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Physics

Standard level

Paper 1A

28 April 2026

Zone A afternoon | **Zone B** afternoon | **Zone C** afternoon

1 hour 30 minutes [Paper 1A and Paper 1B]

Instructions to students

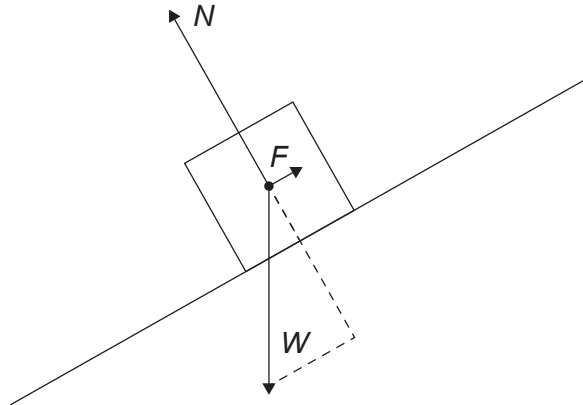
- Do not open this examination paper until instructed to do so.
- Answer all questions.
- For each question, choose the answer you consider to be the best and indicate your choice on the answer sheet provided.
- A calculator is required for this paper.
- A clean copy of the **physics data booklet** is required for this paper.
- The maximum mark for paper 1A is **[25 marks]**.
- The maximum mark for paper 1A and paper 1B is **[45 marks]**.

1. An object moves from rest with a uniform acceleration a over a distance d in a time t .

What is a ?

- A. $\frac{d}{t^2}$
- B. $\frac{d^2}{t}$
- C. $\frac{2d}{t^2}$
- D. $\frac{d^2}{2t}$

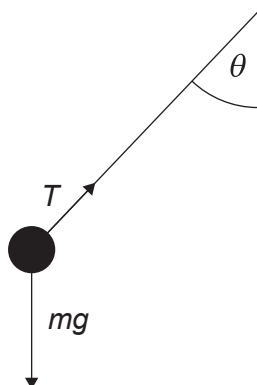
2. The free-body diagram shows a box on a frictionless inclined plane. The diagram and forces are drawn to scale. Weight W and normal force N are shown. The force F is acting up the plane.



What is correct about the motion of the box?

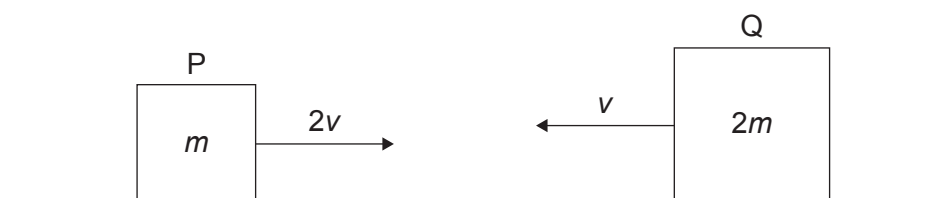
- A. The box is sliding down the plane with a constant speed.
- B. The box is sliding down the plane with an increasing speed.
- C. The box is sliding up the plane with a constant speed.
- D. The box is sliding up the plane with an increasing speed.

3. A sphere of mass m is attached to a string and acts as a pendulum. The diagram shows the moment when the sphere is released with an initial angle to the vertical of θ .



What is the magnitude of the tension T in the string when it is released?

- A. $mg \tan(\theta)$
 - B. $mg \sin(\theta)$
 - C. $mg \cos(90^\circ - \theta)$
 - D. $mg \sin(90^\circ - \theta)$
4. Two blocks, P and Q, have mass m and $2m$ and speed $2v$ and v respectively. They move in opposite directions on a frictionless surface as shown. They collide elastically.



Which statement correctly describes the movements of blocks P and Q after the collision?

