Unit 9: Electricity:

Subunit 9.3: Resistance and resistivity:

Topical Question No: 1

32 Which **measurements** are taken in order to calculate the resistivity of the metal of a piece of wire?

A p.d., current, area, length

B p.d., current, diameter, length

C resistance, area, length

D resistance, length, radius

Topical Question No: 2

34 A coil contains N turns of insulated copper wire wound on to a cylindrical iron core of diameter D. The copper wire has a diameter d. The resistivity of copper is ρ. Diameter D is much greater than diameter d.

What is the total resistance between the two ends of the coil?

A $\frac{4N\rho D}{d^2}$ **B** $\frac{4N\rho d}{D^2}$ **C** $\frac{8N\rho D}{d^2}$ **D** $\frac{8N\rho d}{D^2}$

Topical Question No: 3

34 A wire of resistance $9.55\,\Omega$ has a diameter of $0.280\,\text{mm}$.

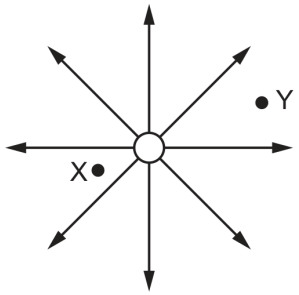
It is made of metal of resistivity $4.90 \times 10^{-7}\,\Omega\,\text{m}$.

What is the length of the wire?

A 1.20 m **B** 4.80 m **C** 19.0 m **D** 76.8 m

Topical Question No: 4

31 The diagram shows the electric field near a point charge and two electrons X and Y.

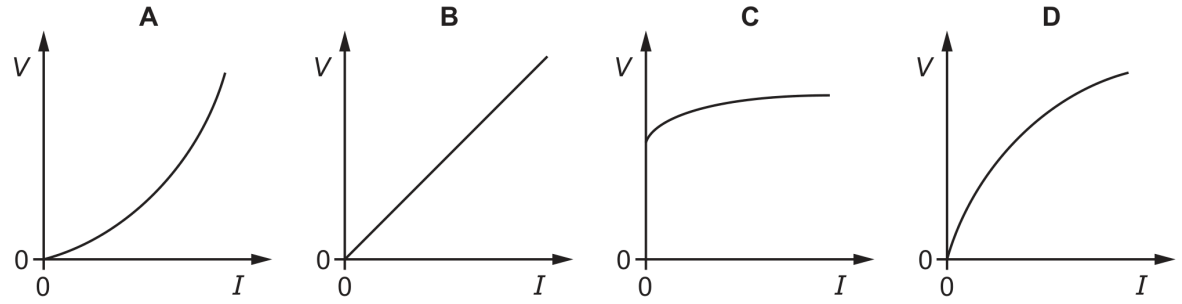


Which row describes the forces acting on X and on Y?

	direction of force	magnitude of force on X
A	radially inwards	less than force on Y
B	radially inwards	greater than force on Y
C	radially outwards	less than force on Y
D	radially outwards	greater than force on Y

Topical Question No: 5

34 Which graph shows the variation with current I of the potential difference V of a filament lamp?



Topical Question No: 6

35 A wire of cross-sectional area $5.0 \times 10^{-6}\,m^2$ is made of a metal of resistivity $50 \times 10^{-8}\,\Omega m$.

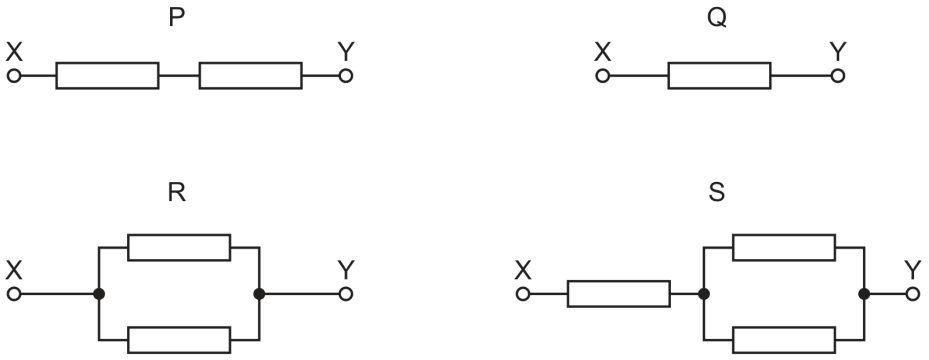
The potential difference across the wire is 6.0 V and the current is 3.0 A.

What is the length of the wire?

A 0.050 m **B** 0.20 m **C** 5.0 m **D** 20 m

Topical Question No: 7

37 Identical resistors are connected in four combinations P, Q, R and S between terminals X and Y.



What is the order of decreasing combined resistance between X and Y (largest first)?

