C5 Potential Dividers

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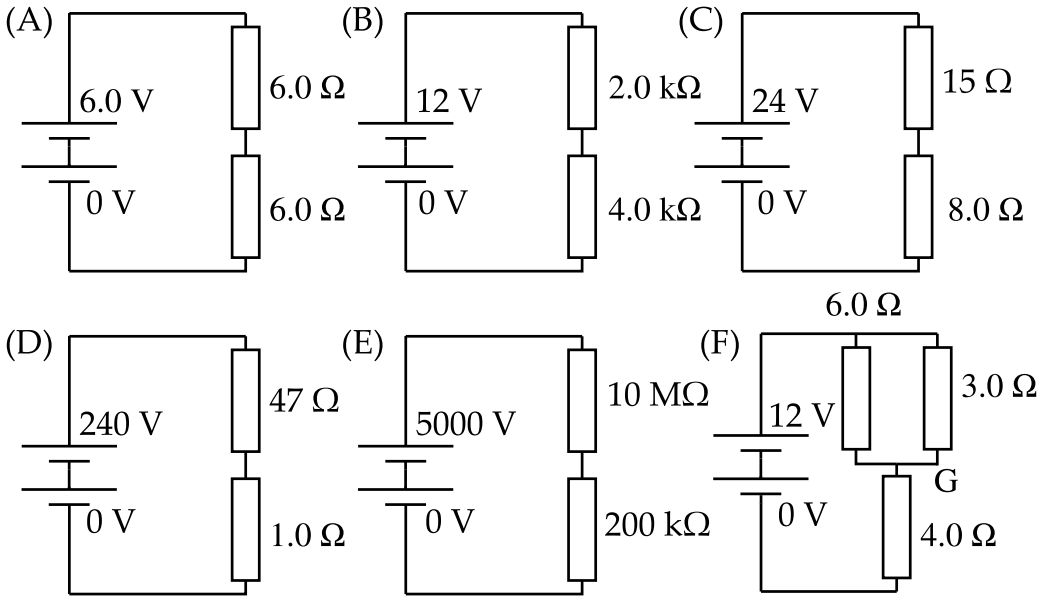

C5.1 What is the voltage across the bottom resistor in circuit (A)?

C5.2 In circuit (B):

a) What is the voltage across the bottom resistor?

b) What would the potential of the point between the resistors be if the 2.0 kΩ resistor were removed, leaving a gap in its place?

c) What would the potential of the point between the resistors be if the 4.0 kΩ resistor were removed, leaving a gap in its place?

d) What would the potential of the point between the resistors be if the 2.0 kΩ resistor were removed and a wire was attached in its place to complete the circuit?

e) A voltmeter with resistance 10 kΩ is used to measure the voltage across the 4.0 kΩ resistor. What would it read?

C5.3 What is the voltage across the bottom resistor in circuit (C)?

C5.4 What is the voltage across the bottom resistor in circuit (D)?

C5.5 What is the voltage across the bottom resistor in circuit (E)?

C5.6 What is the potential at G, the junction between the two resistors in parallel and the one in series, in circuit (F)?

C5.7 The $8.0\ \Omega$ resistance in circuit (C) is a loudspeaker (the battery represents the amplifier). The other resistor is replaced with a variable resistor which can take all values between $0\ \Omega$ and $30\ \Omega$, and is used as a volume control. This volume control changes the voltage across the speaker. What is the range of speaker voltages which are possible? (Give the minimum and maximum.)

C5.8 A thermistor has a resistance of $800\,\Omega$ at a temperature of $16\,^{\circ}$C. It is wired in series with a fixed resistor and a 9.0 V battery. A high-resistance voltmeter is connected to give a 'temperature' reading.

a) If the voltage reading is to go up when the temperature increases, should the voltmeter be connected in parallel with the thermistor or the fixed resistor?

b) If the voltmeter needs to read 3.0 V when the temperature is $16\,^{\circ}$C, what is the resistance of the fixed resistor?