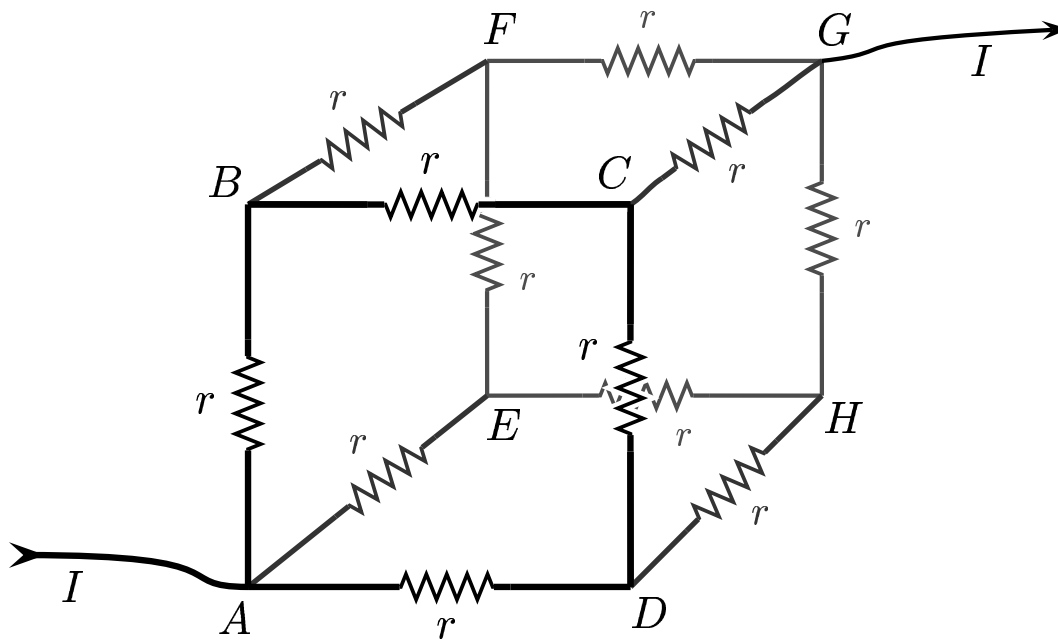


Given: A cubic network has identical resistors, each with a resistance  $r$ . A current  $I$  enters the network at  $A$  and leaves at  $G$ .



Find the network resistance  $r_{total}$  in terms an individual resistor  $r$ .

A)  $r_{total} = \frac{2r}{3}$

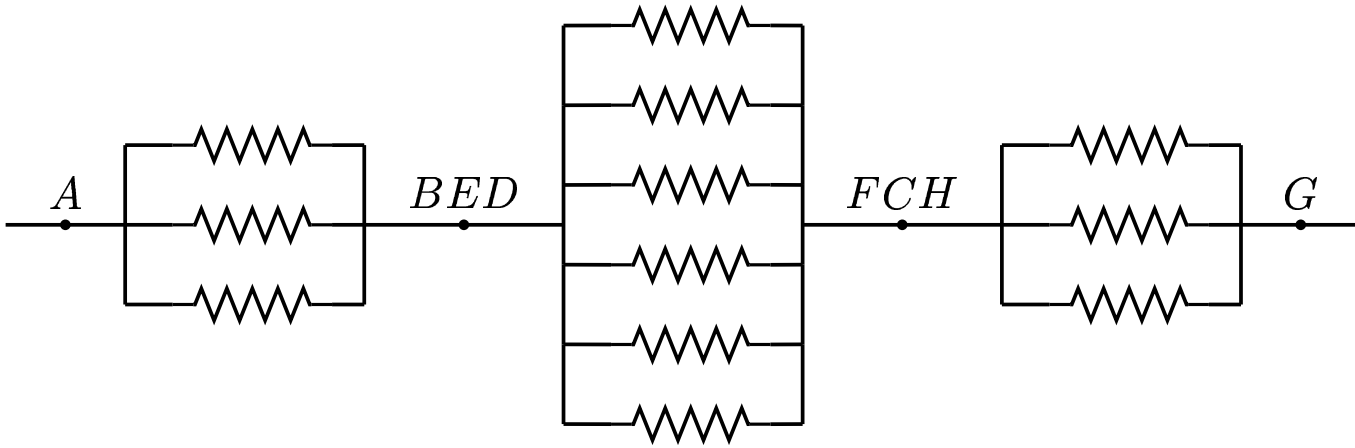
B)  $r_{total} = r$

C)  $r_{total} = 2r$

D)  $r_{total} = \frac{4r}{3}$

E)  $r_{total} = \frac{5r}{6}$

By symmetry, at  $A$ ,  $I$  is equally divided into 3 equal branches and the potential at the junctions  $B$ ,  $E$ , and  $D$  are the same, the these points can be joined together without changing the network resistance  $r_{total}$ . The same is true at the junctions  $F$ ,  $C$ , and  $H$ . The redrawn network is shown below.



Answer **E**. 
$$r_{total} = \frac{1r}{3} + \frac{1r}{6} + \frac{1r}{3} = \frac{5r}{6}.$$

28.03-05 A Cubic Network 2004-10-22