

1

A nucleus of a particular element decays, emitting a series of α and β^- particles.

Which of the following series of emissions would result in an isotope of the original element?

- A 1 α and 1 β^-
- B 1 α and 2 β^-
- C 2 α and 1 β^-
- D 2 α and 2 β^-

(Total 1 mark)

2

In a diffraction-grating experiment the maxima are produced on a screen.

What causes the separation of the maxima of the diffraction pattern to decrease?

- A using light with a longer wavelength
- B increasing the distance between the screen and grating
- C increasing the distance between the source and grating
- D using a grating with a greater slit separation

(Total 1 mark)

3

A girl jogs at 2.0 m s^{-1} in a straight line for 30 seconds, turns around and returns to her starting point 20 seconds later.

What is her average velocity and average speed?

	Average velocity/ m s^{-1}	Average speed/ m s^{-1}	
A	0 m s^{-1}	2.4 m s^{-1}	<input type="checkbox"/>
B	0 m s^{-1}	2.5 m s^{-1}	<input type="checkbox"/>
C	1.0 m s^{-1}	2.0 m s^{-1}	<input type="checkbox"/>
D	2.5 m s^{-1}	2.5 m s^{-1}	<input type="checkbox"/>

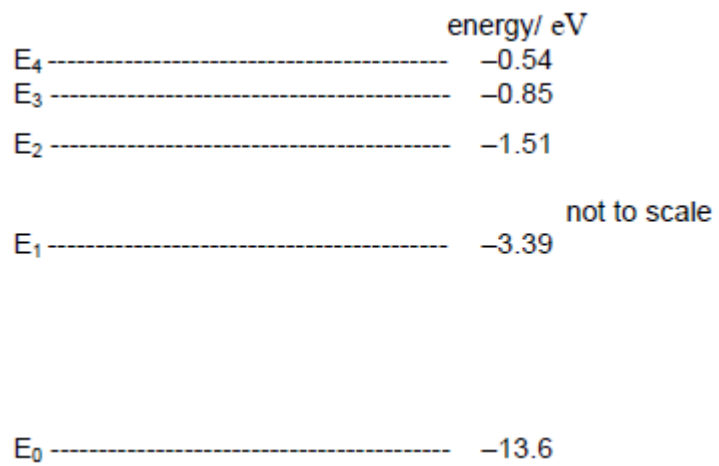
(Total 1 mark)

4 Which is a scalar quantity?

- A momentum
- B weight
- C power
- D moment

(Total 1 mark)

5 The diagram gives some of the energy levels of a hydrogen atom.



The transition of an excited hydrogen atom from E_3 to E_1 causes a photon of visible light to be emitted.

Which transition causes a photon of ultraviolet light to be emitted?

- A E_4 to E_3
- B E_3 to E_2
- C E_2 to E_1
- D E_1 to E_0

(Total 1 mark)

6

What is the phase difference between two points 0.16 m apart on a progressive sound wave of frequency 256 Hz?

speed of sound = 330 m s⁻¹

A $\frac{\pi}{8}$

B $\frac{\pi}{6}$

C $\frac{\pi}{4}$

D $\frac{\pi}{3}$

(Total 1 mark)

7

Which of the following is **not** made of quarks?

A kaon

B muon

C neutron

D pion

(Total 1 mark)

8

The mass of fuel in a racing car decreases during a race. As a result the lap time decreases.

Which of the following could explain this decrease?

A there is less friction on the race track

B the maximum speed of the car has increased

C the maximum acceleration and deceleration are greater

D the engine is more efficient

(Total 1 mark)

9

Which of the following is **not** a unit of power?

A N m s^{-1}

B J s

C W

D $\text{kg m}^2 \text{s}^{-3}$

(Total 1 mark)

10

In a test a 500 kg car travelling at 10 m s^{-1} hits a wall. The front 0.30 m of the car crumples as the car is brought to rest.

What is the average force on the car during the impact?

