delta\lambda$; substitution into $\Delta\lambda/\lambda = v/c$; rearrangement; evaluation;

$\Delta\lambda$ = (657.81 – 656.45 =) 1.36 (nm) $1.36 / 656.45 = v / 3\times10^8$

(v =) 1.36 x 3×10^8 / 656.45 (v =) 620 000 (m/s)

Q7. (i) centre of S marked in the grey region shown;



(ii) closed path drawn with curve; total size approximately twice size of original diagram;

(iii) X marked on part of path closest to candidate's S;

Q8. **MAX four from:**

MP1. identification of cosmic (microwave) background radiation (CMBR);

MP2. CMBR appears to be the same in all directions/is everywhere;

MP3. which implies all parts of the Universe were in contact a long time ago;

MP4. wavelength has increased as the universe has expanded;

MP5. universe was (significantly) hotter long ago;

MAX four from:

MP6. identification of red shift of galaxies;

MP7. the further the galaxy is (from Earth), the greater the red-shift;

MP8. larger redshift means faster movement of galaxies;

MP9. (therefore) the further away, the faster the galaxy moves away;

MP10. galaxies moving apart from each other implies expansion from a single point or since the Big Bang;

Q9. (a)

Coolest ⟶ Hottest				
B	A	Sun	Sirius	Rigel

(b) any THREE from

MP1. red supergiant; MP2. supernova;

MP3. neutron star; MP4. (or) black hole;

(c) (a measure of) brightness; (of a star) at a {standard / fixed / same} distance;

Q10. (a) A = Bright Blue, B = Red Giant C. =Similar to sun D = White dwarf

(b) B red

Q11. (a) Kinetic, main sequence, contract, expand, supernova, neutron star

5(b) D (c) C