

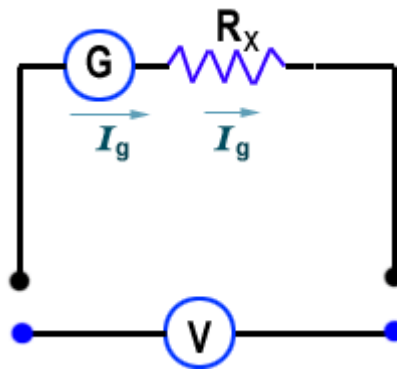
## Answer on Question 51502, Physics, Electromagnetism

### Question:

A galvanometer with coil resistance  $12\Omega$  shows full scale deflection for a current of  $2.5mA$ . How would you convert it into a voltmeter of range 0 to  $10.0V$ ?

### Solution:

In order to convert a galvanometer into voltmeter, a very high resistance is connected in series with galvanometer as we can see in the scheme below:



Let the resistance of galvanometer be  $R_g$  and high resistance  $R_x$  is connected in series to it. Then combined resistance will be  $(R_g + R_x)$ . Therefore, from the Ohm's law we can write the potential between the points to be measured:

$$V = I_g(R_g + R_x).$$

From this formula, we can find the high resistance  $R_x$ :

$$V = I_g R_g + I_g R_x,$$

$$I_g R_x = V - I_g R_g,$$

$$R_x = \frac{V}{I_g} - R_g = \frac{10V}{2.5 \cdot 10^{-3}A} - 12\Omega = 3988\Omega$$

### Answer:

$3988\Omega$  in series.