

APOLLO

Current and circuits

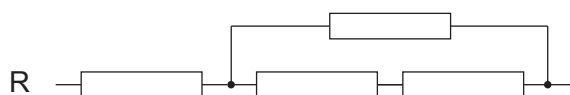
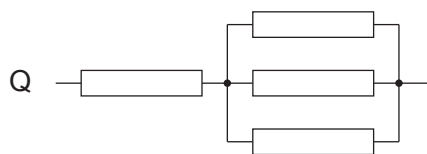
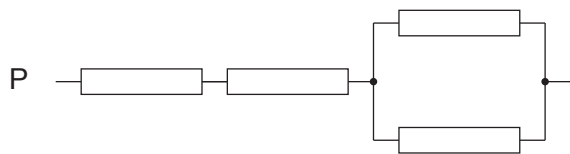
HL

Physics

First assessment 2025

11 questions | questions

14. Three combinations of resistors are shown. The resistors are identical.



What is the total resistance of each combination of resistors in order of **increasing** resistance?

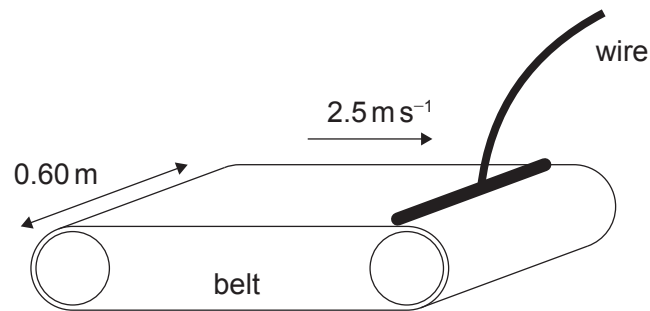
- A. P Q R
- B. Q P R
- C. P R Q
- D. Q R P

— 3 —

4425-0101

15. A continuous belt of width 0.60 m travels at a constant speed of 2.5 m s^{-1} . The belt has a uniform distribution of charge of 5.0 mC m^{-2} on its surface.

As the belt passes a point all the charge is removed and is carried as a current in a wire.

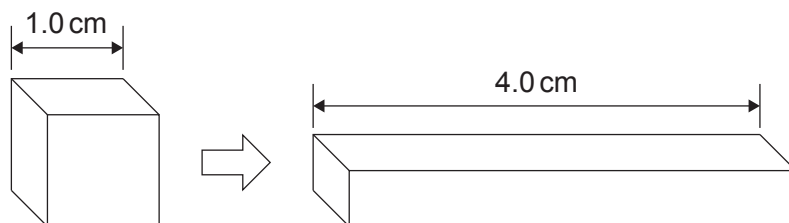


What is the current in the wire?

- A. 1.2 mA
- B. 7.5 mA
- C. 19 mA
- D. 21 mA

16. A cube of side 1.0 cm has a resistance between opposite sides of $50\,\Omega$.

The material is reshaped into a block of length 4.0 cm and constant square cross-section.



What is the resistance of the block between its square ends?

- A. $3.1\,\Omega$
- B. $50\,\Omega$
- C. $800\,\Omega$
- D. $3200\,\Omega$

13. A wire of length L is used in an electric heater. When the potential difference across the wire is 200 V, the power transferred in the wire is 500 W. A second wire is made from the same metal and has the same cross-sectional area. When a potential difference of 400 V is applied across the second wire, the power transferred is 2000 W.

What is the length of the second wire?

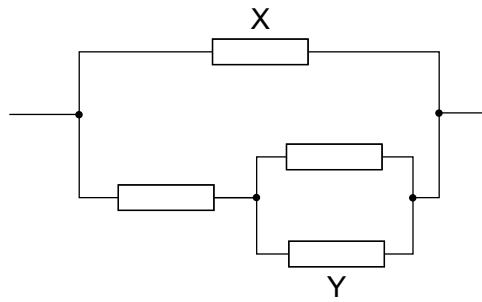
- A. $\frac{L}{4}$
- B. $\frac{L}{2}$
- C. L
- D. $2L$

— 5 —

Turn over

2225-0113

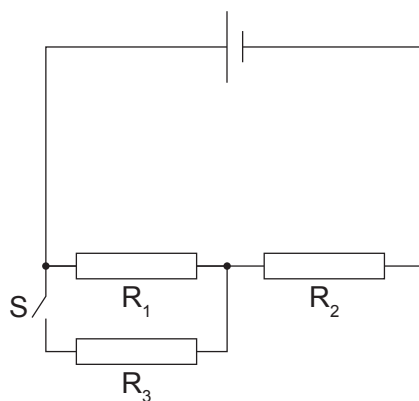
14. Four identical resistors are connected as shown.



