1 Which of the following readings is the greatest length?

A 7.2×10^5 μm

B 7200 mm

C 0.72 km

D 7.2×10^{-6} Gm

2 Which of the following quantities has no units?

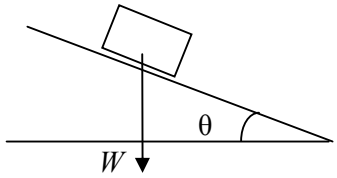
A work

B Young's modulus

C momentum

D strain

3 The figure below shows a body of weight W placed on a plane inclined at an angle θ to the horizontal.



The weight W when resolved into component parallel to the inclined plane is

A $W \cos \theta$ **B** $W \sin \theta$ **C** $W / \cos \theta$ **D** $W / \sin \theta$

4 A student uses an ammeter to measure the current in a circuit. He recorded the reading of current as 5.1 A. The actual value of the current is 5.12 A. What is the most likely reason for the difference between the actual value of the current and the reading from the student?

A The ammeter has zero error.

B There is parallax error.

C The number of reading taken is not sufficient.

D The ammeter is not sensitive enough.

5 In an experiment to determine the thickness of a hollow metal pipe, the external diameter, d_1 and the internal diameter d_2 are found to be (66 ± 2) mm and (49 ± 1) mm respectively. The percentage of uncertainty of thickness of the pipe is at most

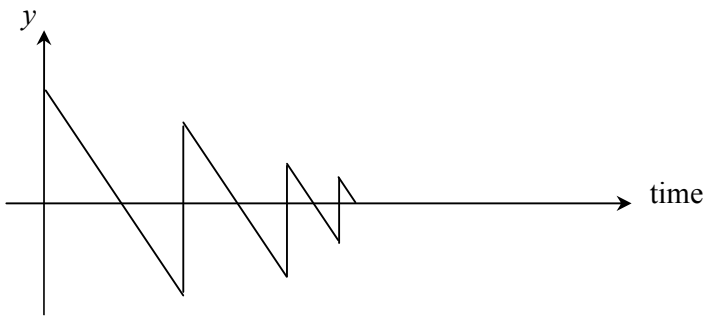
A 5 %

B 6 %

C 9 %

D 18 %

6 The graph below represents the motion of a body is projected upward and rebounds a few times, and finally stops.



The quantity on the *y*-axis represents

A displacement **B** velocity **C** acceleration **D** speed

7 A hot air balloon is accelerating upwards at a constant rate of a ms^{-2}. An object is released from the side of the balloon carriage. What is the magnitude of acceleration of the object immediately after it is released?

A a **B** g **C** $a + g$ **D** $a - g$

8 A plane on a runway takes 16.2 seconds over a distance of 1200 m to take off from rest. Assuming constant acceleration during take off, calculate the speed during take off.

A 9.14 ms^{-1} **B** 74.1 ms^{-1} **C** 148 ms^{-1} **D** 248 ms^{-1}

9 A body moving with constant acceleration experiences a constant rate of change of

A distance

B displacement

C velocity

D force

10 A lift of mass 2000 kg moves upwards with deceleration of 1.0 ms^{-2}. What is the tension in the supporting cable?

A 2000 N

B 17 600 N

C 21 600 N

D 39 200 N

11 Two similar bodies with the same mass and speed are moving in opposite directions in a straight line. If the collision between the two bodies is inelastic, which quantity is conserved after the collision?

A The total energy.

B Speed of the individual mass.

C The magnitude of force acting on the bodies.

D The total kinetic energy.

