Practice Question Set For A-Level
Subject : Physics
Paper-2 Topic : 10_Space

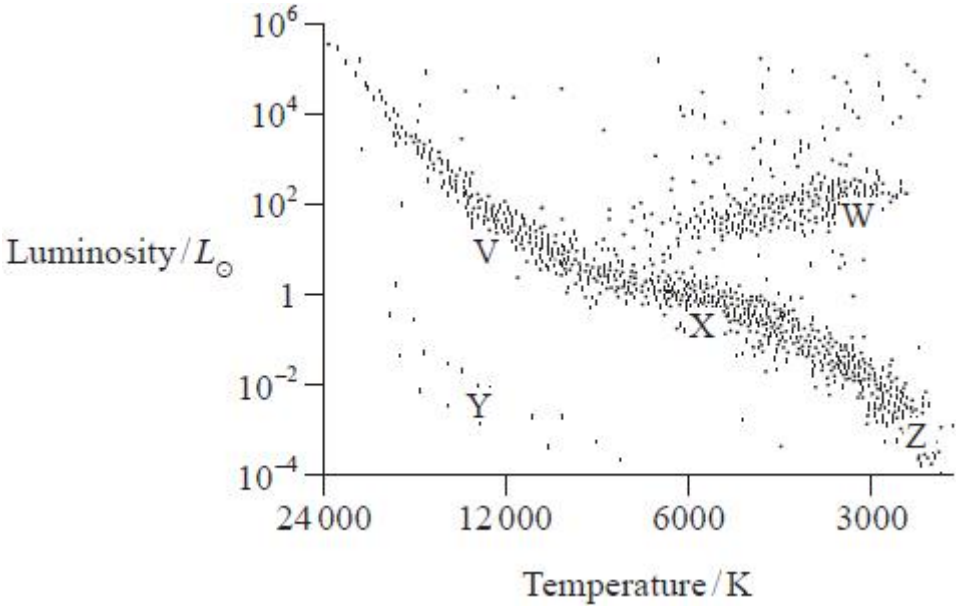
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Name of the Student:_____
Max. Marks : 24 Marks **Time : 24 Minutes**

Q1.

Answer the question with a cross in the box you think is correct ☒ . If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒ .

A Hertzsprung–Russell diagram for stars in our galaxy is shown. V, W, X, Y and Z are positions on the diagram.



Which of the following gives a sequence of positions of the Sun during its lifetime?

☒ **A** V X Z
☒ **B** X W Y
☒ **C** X W Z
☒ **D** Z X V

(Total for question = 1 mark)

Q2.

Answer the question with a cross in the box you think is correct ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

Which of the following is a valid unit for luminosity?

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☒ **A** $W\ m^{-2}$

☒ **B** $N\ m\ s^{-2}$

☒ **C** $J\ s^{-1}$

☒ **D** $J\ m^{-2}$

(Total for question = 1 mark)

Q3.

Answer the question with a cross in the box you think is correct ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

Betelgeuse is a red giant star.

The surface temperature of Betelgeuse is T_B and the surface area of Betelgeuse is A_B.
The surface temperature of the Sun is T_S and the surface area of the Sun is A_S.

Which row in the table shows a correct comparison of the surface temperature and surface area of Betelgeuse with those of the Sun?

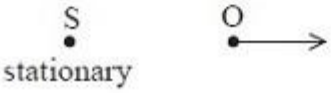
	$T_B > T_S$	$A_B > A_S$
☒ **A**	false	false
☒ **B**	false	true
☒ **C**	true	false
☒ **D**	true	true

(Total for question = 1 mark)

Q4.
The diagrams show the motions of a source of sound, S, and an observer, O.

Which line of the table correctly shows the effect this relative motion has on the frequency of the sound heard by the observer.

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	Motions of S and O	Frequency
☒ **A**		increased
☒ **B**		decreased
☒ **C**		decreased
☒ **D**		increased

(Total for Question = 1 mark)

Q5.

