GCSE (9-1) Astronomy

13.2 Spectroscopy and the H-R diagram

Pupil **Worksheet**

Week **48** Topic **13.2**

Spec. refs **13.21, 13.4, 13.5, 13.6, 13.7**

1. Which part of a spectrometer splits up light from astronomical objects into a spectrum?

- [X] **A** diffraction grating
- [X] **B** mirror
- [X] **C** objective element
- [X] **D** telescope

(1)

2. State **three** properties of a star that can be obtained by studying its spectrum.

. . . . . .

. . . . . .

. . . . . .

(3)

3. Which pupil is correct?

Martha: The colour of light with the longest wavelength is violet.

Bilal: The colour of light with the longest wavelength is red.

Your answer: . . . . . .

(1)

4. Hertzsprung-Russell diagrams are usually obtained by plotting

- [X] **A** absolute magnitude against luminosity
- [X] **B** luminosity against spectral type
- [X] **C** spectral type against temperature
- [X] **D** temperature against absolute magnitude

(1)

5. Which of the following types of star is the **hottest**?

- [X] **A** B4
- [X] **B** A9
- [X] **C** B8
- [X] **D** A6

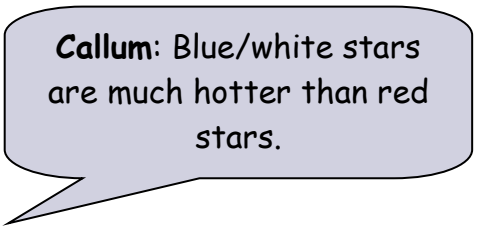
(1)

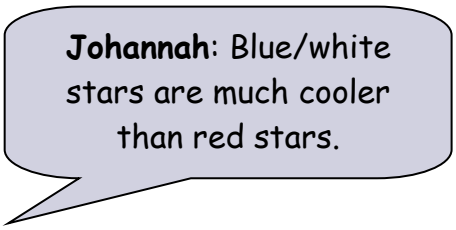
6. Which of the following statements about the standard H-R diagram is correct?

- [X] **A** Absolute magnitude increases upwards and temperature increases to the left
- [X] **B** Absolute magnitude increases downwards and temperature increases to the left
- [X] **C** Absolute magnitude increases upwards and temperature increases to the right
- [X] **D** Absolute magnitude increases downwards and temperature increases to the right

(1)

7. Which pupil is correct?

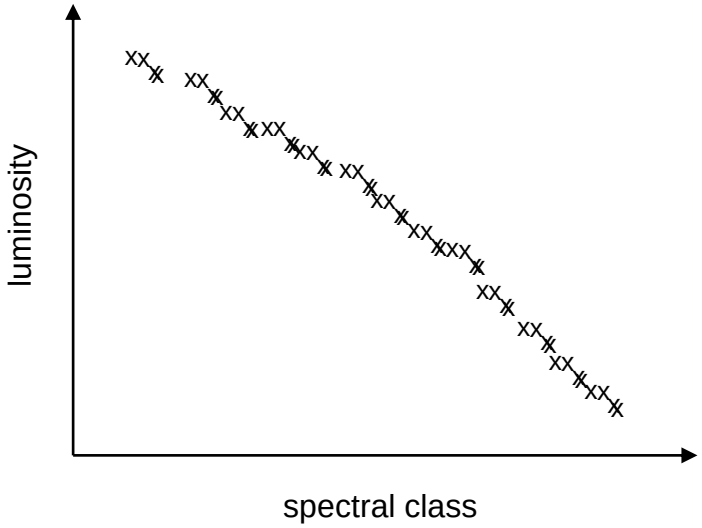




Your answer: . . . . . .

(1)

8. The axes of an H-R diagram are shown below.



A band of stars is shown running top-left to bottom-right.

(a) What is the name for this band of stars?

Your answer: . . . . . .

(1)

(b) On the diagram, indicate the locations of:

(i) white dwarfs (use the letter **W**);

(ii) blue giants (use the letter **B**);

(iii) red supergiants (use the letter **R**).

(3)

9. Which of the following properties of a star can **NOT** be deduced by studying its spectrum?

X	**A**	chemical composition
X	**B**	diameter
X	**C**	radial velocity
X	**D**	temperature

(1)

10. Which of the following types of star is the **coolest**?

X	**A**	blue giant
X	**B**	red supergiant
X	**C**	white dwarf
X	**D**	yellow main sequence

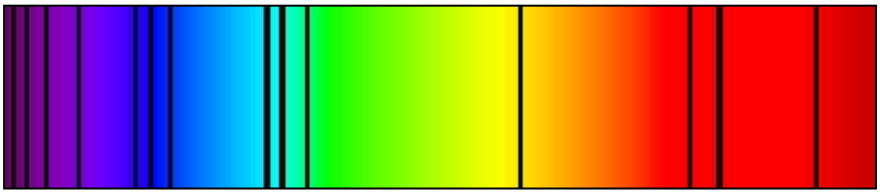
(1)

11. What is the **spectral type** of the Sun?

X	**A**	B2
X	**B**	F5
X	**C**	G2
X	**D**	G5

(1)

12. The spectrum of a star consists of a series of dark (absorption) lines corresponding to specific wavelengths on a continuous coloured background.



Explain the connection between the **dark absorption lines** and the **chemical composition** of the star.

. . . . . .

. . . . . .

. . . . . .

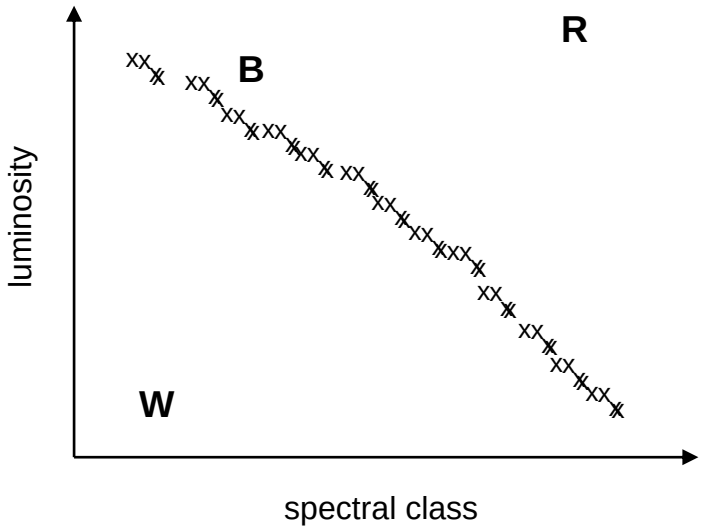
. . . . . .

(4)

Solutions

1. **A** (1)
2. Any three of: chemical composition (1), temperature (1), spectral type/class (1), radial velocity (1). Maximum 3 marks
3. Bilal (1)
4. **B** (1)
5. **A** (1)
6. **B** (1)
7. Callum (1)
8. (a) main sequence (1)

   (b) white dwarfs labelled correctly with **W** (1); blue giants labelled correctly with **B** (1) ; red supergiants labelled correctly with **R** (1)



9. **B** (1)
10. **B** (1)
11. **C** (1)
12. Any (4) of: light passing through the outer layers a star is made of all wavelengths/energies (1); some of this light has the correct wavelength/energy to excite atoms in the star's outer layers (1); when the atoms de-excite (1) they emit radiation/photons of the same wavelength/energy but in a random direction (1) and not necessarily 'outwards' (1); the wavelengths/energies at which these 'reactions' occur depends on the chemical element (1); light received on Earth is dimmer and so darker at these wavelengths (1). Maximum 4 marks

Your score: / 20