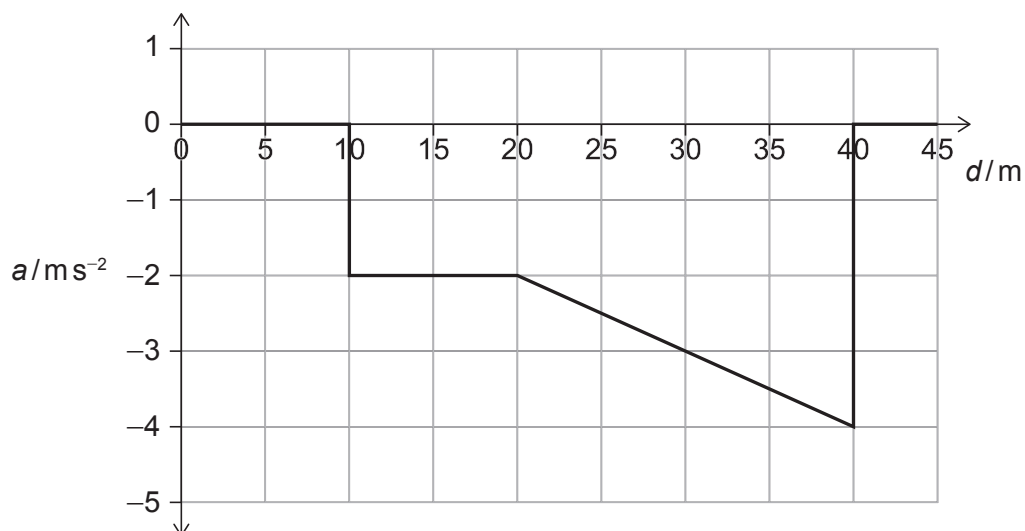
- A. P and Q stop.
- B. P moves to the left and Q stops.
- C. P moves to the left and Q moves to the right.
- D. P and Q move to the left with different speeds.

5. A car moves with speed v on a circular horizontal road of radius R . The coefficient of static friction between the road and the car tyres is μ .

What is the largest v at which the car can move without sliding?

- A. $\frac{gR}{\mu}$
- B. μgR
- C. $\sqrt{\frac{gR}{\mu}}$
- D. $\sqrt{\mu gR}$

6. The graph shows the variation of the acceleration with distance of a car of mass 1500 kg slowing down to a stop at $d = 40$ m.



What energy is dissipated during the process?

- A. 80 J
 - B. 100 J
 - C. 120 kJ
 - D. 150 kJ
7. Ice is melting inside an isolated container filled with water at a temperature of 20°C . The ice completely melts.

Which statement about the system during the phase change is correct?

- A. The internal energy of the ice molecules increases.
- B. The potential energy of the ice molecules decreases.
- C. The kinetic energy of the ice molecules increases.
- D. The kinetic energy of the water molecules increases.

8. The surface temperature of a star that is moving away from the Earth is 6500 K.

What colour is the peak of the star's emission spectrum and in which direction is it shifted to an observer on Earth due to the motion of the star?

	Colour	Direction of shift
A.	blue	towards blue
B.	blue	towards red
C.	red	towards blue
D.	red	towards red

9. Which is correct about greenhouse gases in the atmosphere of a planet?

- A. They reflect incoming ultraviolet radiation from the Sun.
- B. They absorb incoming ultraviolet radiation from the Sun.
- C. They reflect infrared radiation from the surface of the planet.
- D. They absorb infrared radiation from the surface of the planet.

10. Two containers of equal volume, X and Y, are filled with an ideal gas. The pressure in X is 8.1×10^6 Pa and its temperature is 18°C . The pressure in Y is 5.3×10^6 Pa and its temperature is 36°C .

