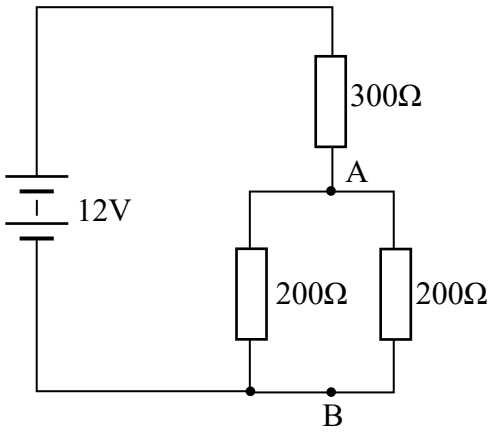
# Potential Dividers

1. Three resistors are connected to a 12V battery as shown.



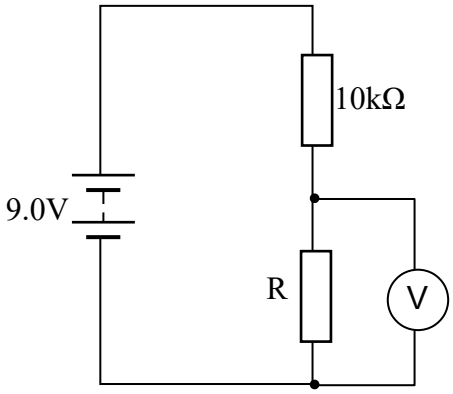

   (a) What is the equivalent resistance of the two 200Ω resistors in parallel?

   (b) What is the voltage between A and B?

   (c) What is the voltage across the 300Ω resistor?

   *(100Ω, 3V, 9V)*

2. The voltmeter in this circuit reads 6.2V.

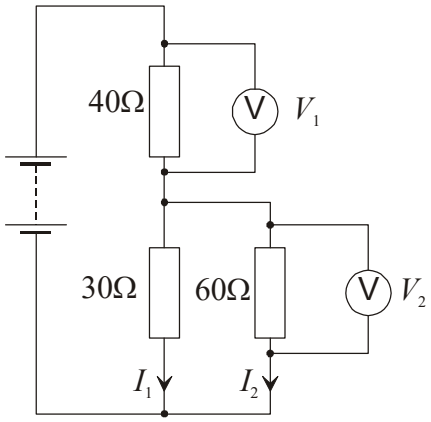



   (a) What is the voltage across the 10kΩ resistor?

   (b) What is the resistance of the resistor R?

   *(2.8V, 22kΩ)*

3. In this circuit, what is the ratio of:

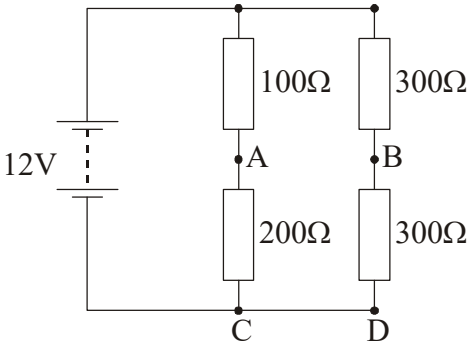



   (a) $\frac{I_1}{I_2}$

   (b) $\frac{V_1}{V_2}$

   *(2, 2)*

4.



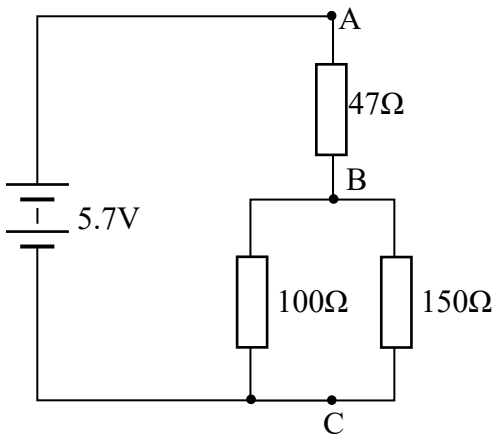

   (a) What is the voltage between A & C?

   (b) What is the voltage between B & D?

   (c) What would a voltmeter read if connected between A & B?

   *(8V, 6V, 2V)*

5. Three resistors, of resistance 47Ω, 100Ω and 150Ω are connected to a battery as shown. A voltmeter connected across the battery reads 5.7V.



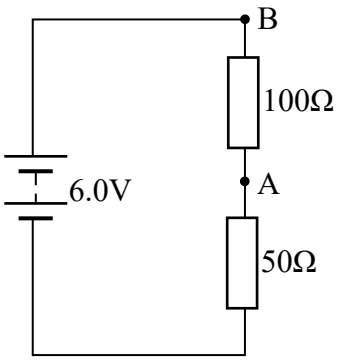

Calculate

(a) the resistance of the circuit between B and C. *(60Ω)*

(b) the voltage between A & B and between B & C. *(2.5V, 3.2V)*

(c) the current through the 47Ω resistor, the 100Ω resistor and the 150Ω resistor. *(53mA, 32mA, 21mA)*

6. A series circuit is connected as shown in the diagram.



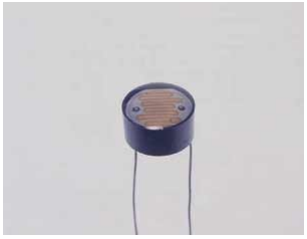

(a) What is the potential difference between A and B?

