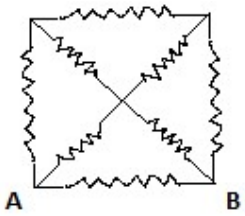
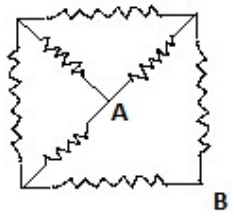
Multiple choice questions with one correct alternative

1. 

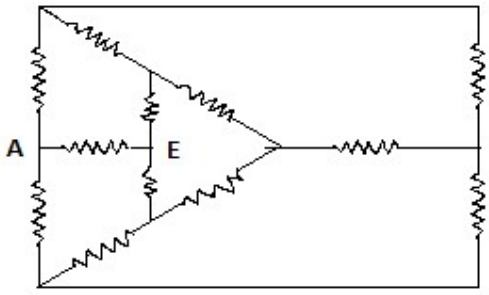
Equivalent resistance between A and B is

*(A) $\frac{8r}{15}$ (B) $\frac{7r}{15}$ (C) $\frac{15r}{8}$ (D) $\frac{15r}{7}$

2. 

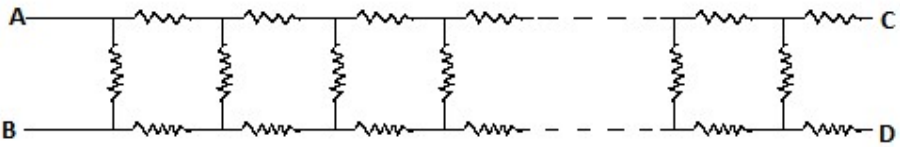
Equivalent resistance between A and B is

(A) $\frac{8r}{7}$ *(B) $\frac{7r}{8}$ (C) $\frac{3r}{4}$ (D) r

3. 

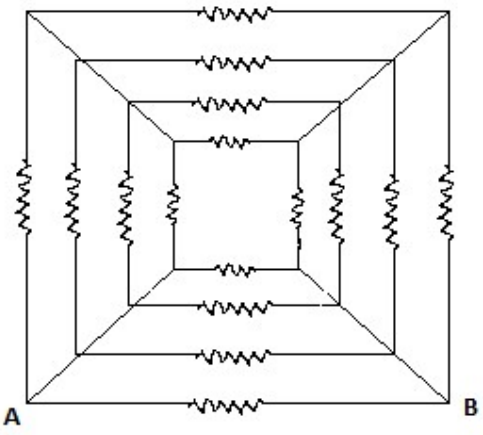
Equivalent resistance between A and E is

*(A) $\frac{7r}{12}$ (B) $\frac{7r}{13}$ (C) $\frac{7r}{15}$ (D) $\frac{8r}{13}$

4. 

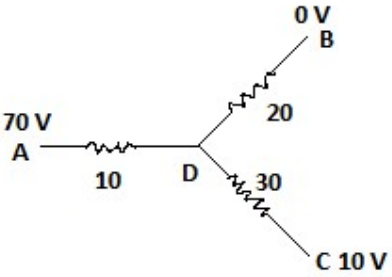
Find the value of the resistor to be connected between C and D so that the resistance of the entire network between A and B becomes independent of the number of elementary sets.

(A) R (B) $R\left(\sqrt{3}-1\right)$ (C) 3R (D) $R\left(\sqrt{3}+1\right)$

5. 

Sixteen resistors each of 16 Ω are connected as shown. The effective resistance between A and B in ohm is

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

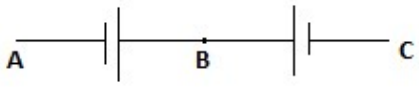
6. 

(A) V_D = 40 volt

(B) The currents in AD, DB and DC are in the ratio 3: 2: 1

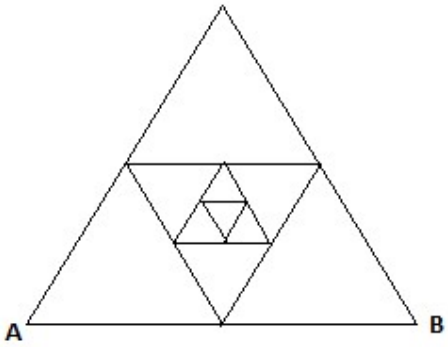
(C) The currents in AD, DB and DC are in the ratio 1: 2: 3

(D) The network draws a total power of 200 W

7. 