A P → S → Q → R

B P → S → R → Q

C Q → R → S → P

D S → P → Q → R

Topical Question No: 8

34 A manufacturer recommends that the longer the extension cord you use with an electric drill, the bigger the cross-sectional area of the cord should be.

What is a reason for this recommendation?

A Resistance is inversely proportional to both the length and the cross-sectional area.

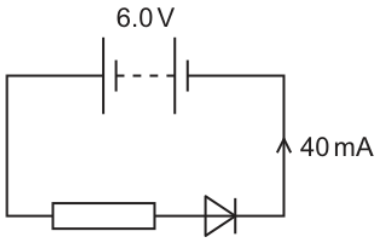
B Resistance is inversely proportional to the length and directly proportional to the cross-sectional area.

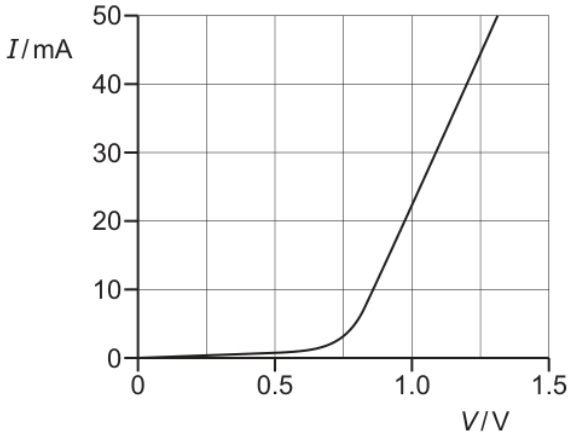
C Resistance is proportional to both the length and the cross-sectional area.

D Resistance is proportional to the length and inversely proportional to the cross-sectional area.

Topical Question No: 9

34 A fixed resistor and a diode are connected in series to a battery of electromotive force (e.m.f.) 6.0 V and negligible internal resistance. The graph shows the variation with potential difference (p.d.) V of the current I for the diode.





The current in the diode is 40 mA.

What is the resistance of the fixed resistor?

A 30 Ω **B** 120 Ω **C** 150 Ω **D** 180 Ω

Topical Question No: 10

30 The resistance of a thermistor depends on its temperature, and the resistance of a light-dependent resistor (LDR) depends on the illumination.

Under which conditions will the resistance of both a thermistor and an LDR be highest?

	thermistor	LDR
A	highest temperature	highest illumination
B	highest temperature	lowest illumination
C	lowest temperature	highest illumination
D	lowest temperature	lowest illumination

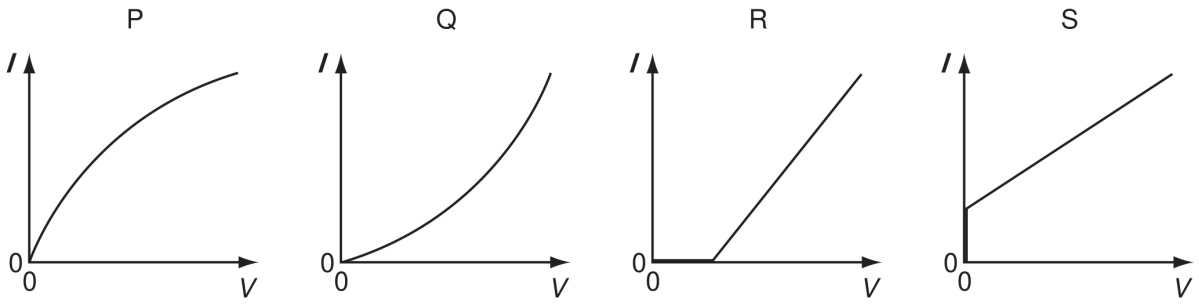
Topical Question No: 11

36 What is the unit of resistivity?

A Ωm^{-2} **B** Ωm^{-1} **C** Ω **D** Ωm

Topical Question No: 12

33 The graphs show possible current-voltage (I-V) relationships for a filament lamp and for a semiconductor diode.



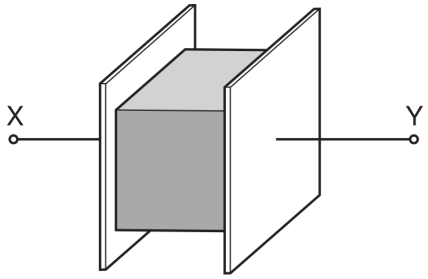
Which row best specifies the correct I-V graphs for the lamp and the diode?

	filament lamp	semiconductor diode
A	P	R
B	P	S
C	Q	R
D	Q	S

Space for working

Topical Question No: 13

34 The resistance of a metal cube is measured by placing it between two parallel plates, as shown.



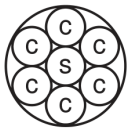
The cube has volume V and is made of a material with resistivity ρ. The connections to the cube have negligible resistance.

