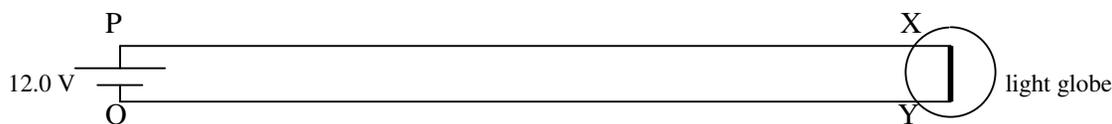


Short circuit worksheet

Question 1 A light globe is connected to a 12.0 V battery. Each connection wire has a resistance of 0.050Ω . The internal resistance of the battery is 0.10Ω . The current around the circuit is 0.20 A .

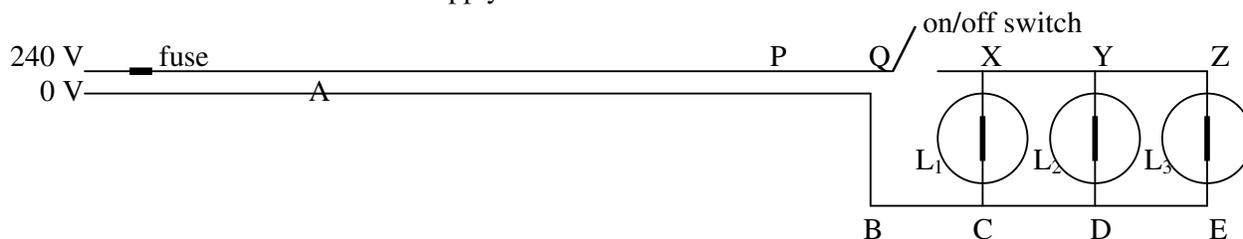


- Determine the drop in voltage from (i) P to X, and (ii) from Y to Q.
- What is the difference in potential between X and Y?

Now a short occurs across X and Y.

- Write down the value of V_{XY} .
- Determine the current in the battery.
- Determine the value of V_{PQ} .

Question 2 The following diagram shows a lighting circuit consisting of three lights L_1 , L_2 , L_3 and an on/off switch connected to the mains supply.



Initially the switch is off.

- Write down the potential at points P, Q, X, Y, Z, A, B, C, D and E.
- Determine the values of V_{PA} , V_{PQ} , V_{QX} , V_{PD} and V_{AE} .

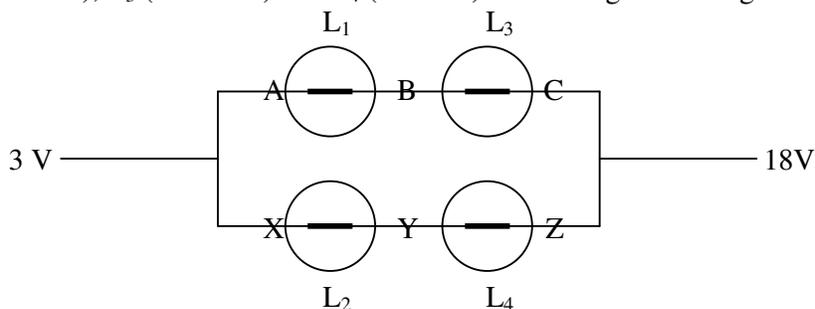
Now the switch is on.

- Write down the potential at points P, Q, X, Y, Z, A, B, C, D and E.
- Determine the values of V_{PA} , V_{PQ} , V_{QX} , V_{PD} and V_{AE} .

Now light L_2 is shorted while the switch is on.

- What is the meaning of 'light L_2 is shorted'?
- Describe and explain the effect of the short on the lighting circuit.
- Write down the potential at points P, Q, X, Y, Z, A, B, C, D and E.

Question 3 The following diagram shows a part of a larger circuit. This part consists of four ohmic lights, L_1 ($40\text{W}12\text{V}$), L_2 ($20\text{W}12\text{V}$), L_3 ($10\text{W}12\text{V}$) and L_4 ($5\text{W}12\text{V}$). The rating of each light is shown in brackets.



- Determine the resistance of each light.
- Which light is the brightest?
- If a short occurs between B and Y only, describe and explain the effects on the lights.
- If a short occurs between B and C only, describe and explain the effects on the lights.
- If a short occurs between A and Y only, describe and explain the effects on the lights.