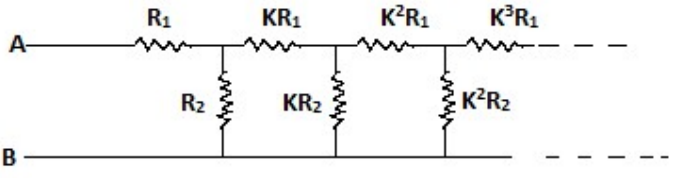
A potentiometer is connected between A and B and a balance is obtained at 64 cm. When the potentiometer lead is moved from B to C, the balance is found at 8 cm. If the potentiometer is now connected between B and C, balance will be found at

(A) 8 cm (B) 56 cm (C) 64 cm (D) 72 cm



8. Find the equivalent resistance between A and B for the frame made of thin wire assuming that the number of embedded equilateral triangles with sides decreasing to half tends to infinity. Side AB has a length equal to 2 m and resistance per unit length of the wire is $\left(\sqrt{7}+1\right)$.

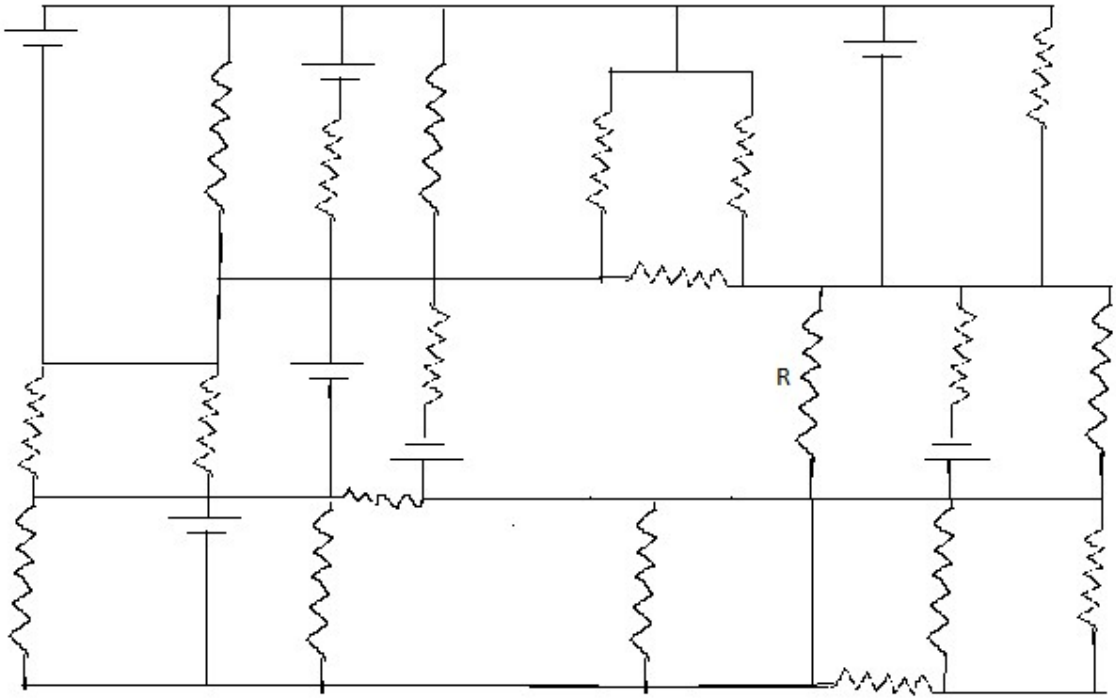
Ans: 4



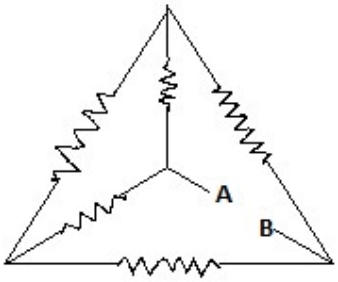
9. The diagram has infinite number of elements each having two resistors. The resistors in each subsequent element differs by a factor K = ½ from the resistors of the previous elements. The equivalent resistance between A and B is