What is $\frac{\text{current in X}}{\text{current in Y}}$?

- A. $\frac{1}{2}$
- B. $\frac{2}{3}$
- C. $\frac{3}{2}$
- D. 3

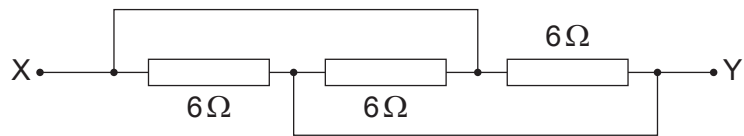
17. Three identical resistors, R_1 , R_2 and R_3 , each of resistance $2\,\Omega$, are connected to a cell of negligible internal resistance as shown. When switch S is open, the power dissipated by R_1 is $18\,\text{W}$.



What is the power dissipated by R_1 when S is closed?

- A. $8\,\text{W}$
- B. $16\,\text{W}$
- C. $18\,\text{W}$
- D. $36\,\text{W}$

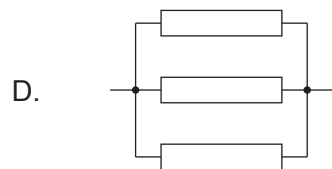
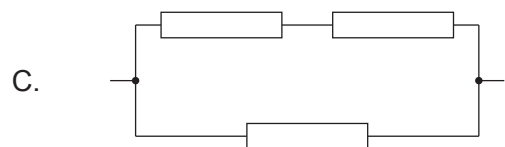
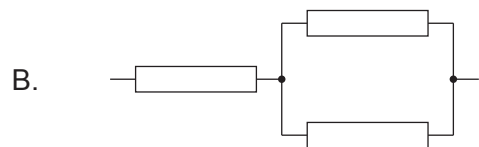
18. Three identical resistors of 6Ω are arranged as shown.



What is the resistance between X and Y?

- A. 2Ω
- B. 4Ω
- C. 9Ω
- D. 18Ω

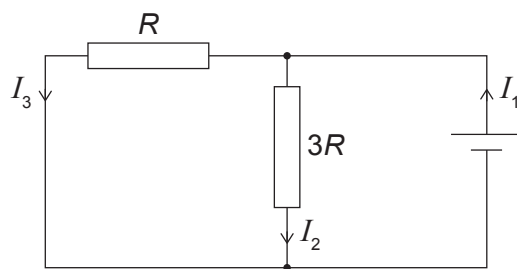
- 16.** Three identical resistors are arranged in four different networks. The same potential difference is applied across each network. Which network dissipates the greatest electrical power?



— 11 —

0020-0107

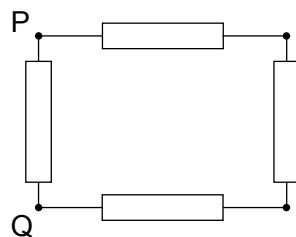
17. In the circuit shown, the cell has negligible internal resistance.



Which equation is correct?

- A. $I_1 = 4(I_2 + I_3)$
- B. $I_1 = 4I_2$
- C. $I_3 = 4I_2$
- D. $I_3 = \frac{4I_1}{3}$

15. Four identical resistors, each of resistance R , are connected as shown.



What is the effective resistance between P and Q?

- A. $\frac{3R}{4}$
- B. R
- C. $\frac{4R}{3}$
- D. $4R$

— 10 —

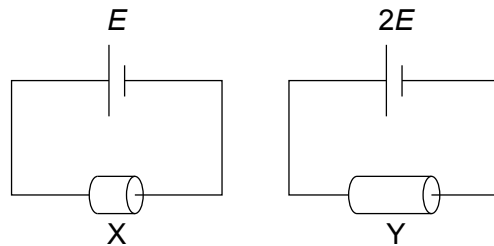
Turn over
0000-0001

- 16.** Conductor X is connected to a cell of emf E . A power of 16 W is dissipated in X.

Conductor Y is made from the same material with the same diameter as X but is twice as long. A cell of emf $2E$ is connected to Y.

Both cells have negligible internal resistance.

What power is dissipated in Y?



- A. 8.0 W
- B. 16 W
- C. 32 W
- D. 64 W