Which expression gives the electrical resistance of the metal cube between X and Y?

A $\rho V^{\frac{1}{3}}$ **B** $\rho V^{\frac{2}{3}}$ **C** $\frac{\rho}{V^{\frac{1}{3}}}$ **D** $\frac{\rho}{V^{\frac{2}{3}}}$

Topical Question No: 14

34 An electric power cable consists of six copper wires c surrounding a steel core s.



A length of 1.0 km of one of the copper wires has a resistance of 10 Ω and 1.0 km of the steel core has a resistance of 100 Ω.

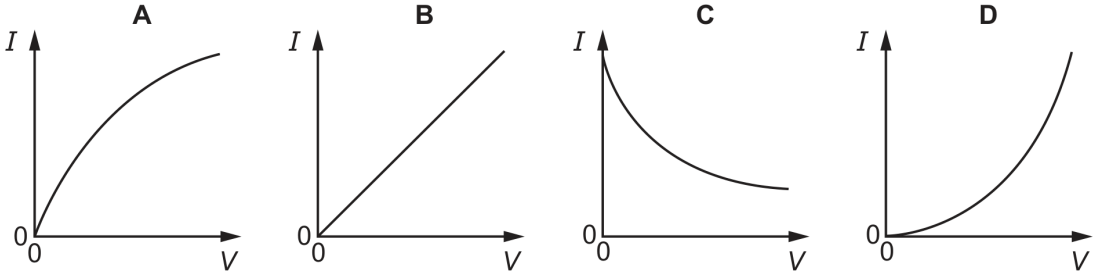
What is the approximate resistance of a 1.0 km length of the power cable?

A 0.61 Ω **B** 1.6 Ω **C** 160 Ω **D** 610 Ω

Topical Question No: 15

32 The potential difference V across a filament lamp is slowly raised from zero to its normal operating value.

Which graph represents the variation with V of the current I in the lamp?



Topical Question No: 16

34 Which equation is used to define resistance?

A energy = (current)^2 × resistance × time

B potential difference = current × resistance

C power = (current)^2 × resistance

D resistivity = resistance × area ÷ length

Topical Question No: 17

32 Which expression gives the definition of resistance?

A current divided by potential difference

B current multiplied by potential difference

C potential difference divided by current

D resistivity multiplied by length

Topical Question No: 18

33 A cylindrical wire of length 10 m and diameter 2.0 mm has a resistance of 0.050 Ω.

From which material is the wire made?

	material	resistivity / Ω m
A	bronze	1.6×10^{-7}
B	nichrome	1.6×10^{-6}
C	silver	1.6×10^{-8}
D	zinc	6.3×10^{-8}

Topical Question No: 19

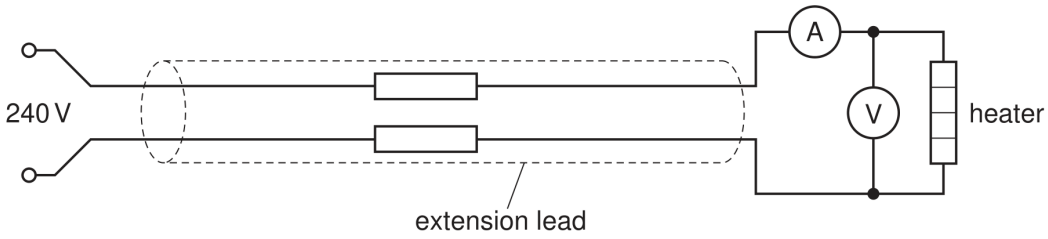
33 A metal wire of length 0.50 m has a resistance of 12 Ω.

What is the resistance of a wire of length 2.0 m and made of the same material, but with half the diameter?

A 12 Ω **B** 48 Ω **C** 96 Ω **D** 192 Ω

Topical Question No: 20

36 An extension lead is used to connect a 240 V electrical supply to a heater as shown.



A voltmeter measures the potential difference (p.d.) across the heater as 216 V and an ammeter measures the current through the heater as 7.7 A.

What is the total resistance of the extension lead?

A 3.1 Ω **B** 6.2 Ω **C** 28 Ω **D** 31 Ω

Space for working

Answer Key

1. N/A
2. N/A
3. N/A
4. N/A
5. N/A
6. N/A
7. N/A
8. D
9. B
10. N/A
11. N/A
12. N/A
13. N/A
14. N/A
15. N/A
16. N/A
17. C
18. N/A
19. N/A
20. N/A