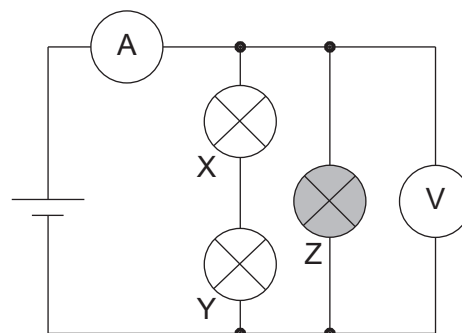
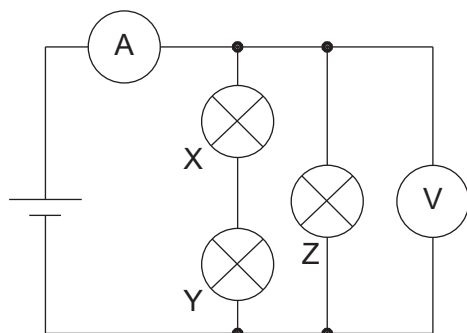
What is the ratio $\frac{\text{number of gas atoms in X}}{\text{number of gas atoms in Y}}$?

- A. 3.1
- B. 1.6
- C. 0.6
- D. 0.3

11. Two wires, X and Y, of the same material are compared. Wire X has a length of 10 m and a diameter of 2 mm. Wire Y has a length of 8 m and a diameter of 5 mm.

What is the ratio $\frac{\text{resistance of X}}{\text{resistance of Y}}$?

- A. 0.1
B. 0.3
C. 3
D. 8
12. Three identical lightbulbs are connected to a cell as shown. The cell has a negligible internal resistance. The ammeter and voltmeter read I_0 and V_0 respectively. Lightbulb Z (shown in grey) burns out and can no longer conduct electricity.



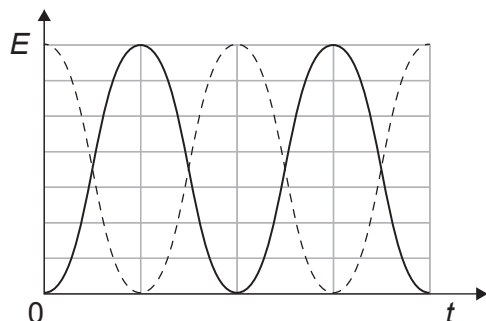
What are the new readings of the ammeter and the voltmeter?

	Ammeter reading	Voltmeter reading
A.	$\frac{1}{3}I_0$	less than V_0
B.	$\frac{2}{3}I_0$	less than V_0
C.	$\frac{1}{3}I_0$	V_0
D.	$\frac{2}{3}I_0$	V_0

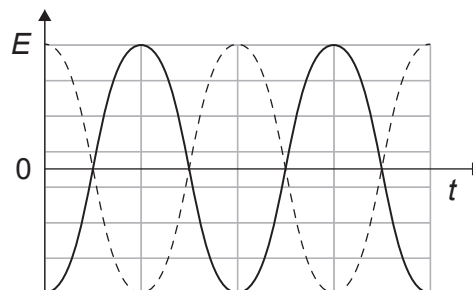
13. An object is undergoing simple harmonic motion. At $t = 0$ s the object goes through the equilibrium position. Kinetic energy is shown with a dashed line and potential energy with a solid line.

Which graph correctly represents the variation of kinetic and potential energy with time?

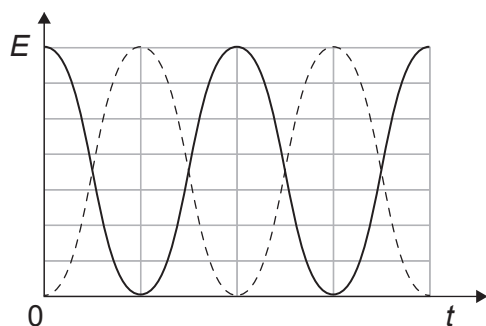
A.



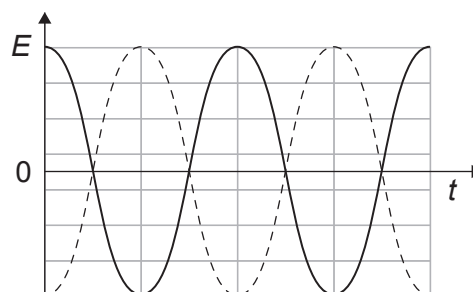
B.



