1 A cylindrical conductor of length l, diameter D, and resistivity ρ has a resistance R.

What is the resistance of another cylindrical conductor of length l, diameter $\frac{D}{2}$, and resistivity ρ?

A $8R$ ⬭

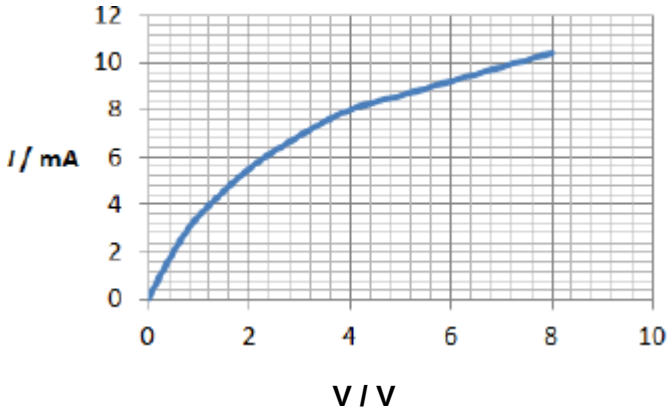
B $4R$ ⬭

C $2R$ ⬭

D R ⬭

(Total 1 mark)

2 The graph shows the current–voltage (I–V) characteristics of a filament lamp.



What is the resistance of the filament when the potential difference (pd) across it is 4.0 V?

A 500 Ω ⬭

B 1700 Ω ⬭

C 2000 Ω ⬭

D 6000 Ω ⬭

(Total 1 mark)

3 A body falls freely, with negligible air resistance. What quantity of the body is its rate of change of momentum?

A mass ⬭

B power ⬭

C kinetic energy ⬭

D weight ⬭

(Total 1 mark)

4 Three identical cells, each of internal resistance R, are connected in series with an external resistor of resistance R. The current in the external resistor is I. If one of the cells is reversed in the circuit, what is the new current in the external resistor?

A $\frac{I}{3}$ ⬭

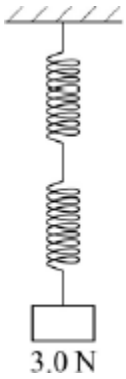
B $\frac{4I}{9}$ ⬭

C $\frac{I}{2}$ ⬭

D $\frac{2I}{3}$ ⬭

(Total 1 mark)

5 A load of 3.0 N is attached to a spring of negligible mass and spring constant 15 N m^{-1}.



What is the energy stored in the spring?

A 0.3 J ⬭

B 0.6 J ⬭

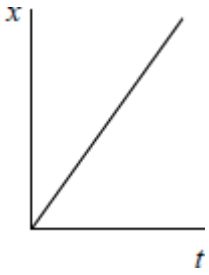
C 0.9 J ⬭

D 1.2 J ⬭

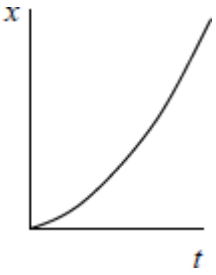
(Total 1 mark)

6 A car accelerates uniformly from rest along a straight road. Which graph shows the variation of displacement *x* of the car with time *t*?

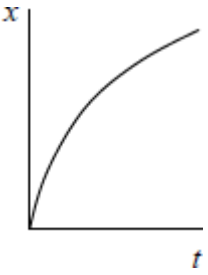
A



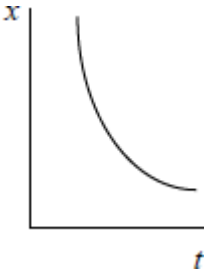
B



C



D



A ⬭

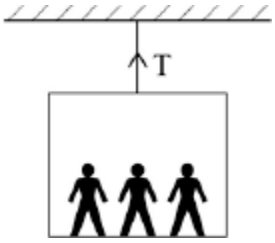
B ⬭

C ⬭

D ⬭

(Total 1 mark)

7 A lift and its passengers with a total mass of 500 kg accelerates upwards at 2 m s^{-2} as shown. Assume that g = 10 m s^{-2}.