(b) An additional resistor of 100Ω is connected between the 50Ω resistor and the cells. What is the voltage between A and B now?

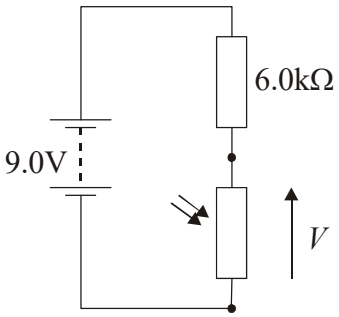
(c) The additional 100 Ω resistor is now connected in parallel with the first 100Ω resistor. What is the voltage between A and B now?

*(4V, 2.4V, 3V)*

7. The resistance of a light dependent resistor (LDR) decreases as the light intensity increases.



An LDR is connected in series with a 6.0kΩ resistor as part of a light level sensor circuit.




(a) What is the output voltage *V*, when the resistance of the LDR is
   (i) 6.0kΩ (in the dark)
   (ii) 3.0kΩ
   (iii) 2.0kΩ (in the light)

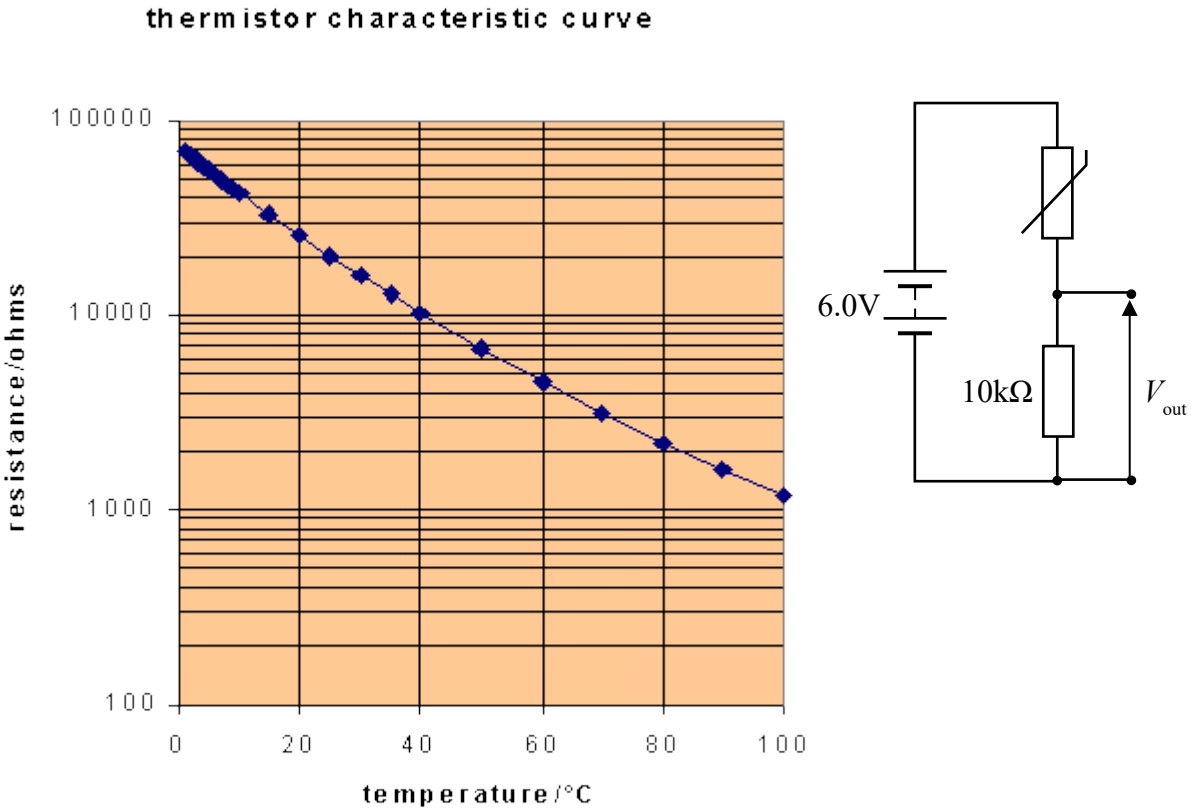
*(4.5V, 3.0V, 2.25V)*

(b) How would you alter the circuit so that the output *V* increases with increasing light level?

8. A catalogue states that, when a particular light emitting diode (LED) is used with a 5V supply, a 270Ω resistor must be connected in series to limit the current to 10mA.
Calculate:
   (i) the voltage across the resistor,
   (ii) the voltage across the LED,
   (iii) the resistance of the LED in these conditions.

*(2.7V, 2.3V, 230Ω)*

9. The resistance of a **thermistor** changes with temperature. The graph shows the characteristic of a thermistor.
(Note that the resistance scale is not linear – it is **logarithmic**.)




This thermistor is used with a 10kΩ resistor in a temperature sensor, in the circuit shown.
Calculate the output voltage $V_{out}$ at:
   (i) 40°C,
   (ii) 80°C.

*(3.0V, 5.9V)*