C.



D.

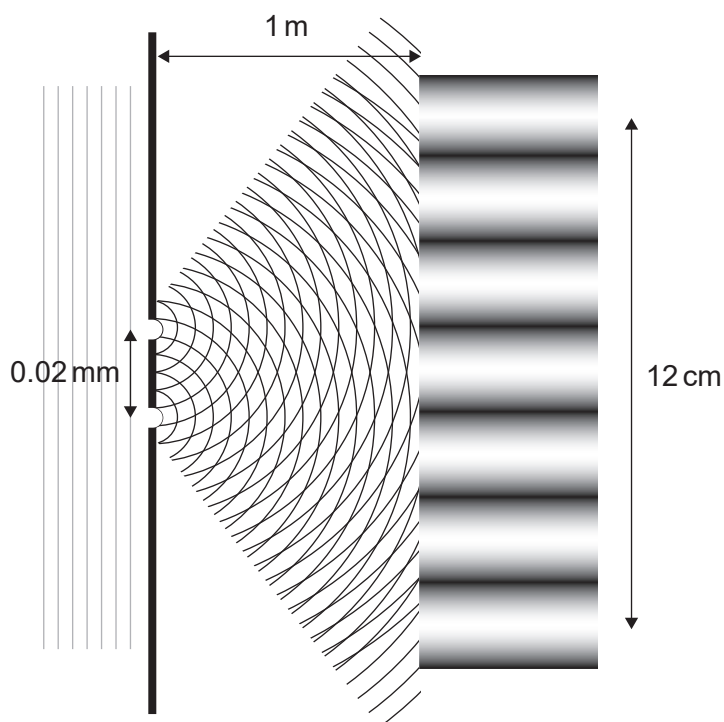


14. Two waves, X and Y, are sent simultaneously through the Earth with a frequency of 5 Hz. They travel through different materials in the Earth's crust. Wave X has a wavelength of 1100 m and wave Y has a wavelength of 660 m. The waves are detected 300 km from their source.

What is the time interval between the detection of the two waves and which wave is detected first?

	Time interval/s	Wave detected first
A.	55	X
B.	36	X
C.	55	Y
D.	36	Y

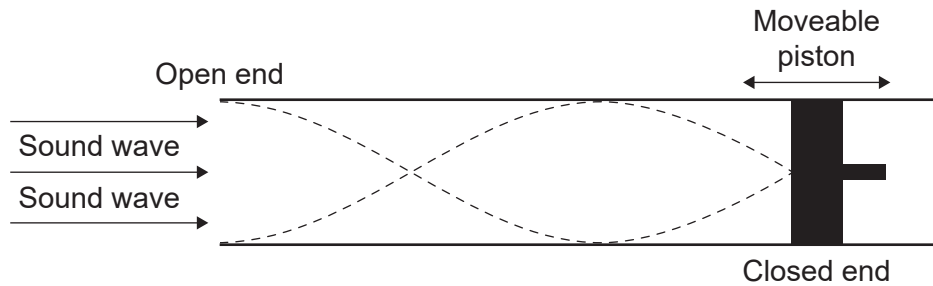
15. Light is sent through two slits separated by 0.020 mm. An interference pattern is observed on a screen 1.0 m from the double slit. The pattern in the diagram shows fringes along a distance of 12 cm.



What is the wavelength of the light?

- A. $4.0 \times 10^{-7} \text{ m}$
- B. $2.4 \times 10^{-6} \text{ m}$
- C. $4.0 \times 10^{-5} \text{ m}$
- D. $1.0 \times 10^{-3} \text{ m}$

16. A loudspeaker is directed into a tube that is closed at one end by a movable piston. A standing wave is formed. In this configuration, the tube generates a loud sound with a constant frequency. The tube is shortened by moving the piston to the left until another loud sound is heard.

