

Answer on question # 55600, Physics / Electromagnetism

Question A circuit flows in a wire of cross section with the free electron traveling with a mean drift velocity v . If an equal current flows in a wire of the same material of twice the radius, what is the mean drift velocity?

$v/4$

$v/2$

$2v$

$4v$

Solution Current is related to mean drift velocity v and cross section area A as

$$I = nAvQ = n\pi r^2 vQ$$

where n is number of electrons and Q is charge of electron. So if you want twice the radius and keep the current the same, you have to decrease mean velocity in 4 times. Answer is $v/4$.