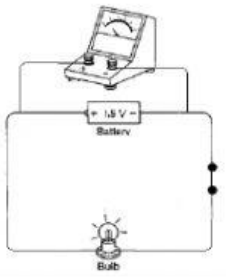
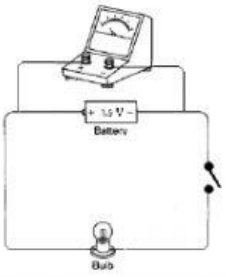
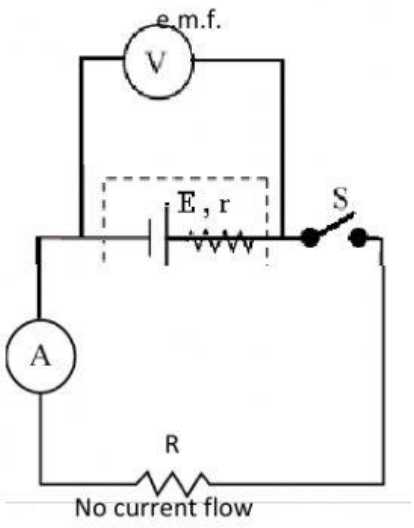
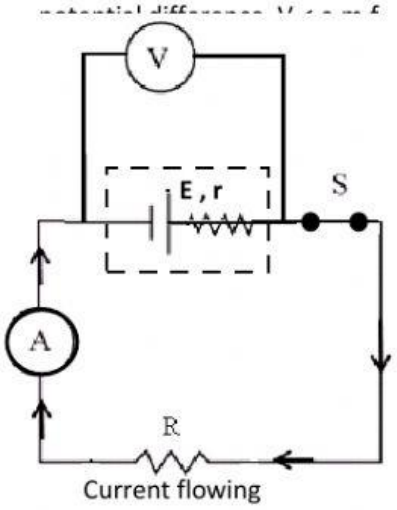
Lembaran kerja 3.3 Electromotive force and internal resistance

Figure (a)	Figure (b)
	
Voltmeter reading, e.m.f.  No current flow	Voltmeter reading, potential difference V < e.m.f. E  Current flowing

1. An electrical circuit is set up as shown in figure (a). A high resistance voltmeter is connected across a dry cell which labeled 1.5 V.

a) Figure (a) is (an open circuit / a closed circuit)

b) There is (current flowing / no current flowing) in the circuit. The bulb (does not light up / lights up)

c) The voltmeter reading shows the (amount of current flow across the dry cell / potential difference across the dry cell)

d) The voltmeter reading is (0 V / 1.5 V / Less than 1.5 V)

e) The potential difference across the cell in **open circuit** is (0 V / 1.5 V / Less than 1.5 V). Hence, the electromotive force, e.m.f., E is (0 V / 1.5 V / Less than 1.5 V)

f) It means, (0 J / less than 1.5 J / 1.5 J / 3.0 J) of electrical energy is required to move **1 C** charge across the cell or around a **complete** circuit.

2. The switch is then closed as shown in figure (b).

a) Figure (b) is (an open circuit / a closed circuit)

b) There is (current flowing / no current flowing) in the circuit. The bulb (does not light up / lights up)

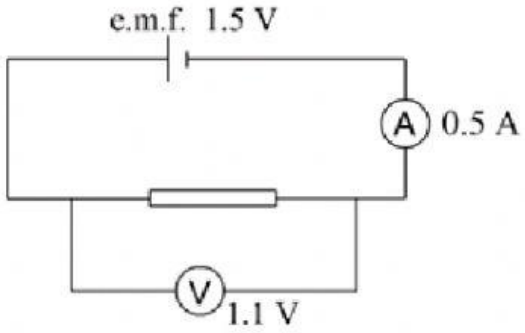
c) The voltmeter reading is the (potential difference across the dry cell / potential difference across the bulb / electromotive force).

d) The reading of the voltmeter when the switch is closed is (lower than/ the same as / higher than) when the switch is open.

e) If the voltmeter reading in figure (b) is 1.3 V, it means, the electrical energy dissipated by 1C of charge after passing through the bulb is (0.2 J / 1.3 J / 1.5 J)

f) The potential difference drops by (0.2 V/ 1.3 V / 1.5 V). It means, the potential difference lost across the internal resistance, r of the dry cell is (0.2 V/ 1.3 V / 1.5 V).

3.



a) Why is the potential difference across the resistor not the same as the e.m.f. of the battery?

The potential drops as much as [.] V across the internal resistance

b) Determine the value of the internal resistance.

Since E = V + Ir

[.] = [.] + [.] r

r = [.] Ω

Therefore, the value of the internal resistance is [.] Ω

c) Determine the value of the external resistor.

Since V = IR

. = . R

R = . Ω

Therefore, the value of the external resistance is . Ω