

Question number	Answer	Notes	Marks
1 (a)	A (absolute magnitude);  B is incorrect because apparent magnitude is how bright the star appears on Earth, regardless of distance C is incorrect because the H-R diagram requires a specific scalar magnitude D is incorrect because the H-R diagram requires a specific magnitude		1
(b)	P: white dwarfs;  Q: main sequence;  R: red giants;	reject if more than one given reject if more than one given reject if more than one given	3
(c)	idea of the left-hand side;  idea that blue/white stars are hottest / hotter than red/orange stars;	allow 'blue' allow use of letter P to indicate left side ignore 'white' allow white dwarfs are hottest	2

Total for Question 1 = 6 marks

Question number	Answer	Notes	Marks
2 (a)	violet;	reject purple, ultraviolet, UV	1
(b)	idea that UV causes mutations/damage (in cells); (leading to) (skin) cancer/blindness;	allow kills cells/tissue, sunburn, burns skin	2
(c) (i)	speed = frequency $\times$ wavelength;	allow standard symbols and rearrangements e.g. $f = v/\lambda$ allow c, v for speed	1
(ii)	substitution OR rearrangement; evaluation;  e.g. $300\,000\,000 = f \times 15$ OR $f = v/\lambda$ (f =) $20\,000\,000$ (Hz)	-1 for POT error  accept 20 MHz, 20 million (Hz), $20 \times 10^6$ (Hz), $2(.0) \times 10^7$ (Hz)	2

Total for Question 2 = 6 marks