What is the tension in the cable?

A 1000 N ⬭

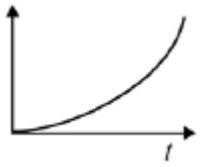
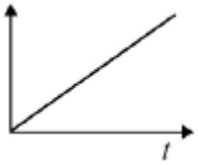
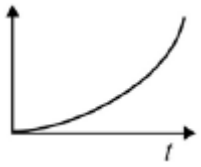
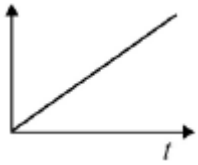
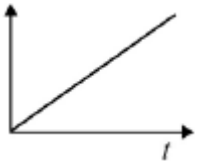
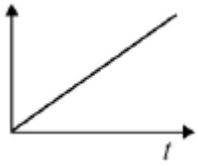
B 4000 N ⬭

C 5000 N ⬭

D 6000 N ⬭

(Total 1 mark)

8 An object is accelerated from rest by a constant force *F* for a time *t*. Which graphs represent the variation of time with the change in the kinetic energy and the change in momentum of the object?

	Kinetic energy	Momentum
A		
B		
C		
D		

A ⬭

B ⬭

C ⬭

D ⬭

(Total 1 mark)

9 In which of the following do both quantities have the same unit?

A Electrical resistivity and electrical resistance. ⬭

B Work function Planck constant ⬭

C Pressure and the Young modulus. ⬭

D Acceleration and rate of change of momentum. ⬭

(Total 1 mark)

10 Sound waves cross a boundary between two media X and Y. The frequency of the waves in X is 400 Hz. The speed of the waves in X is 330 m s^{-1} and the speed of the waves in Y is 1320 m s^{-1}. What are the correct frequency and wavelength in Y?

	Frequency / Hz	Wavelength / m	
A	100	0.82	⬭
B	400	0.82	⬭
C	400	3.3	⬭
D	1600	3.3	⬭

(Total 1 mark)

11 A light source emits light which is a mixture of two wavelength, λ_1 and λ_2. When the light is incident on a diffraction grating it is found that the fifth order of light of wavelength λ_1 occurs at the same angle as the fourth order for light of wavelength λ_2. If λ_1 is 480 nm what is λ_2?

A 400 nm ⬭

B 480 nm ⬭

C 600 nm ⬭

D 750 nm ⬭

(Total 1 mark)

12 Which of the following waves **cannot** be polarised?

A radio ⬭

B ultrasonic ⬭

C microwave ⬭

D ultraviolet ⬭

(Total 1 mark)

13 Which of the following is **not** true?

A Each meson consists of a single quark and a single antiquark. ⬭

B Each baryon consists of three quarks. ⬭

C The magnitude of the charge on every quark is $\frac{1}{3}$ ⬭

D A particle consisting of a single quark has not been observed. ⬭

(Total 1 mark)

14 Electron capture can be represented by the following equation.

$$p + e^- \rightarrow X + Y$$

Which row correctly identifies **X** and **Y**?

	X	**Y**	
A	p	K^-	⬭
B	e^-	e^+	⬭
C	n	V_e	⬭
D	n	π^0	⬭

(Total 1 mark)

15 Electrons and protons in two beams are travelling at the same speed. The beams are diffracted by objects of the same size.

Which correctly compares the de Broglie wavelength λ_e of the electrons with the de Broglie wavelength λ_p of the protons and the width of the diffraction patterns that are produced by these beams?

	comparison of de Broglie wavelength	diffraction pattern	
A	$\lambda_e > \lambda_p$	electron beam width > proton beam width	⬭
B	$\lambda_e < \lambda_p$	electron beam width > proton beam width	⬭
C	$\lambda_e > \lambda_p$	electron beam width < proton beam width	⬭
D	$\lambda_e < \lambda_p$	electron beam width < proton beam width	⬭

(Total 1 mark)