12 A lorry and a car collide head-on and both vehicles come to rest in 10 ms. Which of the following statements is true?

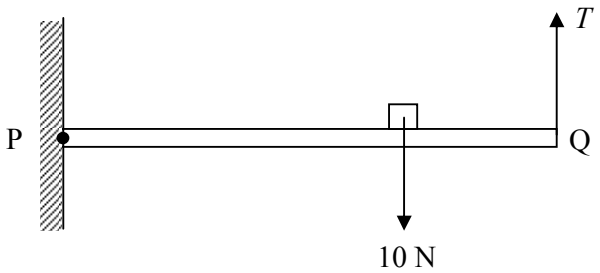
A The lorry experiences a greater impulsive force because its mass is larger

B The car experiences a greater impulsive force because its mass is smaller

C Both experience the same force

D The momentum change for the lorry is larger than that of the car.

13 The figure below shows a uniform rod PQ of length 1.0 m and of weight 20 N hinged at P. The end Q is supported by a vertical cord. A load of 10 N is placed 0.80 m from the end of P.



The tension in the cord is

A 18 N

B 20 N

C 22 N

D 24 N

14 The following is true about a couple **except**

A Torque produced by a couple is equal to the product of one force and the perpendicular distance between the forces

B It produces rotational motion only

C It produces translational motion only

D It is a pair of parallel forces, equal in magnitude but opposite in directions.

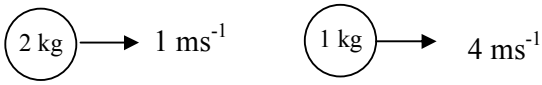
15 The diagram shows two spherical masses approaching each other head-on at an equal speed of 6 ms^{-1}. One has mass 2 kg and the other has mass 1 kg.

Which diagram, showing the situation after the collision, shows the result of an elastic collision?

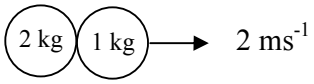
A

B

C



D



16 A car of mass 1000 kg can generate a constant power 20 kW. If air resistance is negligible, what is its acceleration at the speed of 30 ms^{-1}?

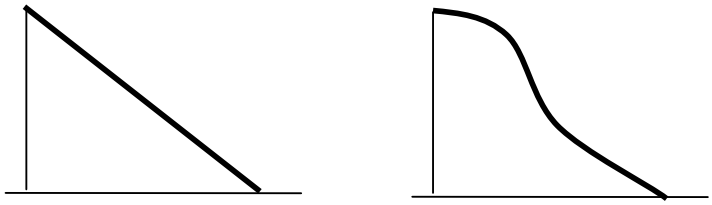
A 1.50 ms^{-2}

B 1 500 ms^{-2}

C 0.67 ms^{-2}

D 670 ms^{-2}

17 Figure (a) shows a smooth straight slide and figure (b) shows a smooth curved slide. Both slides have the same vertical height.



(a) (b)

A boy of mass m slides down from the top of the straight slide and another boy of mass $2m$ slides down from the curved slide. The speed at which the first boy reaches the bottom of the straight slide is v_s and the speed at which the second boy reaches the bottom of the curved slide is v_c. Which of the following is true?

A $v_c = v_s$ **B** $v_c = 2v_s$ **C** $v_c > 2v_s$ **D** $2v_c = v_s$

18 The diagrams show two ways of hanging a body weight W in equilibrium by two strings. The forces shown are tension in both strings.

Which information about the magnitude of the forces is correct?

A	$T_1 < T_2$	$F_1 > F_2$
B	$T_1 = T_2$	$F_1 > F_2$
C	$T_1 > T_2$	$F_1 > F_2$
D	$T_1 < T_2$	$F_1 = F_2$

19 Which of the following options best defines plastic behaviour of a material?

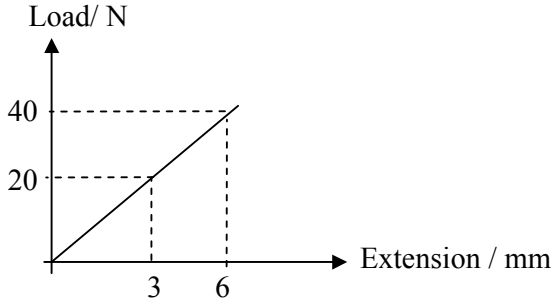
A extends beyond the limit of proportionality

B has a horizontal force-extension curve

C extends continuously under a steady load

D suffers permanent deformation

20 A uniform wire of length 2.0 m and cross sectional area 2.8×10^{-7} m^2 is fixed vertically. A variable load is suspended at the lower end. The graph shows the variation of the load with extension. Calculate the Young's modulus for the wire.