Ultrasound is used to investigate the blood in an artery in a human body by detecting a Doppler shift. This Doppler shift is used to measure the

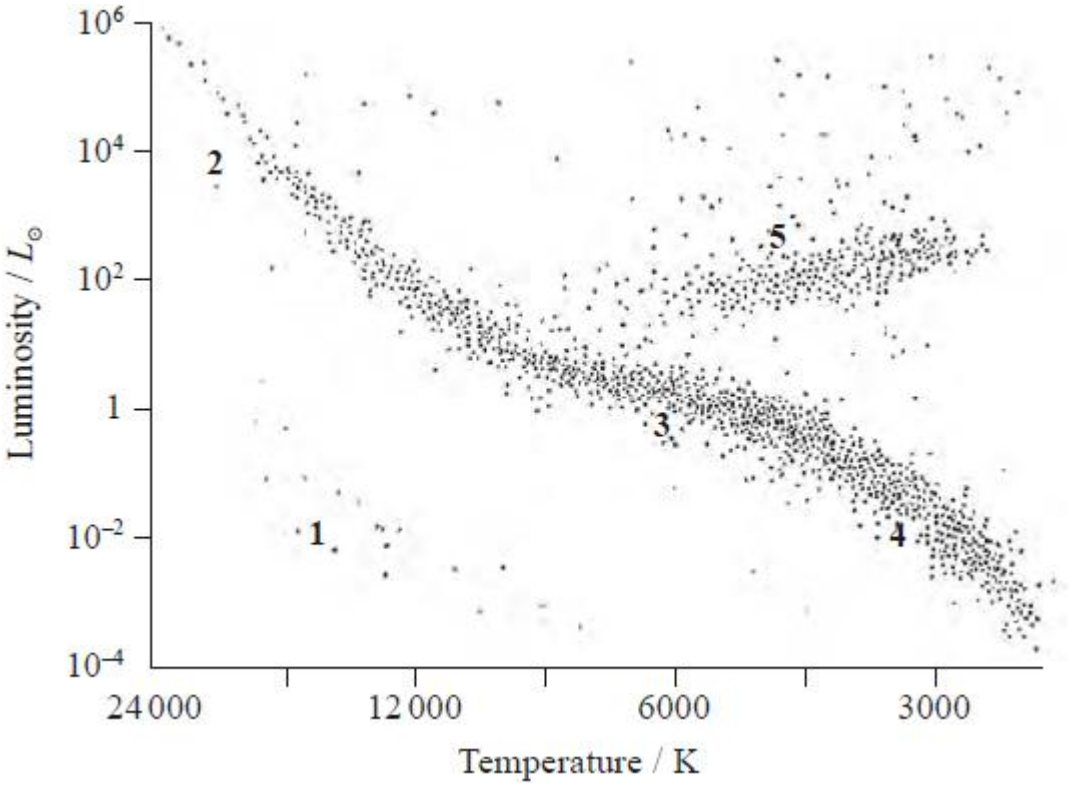
☒ **A** diameter of the artery.
☒ **B** size of the particles in the blood.
☒ **C** temperature of the blood.
☒ **D** velocity of the blood.

(Total for question = 1 marks)

Q6.

Five regions are labelled on the Hertzsprung-Russell diagram shown.

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Which sequence could show part of the evolution of a star like the Sun?

- **A** 1→5→3
- **B** 2→3→4
- **C** 3→5→1
- **D** 4→3→2

(Total for question = 1 mark)

Q7.

A correct unit for radiant energy flux is

- **A** N m^{-1} s^{-1}
- **B** Nm^{-1}
- **C** W
- **D** W m^2

(Total for question = 1 mark)

Q8.

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A star is estimated to have approximately the same surface temperature as the Sun, but less than 1% of the Sun's luminosity.