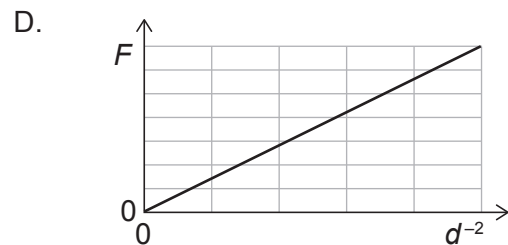
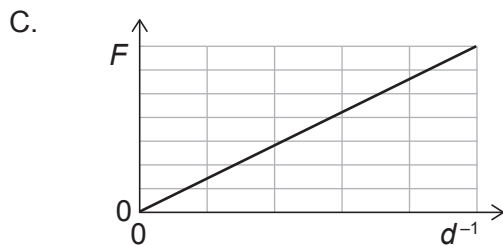
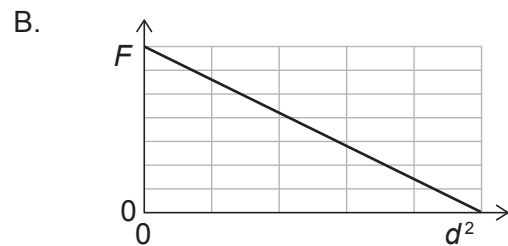
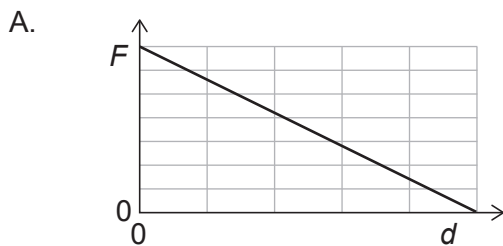


What was the initial harmonic and what is the final harmonic?

	Initial harmonic	Final harmonic
A.	first	first
B.	first	second
C.	third	first
D.	third	second

17. A spaceship is approaching a planet.

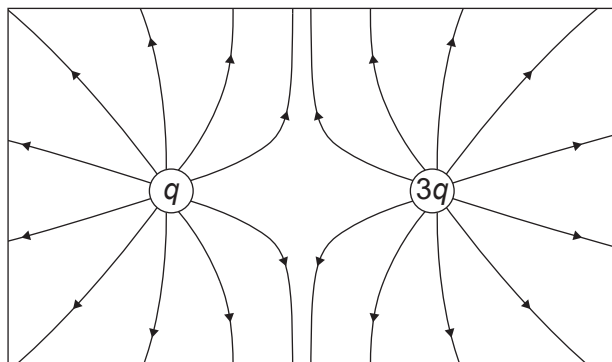
Which graph correctly represents the variation of the attractive force F with distance d as measured to the centre of the planet?



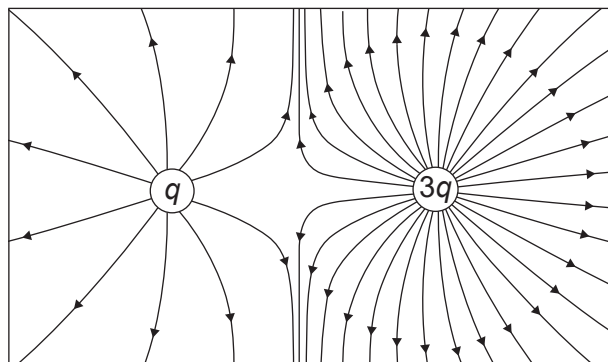
18. Two positive charges, q and $3q$, are brought together.

Which diagram best represents the electric field lines for this situation?

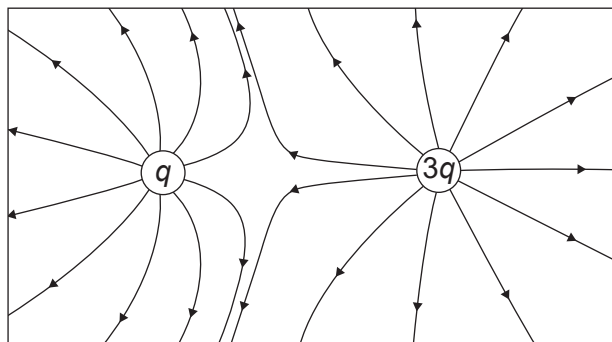
A.