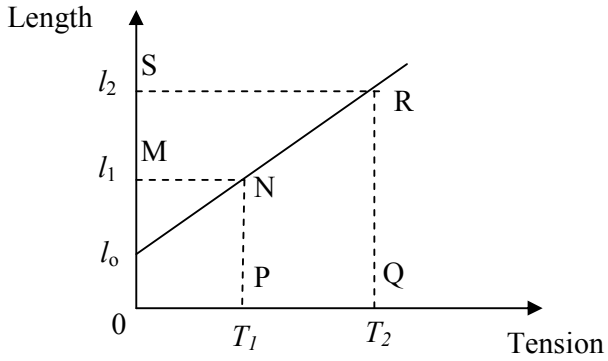
A 6.6 kPa

B 14 kPa

C 47 kPa

D 47 GPa

21 The tension in a spring of natural length l_o is first increased from zero to T_1, causing the length to increase to l_1. The tension is then further increased to T_2, causing length to increase to l_2.



Which area of graph represents the work done by the spring during this further increase in length?

A SRNM

B PNRQ

C OLRQ

D SRQPNM

22 Which of the following summarises the change in wave characteristics from microwaves to ultra-violet light in the electromagnetic spectrum?

	Frequency	Interference fringe separation due to two coherent sources
A	decreases	increases
B	decreases	decreases
C	increases	increases
D	increases	decreases

23 Which is the most correct statement about wave?

A A progressive wave has a node at the beginning

B A transverse wave cannot be reflected

C A transverse wave cannot be polarized

D Sound can form stationary waves

24 Coherent light is incident on two fine parallel slits, $\mathbf{S_1}$ and $\mathbf{S_2}$, as shown in the diagram.

If a bright fringe occurs at **P**, which of the following gives possible phase differences for the light waves arriving at **P** from $\mathbf{S_1}$ and $\mathbf{S_2}$?

A $\pi, 3\pi, 5\pi \ldots$

B $2\pi, 4\pi, 6\pi \ldots$

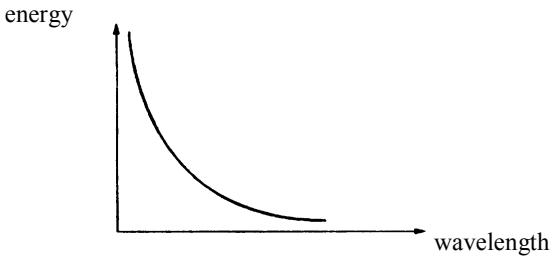
C $\pi, 2\pi, 3\pi \ldots$

D $\pi/2, 3\pi/2, 5\pi/2 \ldots$

25 Illuminated normally, a diffraction grating produces second-order bright images with an angle of 60^{o} between them. The light is monochromatic and has a wavelength 480 nm. The spacing of the grating in **mm** is

A 1.9×10^{-3} **B** 1.6×10^{-3} **C** 1.2×10^{-3} **D** 8×10^{-3}

26 The diagram shows the relationship between the energy of electromagnetic radiation and the wavelength of the waves.



Which of the following has the lowest energy?