A 830 N

B 7500 N

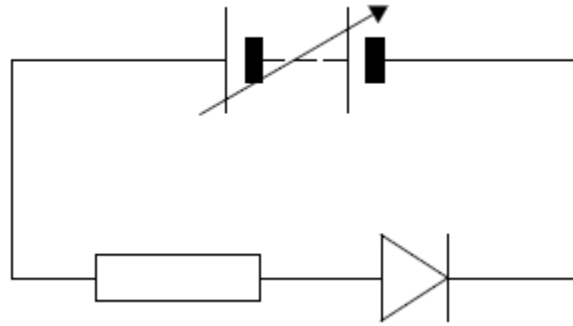
C 8300 N

D 83 000 N

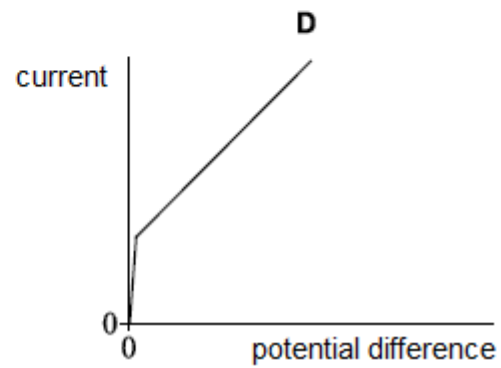
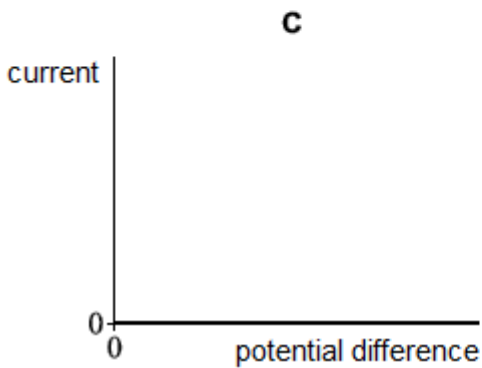
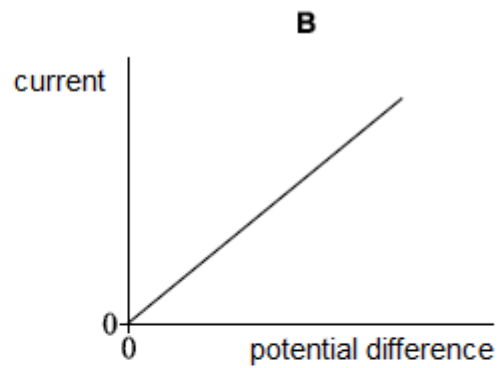
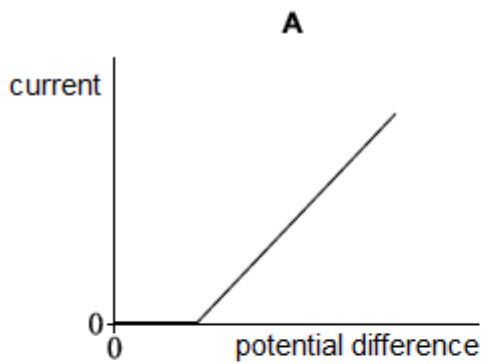
(Total 1 mark)

11

A resistor and diode are connected in series with a variable power supply as shown in the diagram.



Which best shows the characteristic for the combination of the resistor and diode?



- A
- B
- C
- D

(Total 1 mark)

12

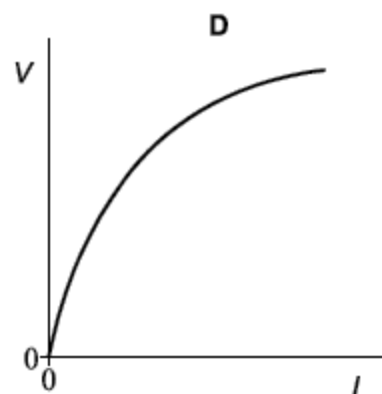
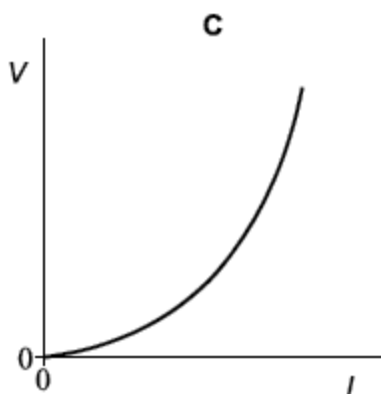
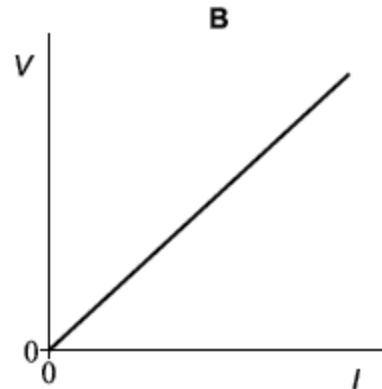
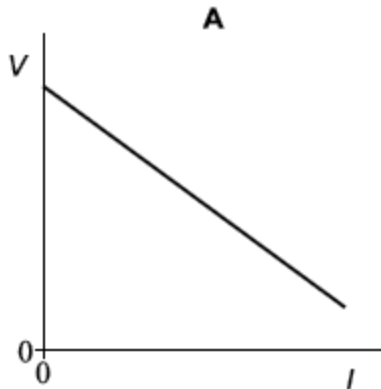
Which line, **A** to **D**, in the table correctly shows what is conserved in an elastic collision?

	Mass	Momentum	Kinetic energy	Total energy
A	conserved	not conserved	conserved	conserved
B	not conserved	conserved	conserved	not conserved
C	conserved	conserved	not conserved	conserved
D	conserved	conserved	conserved	conserved

(Total 1 mark)

13

A student investigates how the potential difference V across the terminals of a cell varies with the current I in the cell.



Which graph correctly shows how V varies with I ?

A

B

C

D

(Total 1 mark)

- 14** The National Grid uses high-voltage transmission lines to carry electrical power around the UK. A particular transmission line delivers 800 MW of power at 132 kV to the user. It loses 1% of the transmitted power as heat.

What is the resistance of the transmission line?

- A** 0.2 Ω
- B** 6 Ω
- C** 20 Ω
- D** 2000 Ω

(Total 1 mark)

- 15** Which of the following is correct when total internal reflection occurs?

- A** the angle of incidence is less than the critical angle
- B** the light meets an optically less dense medium
- C** the light enters a medium with a higher refractive index
- D** the angles that the incident and refracted rays make with the normal are the same

(Total 1 mark)