(A) $\frac{R_1 - R_2}{2}$ (B) $\frac{R_1 - R_2 + \sqrt{6R_1R_2}}{2}$

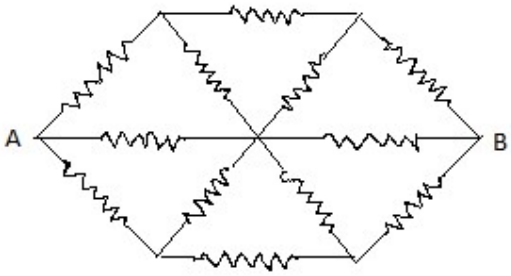
*(C) $\frac{R_1 - R_2 + \sqrt{R_1^{\,2} + R_2^{\,2}\,6R_1R_2}}{2}$ (D) None

10. 

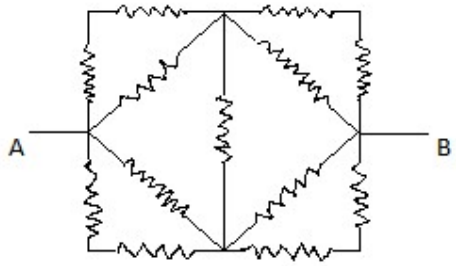
All the resistances in the above resistance-monster maze are of 4 ohms and the batteries (ideal) have an e.m.f of 4 V. What is the current through the resistor R?

11. 

If all the resistances are R, find the equivalent resistance between A and B.

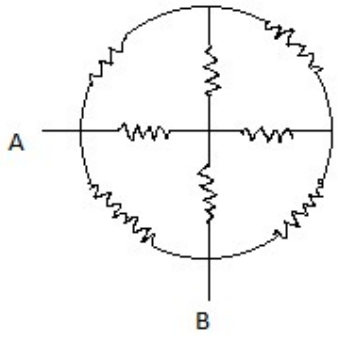


12. All the resistances shown are R ohm each. Find the equivalent resistance between A and B.



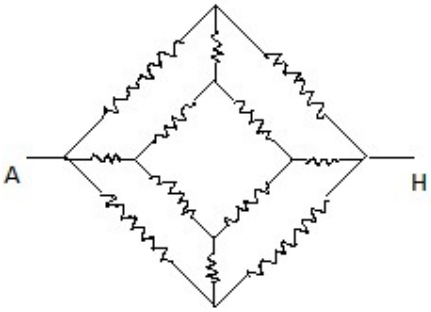
13. Thirteen resistors each of resistance R are connected as shown. Equivalent resistance between A and B is

(a) 2R (b) 4R/3 (c) 2R/3 (d) R



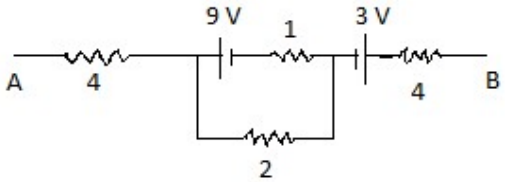
14. Eight resistances each of 5 ohms are connected as shown. Equivalent resistance between A and B is

(a) 8/3 (b) 16/3 (c) 15/7 (d) 19/2



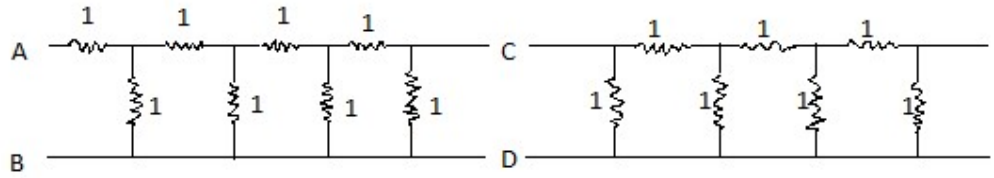
15. Twelve resistors each of resistance 1 ohm are connected as shown. Net resistance between A and H is