A infrared

B microwaves

C ultra-violet

D X-rays

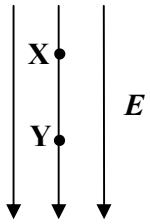
27 A charge of 3C experiences a force of 3000 N when it is moved in a uniform electric field, *E*. What is the potential difference between two points X and Y separated by a distance of 1 cm

A 0 V

B 10 V

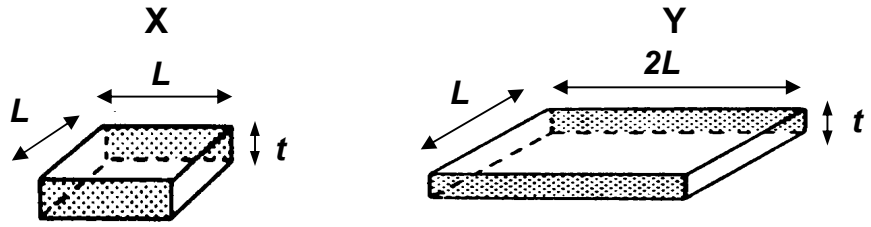
C 1000 V

D 9000 V



[Turn over

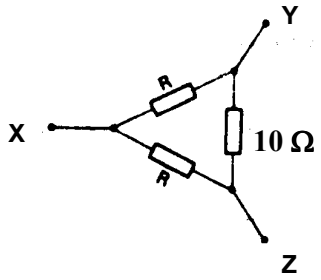
28 The diagram shows two squares, X and Y, cut from a sheet of metal of uniform thickness *t*. The dimensions of X and Y are shown in the diagram.



The resistances of the squares, R_X and R_Y, are measured between the opposite faces shaded in the diagram. What is the value of $\frac{R_X}{R_Y}$?

A 1 **B** 2 **C** 3 **D** 4

29 The diagram shows a network of three resistors. Two of these marked *R* are identical. The other one has a resistance of 10 Ω.



The resistance between **Y** and **Z** is found to be 5 Ω. What is the resistance between **X** and **Y**?

A 3.8 Ω **B** 5.8 Ω **C** 1.8 Ω **D** 7.6 Ω

30 A cell of e.m.f. *E* delivers a charge *Q* to an external circuit. Which statement is correct?

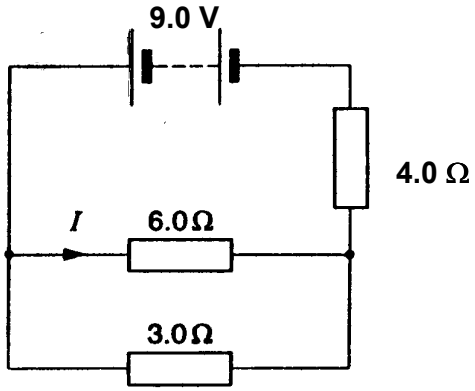
A The energy dissipation in the external circuit is *EQ*

B The energy dissipation within the cell is *EQ*

C The external resistance is *EQ*

D The total energy dissipation in the cell and the external circuit is *EQ*

31 The diagram shows a circuit in which the battery has negligible internal resistance.



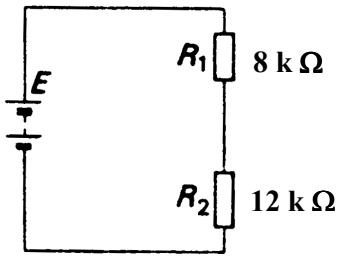
What is the value of the current I ?

A 0.5 A **B** 1.0 A **C** 1.5 A **D** 2.0 A

32 An electrical source with internal resistance r is used to operate a lamp of resistance R. What fraction of the total power is delivered to the lamp?

A $\frac{R}{R+r}$ **B** $\frac{R+r}{R}$ **C** $\frac{R}{r}$ **D** $\frac{r}{R}$

33 A battery of e.m.f. E and negligible internal resistance is connected to 2 resistors of resistances R_1 and R_2 as shown in the circuit diagram.