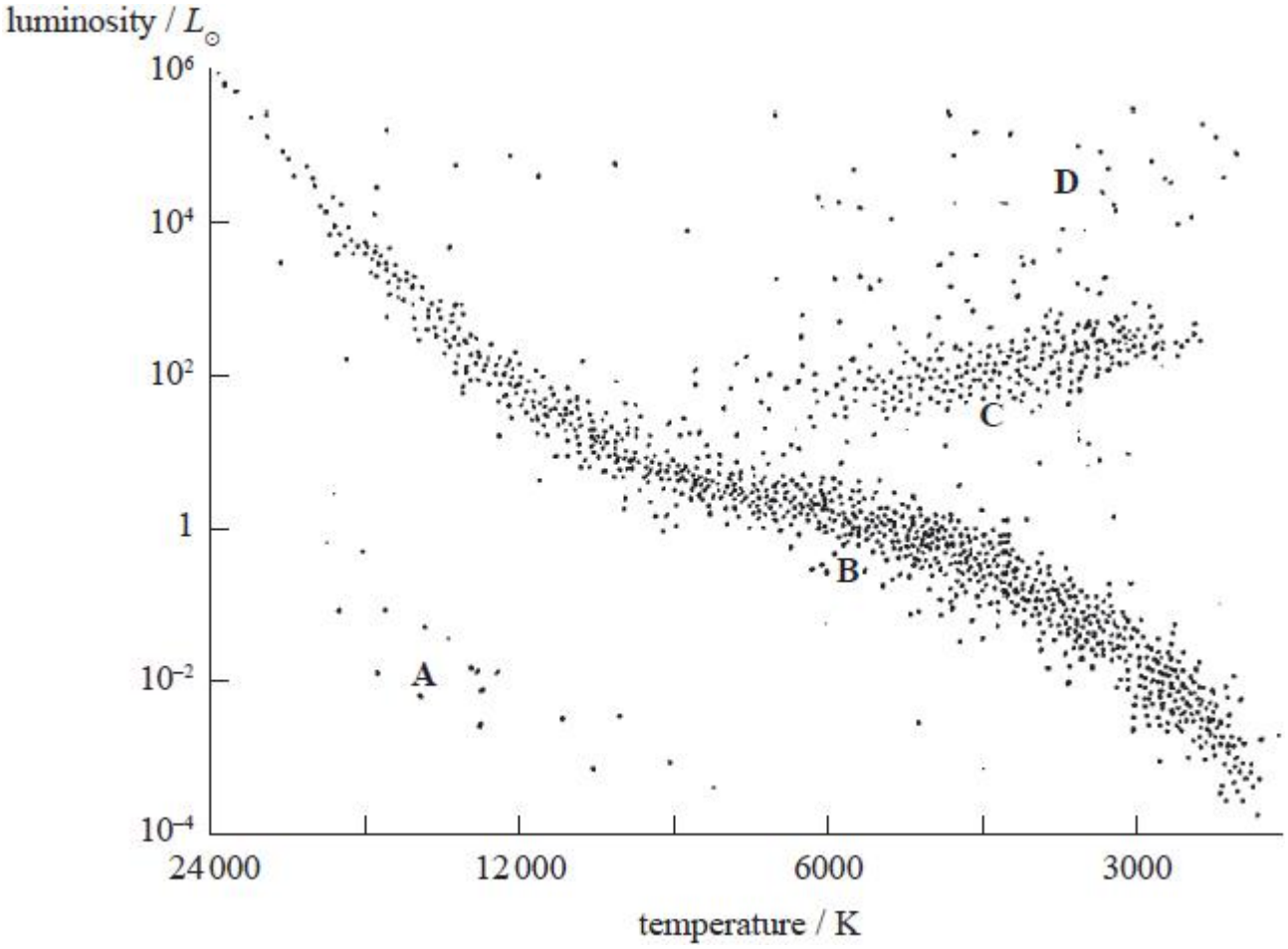
The star is best classified as a

- **A** main sequence star.
- **B** red dwarf star.
- **C** red giant star.
- **D** white dwarf star.

(Total for Question = 1 mark)

Q9.

Four regions **A**, **B**, **C** and **D** are labelled on the Hertzsprung-Russell diagram.



Which region includes the position of the Sun?

(1)

- **A**
- **B**
- **C**
- **D**

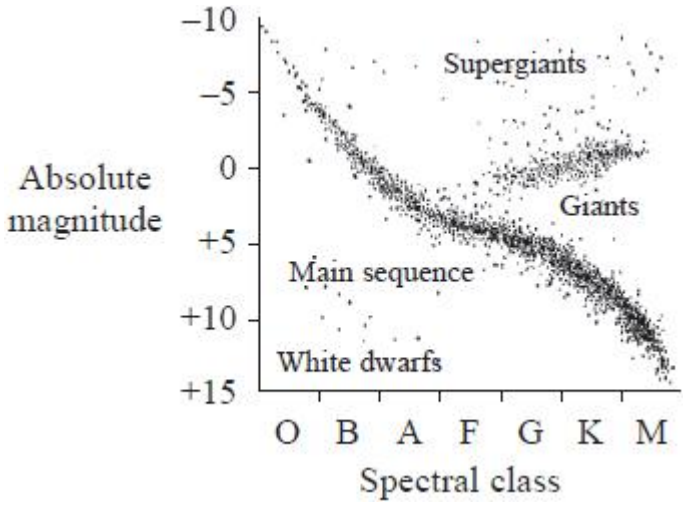
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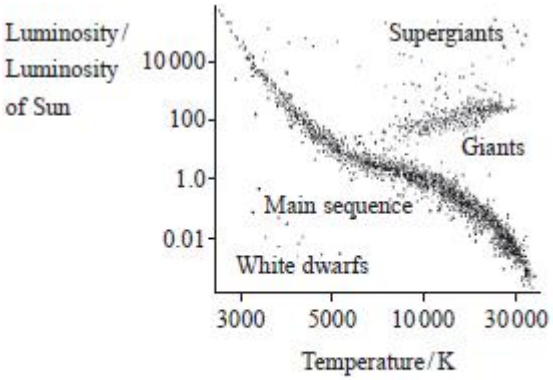
Q10.