(a) 5/3 (b) 1 (c) 3/4 (d) 7/6



16. In the circuit shown potential difference between A and B is 16 V. The current passing through the 2 ohm resistance is

(a) 2.5 A (b) 3.5 A (c) 4 A (d) zero



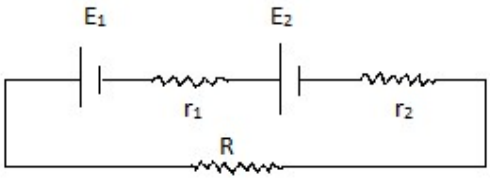
17. In the two circuits shown

(a) $R_{AB} = R_{CD} = (\sqrt{3} + 2)$ (b) $R_{AB} = \sqrt{3} + 1$

(c) $R_{CD} = \sqrt{5} + 1$ (d) $R_{AB} > R_{CD}$

18. The length of the potentiometer wire is L. A cell of e.m.f E is balanced at a length L/3 from the positive end of the wire. If the length of the wire is increased by L/2, at what distance will the same cell give the balance point?

(a) 2L/3 (b) L/2 (c) L/6 (d) 4L/3



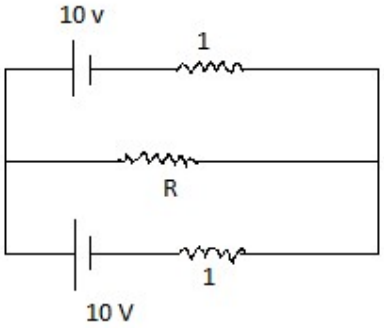
19. Under what conditions, current passing through R can be increased by short circuiting the battery of e.m.f E_2. The internal resistance of the two batteries are r_1 and r_2 respectively.

(a) $E_2r_1 > E_1(R + r_2)$ (b) $E_1r_2 < E_2(R + r_1)$

(c) $E_2r_2 < E_1(R + r_2)$ (d) $E_1r_1 > E_2(R + r_1)$

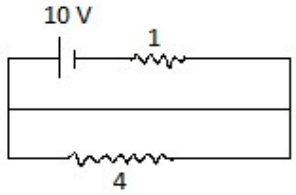
20. A cell develops the same power across two resistances R_1 and R_2 separately. The internal resistance of the cell is

(a) $R_1 + R_2$ (b) $(R_1 + R_2)/2$ (c) $\sqrt{(R_1R_2)}$ (d) $\sqrt{(R_1R_2)}/2$



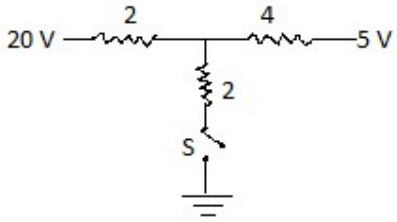
21. Maximum power developed across resistance R in the circuit shown is (use $E = \dfrac{\sum \frac{E}{r}}{\sum \frac{1}{r}}$ and r = R)

(a) 50 W (b) 75 W (c) 25 W (d) 100 W



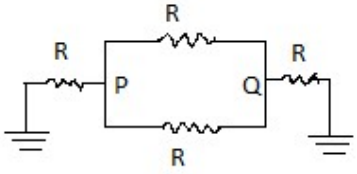
22. Potential difference across the terminals of the battery is (1 ohm is the internal resistance of the battery)

(a) 8 V (b) 10 V (c) 6 V (d) zero



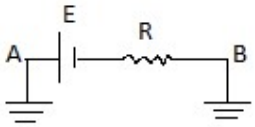
23. As the switch S is closed, what current passes through it?

(a) 4.5 A (b) 6 A (c) 3 A (d) 0



24. What is the net resistance between P and Q?

(a) R/2 (b) 2R/5 (c) 3R/5 (d) R/3



25. Select the correct alternatives.

(a) Potential difference across A and B is zero

(b) Potential difference across A and B is E

(c) Current across AB is zero

(d) Current across AB is E/R