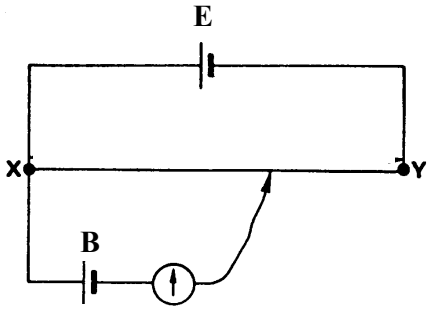
What is the potential difference across the resistor of resistance R_2?

A $\frac{3}{2}$E **B** $\frac{2}{3}$E **C** $\frac{3}{5}$E **D** $\frac{1}{2}$E

34 Each of Kirchhoff's law is linked to the conservation of a physical quantity. What physical quantity is assumed to be conserved in the formulation of Kirchhoff's first and second law?

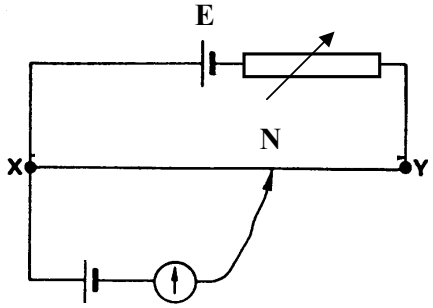
	Kirchhoff's first law	Kirchhoff's second law
A	energy	charge
B	energy	momentum
C	charge	energy
D	momentum	energy

35 In the circuit shown, cell E has a constant e.m.f. of 2.0 V and negligible internal resistance. Wire XY is 100 cm long and has a resistance of 4.0 Ω. Cell B has an e.m.f. of 1.5 V and an internal resistance of 10 Ω.
What is the balance length when a 1.0 Ω resistor is placed in series with cell B?



A 12.5 cm **B** 25.0 cm **C** 50.0 cm **D** 75.0 cm

36 In the potentiometer circuit below, the moveable contact is placed at N on the bare wire XY, such that the galvanometer shows zero deflection.

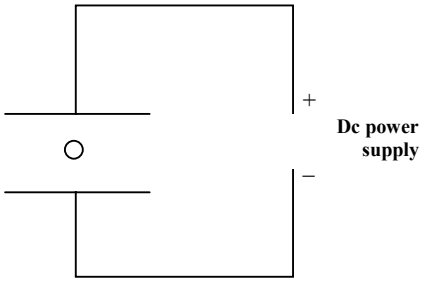


The resistance of the variable resistor is now decreased.

What is the effect of this decrease on the potential difference across the wire XY and on the position of the moveable contact for zero deflection?

	Potential difference across XY	Position of moveable contact
A	increases	nearer to X
B	increases	nearer to Y
C	decreases	nearer to X
D	decreases	nearer to Y

37 A negatively charged particle is held stationary between two horizontal charged conducting plates, as shown in the diagram below.
Which of the following changes would cause the particle to move downwards?



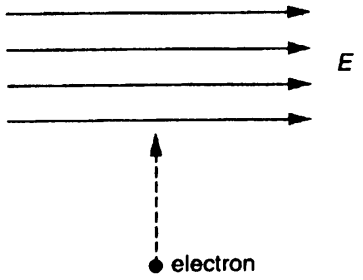
A Increase the electric field strength

B Increase the charge on the particle

C Decrease the mass of the particle

D Decrease the electric field strength

38 An electron ion is projected at right angles to a uniform electric field *E*.



In the absence of other fields, in which direction is the electron deflected?

A to the right

B to the left

C into the plane of the paper

D out of the plane of the paper

39 Which is the most **incorrect** statement concerning radiation from radioactive materials?

A Alpha-particles have positive charge

B Gamma rays are slightly defected by a magnetic field

C Beta- particles can penetrates a very thin piece of paper

D An electric field can deflect alpha- and beta- particles.

40 As a result of successive decays in a radioactive series, the nucleon number of an isotope decreases by 4 while its proton number is unchanged. How many alpha particles and beta-particles are emitted?

	alpha	beta
A	1	2
B	1	4
C	2	1
D	2	2