Answer the question with a cross in the box you think is correct ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

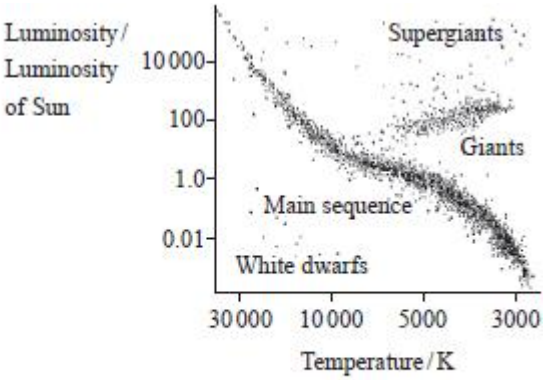
A student finds a Hertzsprung-Russell diagram in an old astronomy book and notices that the axes aren't the same as in her current textbook.



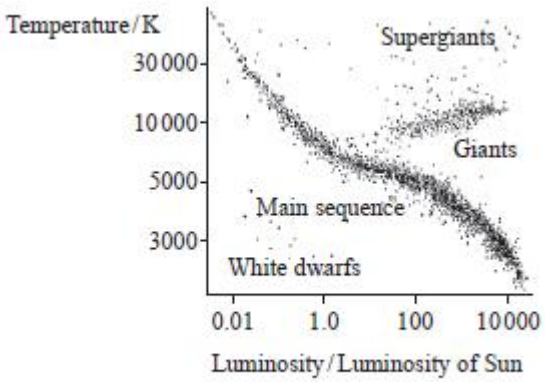
Which of the following graphs shows a correct alternative way to label the axes?



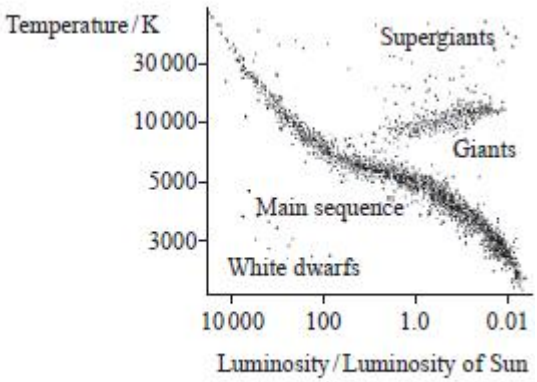
A



B



C



D

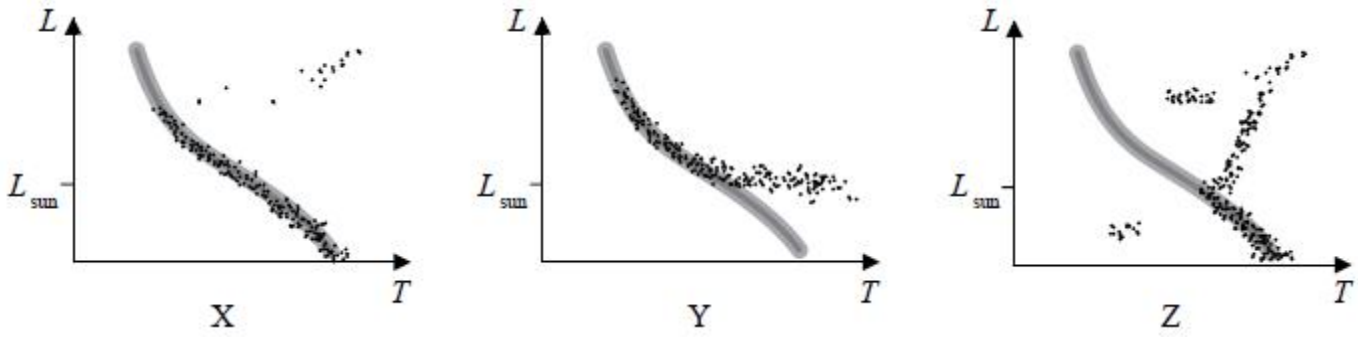
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☒ **A**
☒ **B**
☒ **C**
☒ **D**

(Total for question = 1 mark)

Q11.

Hertzsprung-Russell diagrams are shown for three star clusters.



Choose the row that correctly identifies the relative ages of the three clusters.