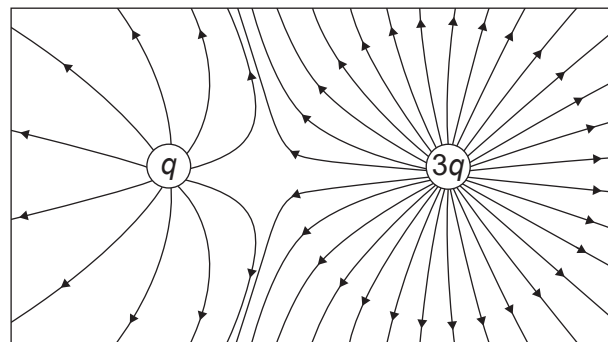
B.



C.



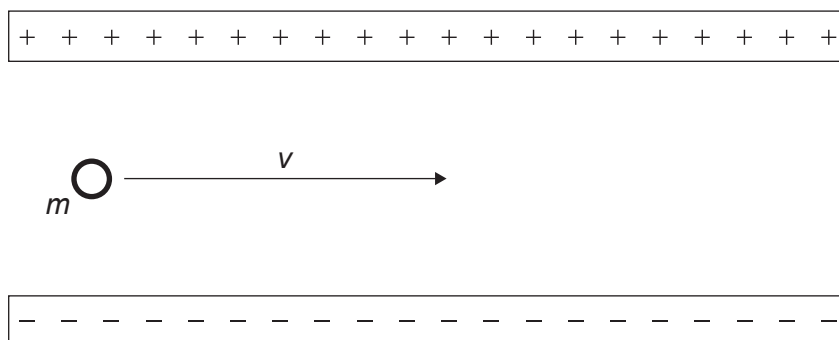
D.



19. An electric charge of 2 C causes an electric field of strength E_1 at 5 cm. A second charge of 1 C causes an electric field of strength E_2 at 50 cm.

What is $\frac{E_2}{E_1}$?

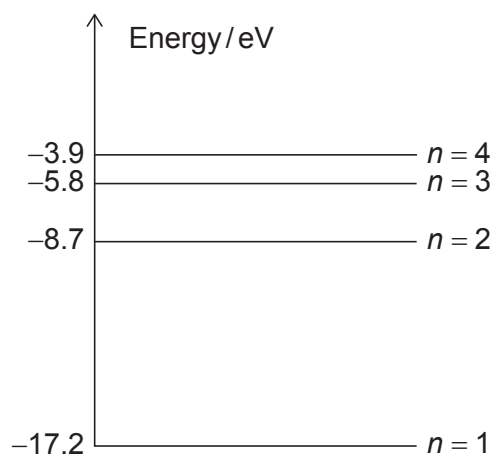
- A. 0.005
- B. 0.05
- C. 20
- D. 200
20. A particle with mass m and negative charge of magnitude q is moving with speed v between two charged horizontal plates. The plates form an electric field E .



What is the resultant force on the particle?

- A. mg
- B. $qE - mg$
- C. $qE + mg$
- D. qE

21. The diagram shows the first four energy levels in an atom.



Which statement gives the correct wavelength for a transition from $n = 4$ to $n = 2$ in this atom?

- A. $\frac{c \times h}{(-8.7 + 3.9)e}$
- B. $\frac{c \times (-8.7 + 3.9)e}{h}$
- C. $\frac{c \times h}{(-3.9 + 8.7)e}$
- D. $\frac{c \times (-3.9 + 8.7)e}{h}$
22. The following statements are made about alpha, beta and gamma radiation. Which is correct?
- A. Electric fields can deflect gamma rays.
- B. Beta particles have a charge of magnitude e .
- C. Alpha particles have a charge of magnitude e .
- D. Gamma rays are more ionizing than alpha and beta rays.

23. Which statement about nuclear power plants is correct?

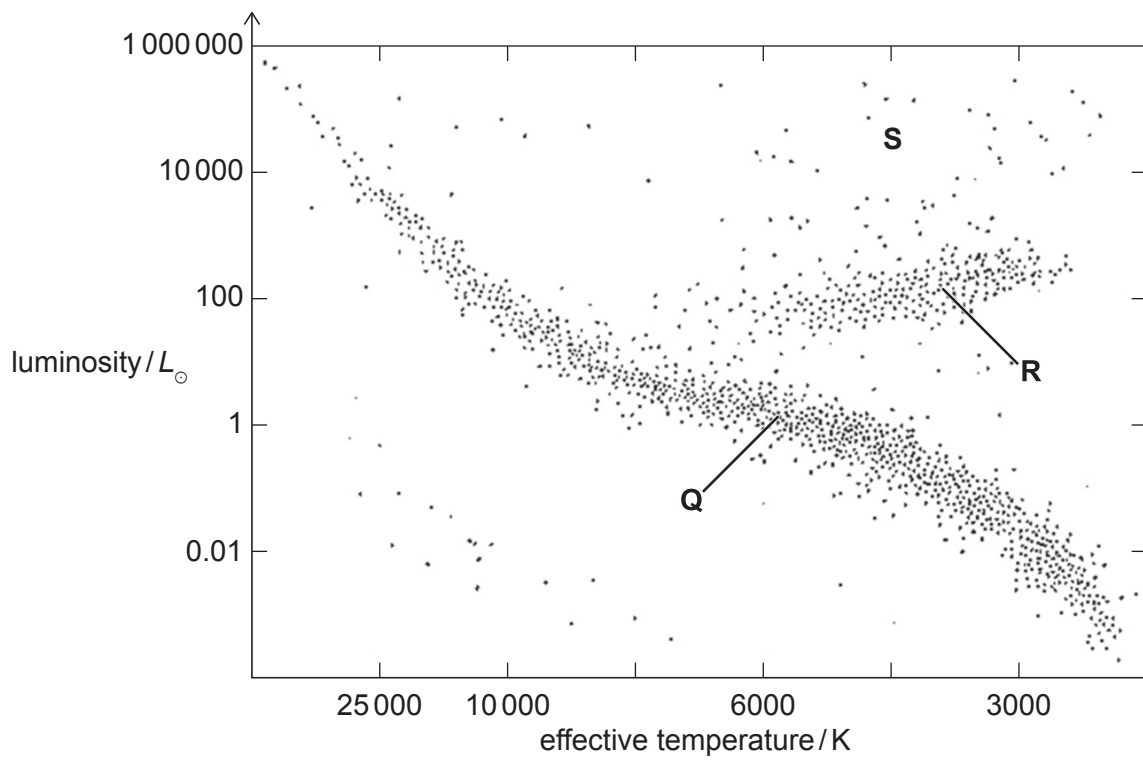
- A. The fission process generates radioactive waste that is difficult to dispose of.
- B. Nuclear power plants use water from nearby rivers to control chain reactions.
- C. Nuclear power plants use control rods to cool down reactors.
- D. Chain reactions in fission reactors are unstoppable once they have started.

24. Nuclear fusion in stable stars produces very high temperatures and pressures.

Why are these stars not exploding?

- A. The fusion process only occurs in the centre of the stars.
- B. The fusion process is too slow to cause an explosion.
- C. The cooler outer layer of the stars holds them together.
- D. The inward gravitational pressure is in equilibrium with the outward thermal pressure.

25. The Sun will leave the main sequence to become a red giant in the future.



In which of the areas shown in the Hertzsprung–Russell diagram will the Sun begin and end this process?

	Begins	Ends
A.	R	R
B.	R	S
C.	Q	R
D.	Q	S