	Youngest ⟶ Oldest		
☒ **A**	X	Z	Y
☒ **B**	Y	X	Z
☒ **C**	Y	Z	X
☒ **D**	Z	X	Y

(Total for question = 1 mark)

Q12.

A line in the hydrogen spectrum of a star in the Milky Way galaxy is observed to have a wavelength of 656.3 nm. In a laboratory on Earth this line has a wavelength of 654.9 nm.

Which of the following expressions gives the magnitude of the velocity of the star relative to Earth?

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☒ **A** $\frac{656.3}{654.9} \times 3 \times 10^8 \text{ms}^{-1}$

☒ **B** $\frac{654.9}{(656.3 - 654.9)} \times 3 \times 10^8 \text{ms}^{-1}$

☒ **C** $\frac{654.9}{656.3} \times 3 \times 10^8 \text{ms}^{-1}$

☒ **D** $\frac{(656.3 - 654.9)}{654.9} \times 3 \times 10^8 \text{ms}^{-1}$

(Total for question = 1 mark)

Q13.

A sample of gas is contained within a sealed tube with a moveable piston at one end.
The gas occupies a volume *V* at pressure *p* and temperature *T*.

The temperature of the gas is increased to 2*T* and the volume of the cylinder changes.
The pressure decreases to *p*/2.

What will the new volume be?

☒ **A** *V*/ 2

☒ **B** *V*

☒ **C** 2*V*

☒ **D** 4*V*

(Total for question = 1 mark)

Q14.

Answer the question with a cross in the box you think is correct ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

There are several different methods that can be used to determine the distance from our solar system to astronomical objects. These include the measurement of red shift, trigonometrical parallax and the use of standard candles.

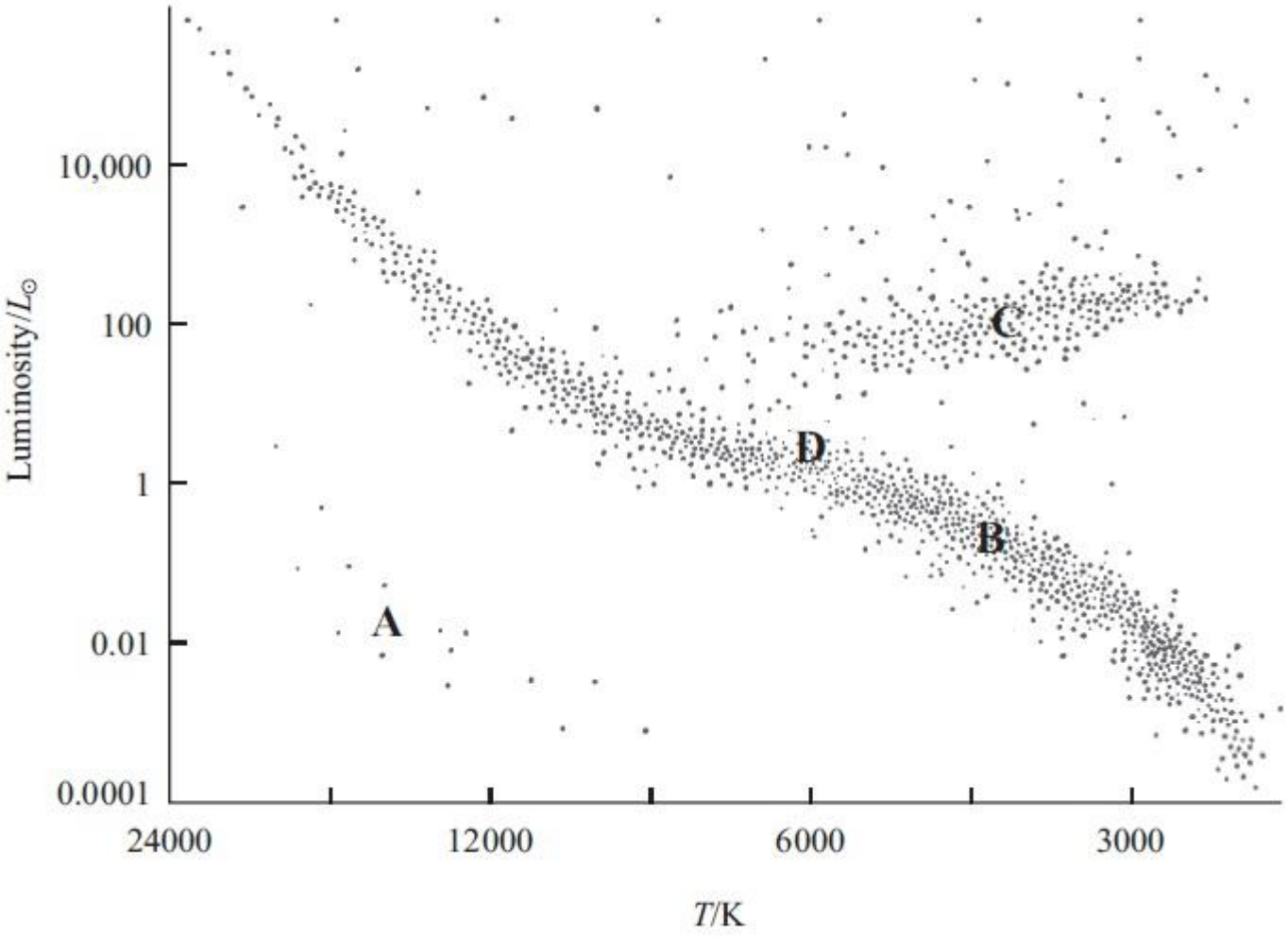
Which row of the table shows a suitable method for each of the objects named?

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	Nearby star	Nearby galaxy	Very distant galaxy
☒ **A**	parallax	red shift	standard candle
☒ **B**	red shift	standard candle	parallax
☒ **C**	parallax	standard candle	red shift
☒ **D**	red shift	parallax	standard candle

(Total for question = 1 mark)

Q15.



Which letter A, B, C or D represents the region on the diagram where our Sun would be shown?

☒ **A**
☒ **B**
☒ **C**
☒ **D**

(Total for question = 1 marks)

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Q16.

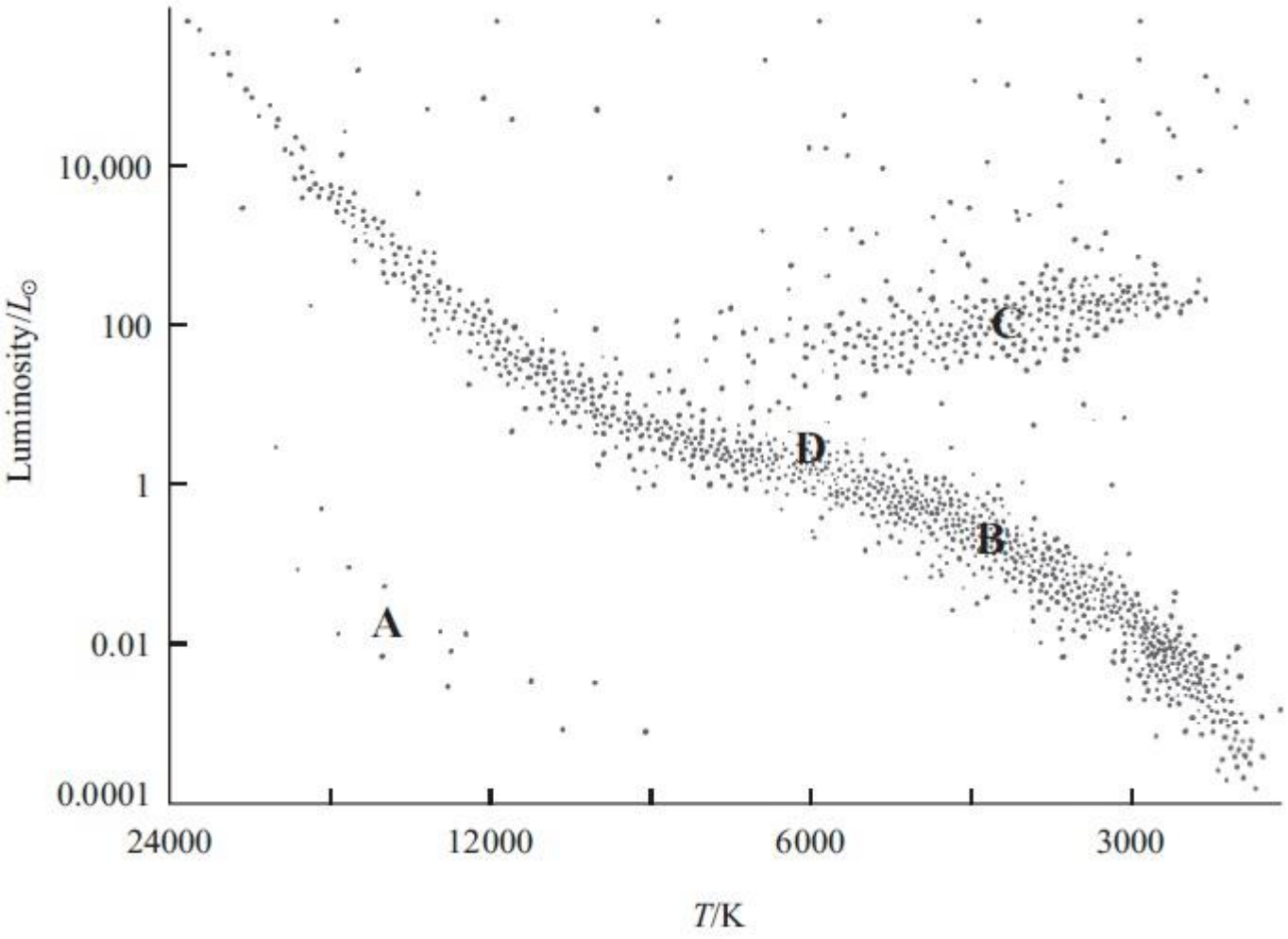
Standard candles are used by astronomers to determine the distances to distant star clusters.

A standard candle has a

- ☒ **A** constant brightness.
- ☒ **B** constant luminosity.
- ☒ **C** known brightness.
- ☒ **D** known luminosity.

(Total for question = 1 mark)

Q17.



Which letter A, B, C or D represents the region on the diagram where a white dwarf star would be shown?

- ☒ **A**
- ☒ **B**
- ☒ **C**
- ☒ **D**

(Total for question = 1 marks)

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Q18.

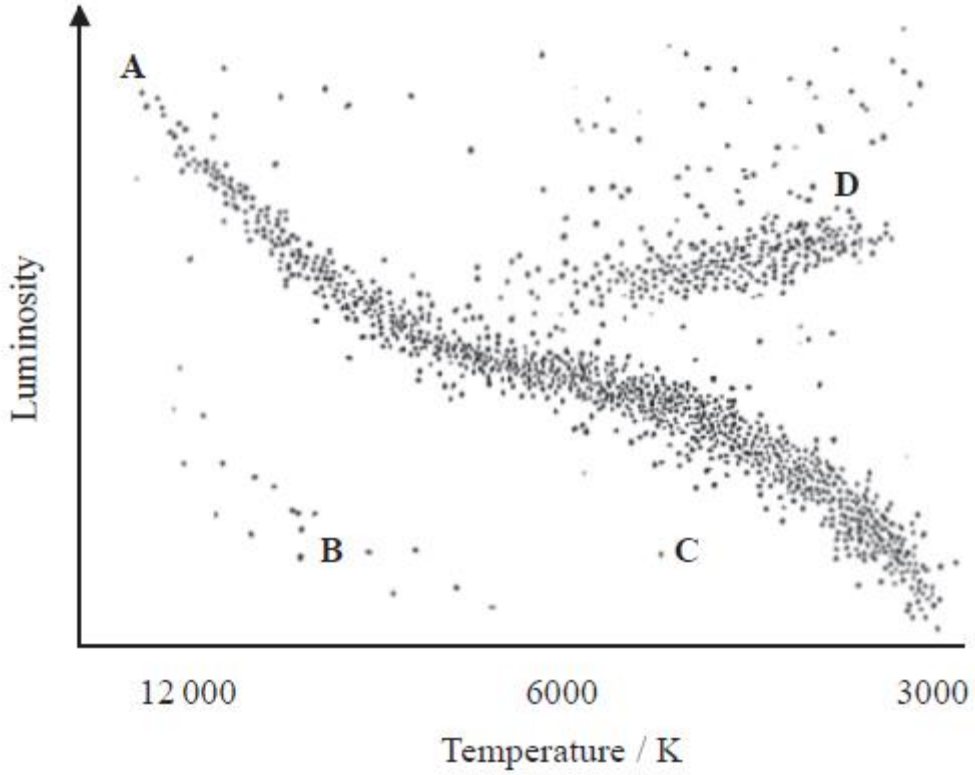
When light from the galaxy in Andromeda is analysed, it is found that the wavelengths are shorter than expected. This tells us that the galaxy is

- **A** moving towards us.
- **B** moving away from us.
- **C** a very distant galaxy.
- **D** rotating on an axis.

(Total for question = 1 mark)

Q19.

This question refers to the Hertzsprung-Russell diagram below.



Which letter, **A**, **B**, **C** or **D**, indicates the region where a white dwarf star would be shown?

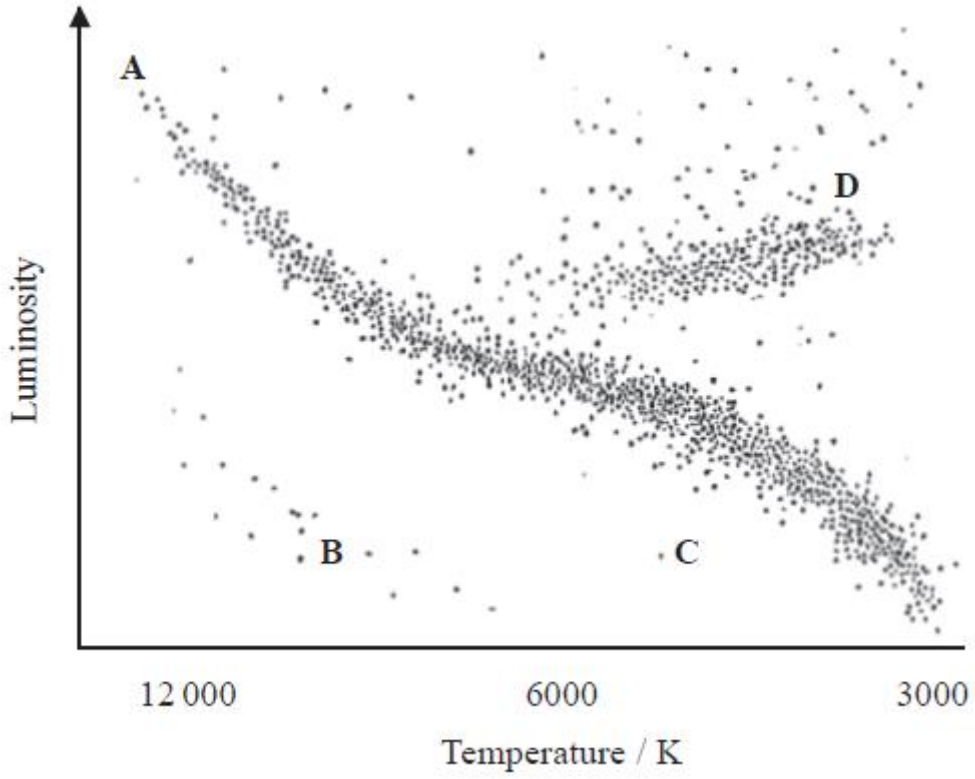
- **A**
- **B**
- **C**
- **D**

(Total for question = 1 mark)

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Q20.

This question refers to the Hertzsprung-Russell diagram below.



Which letter, **A**, **B**, **C** or **D**, indicates the region where a blue giant star would be shown?

- ☒ **A**
- ☒ **B**
- ☒ **C**
- ☒ **D**

(Total for question = 1 mark)

Q21.

Answer the question with a cross in the box you think is correct ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

The diagram shows a source of sound waves and an observer.



Which row of the table shows a situation which would result in a decrease in the frequency of sound observed?

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	Source	Observer
☒ A	moves to the right at $20\,m\,s^{-1}$	moves to the left at $20\,m\,s^{-1}$
☒ B	moves to the right at $20\,m\,s^{-1}$	moves to the right at $20\,m\,s^{-1}$
☒ C	moves to the right at $20\,m\,s^{-1}$	stationary
☒ D	stationary	moves to the right at $20\,m\,s^{-1}$

(Total for question = 1 mark)

Q22.

Answer the question with a cross in the box you think is correct ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

Two stars, P and Q, are observed from Earth. The intensity of radiation from P is less than that from Q. The parallax angle for P is greater than that for Q.

Which row of the table is correct?

	Distance from Earth	Comparison of luminosities
☒ A	P is closer than Q	luminosity of P is greater than Q
☒ B	P is closer than Q	luminosity of P is less than Q
☒ C	P is further away than Q	luminosity of P is greater than Q
☒ D	P is further away than Q	luminosity of P is less than Q

(Total for question = 1 mark)

Q23.

A source of sound of constant frequency is moving towards an observer. Compared to the frequency of the source, the frequency of sound heard by the observer is

☒ **A** higher, because the speed of sound increases.

☒ **B** lower, because the air is compressed.

☒ **C** higher, because the wavelength of the sound decreases.

☒ **D** lower, because the amplitude increases.

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(Total for question = 1 mark)

Q24.

The wavelength of a line in the spectrum produced by a distant star is found to be shorter than the wavelength of the corresponding line in the spectrum produced by the Sun.

This is because the distant star is

- ☒ **A** cooler than the Sun.
- ☒ **B** hotter than the Sun.
- ☒ **C** moving away from the Earth.
- ☒ **D** moving towards the Earth.

(Total for question = 1 mark)

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