Electricity safety MYP / IGCSE

**Important terms** :
Fuse - A device used to prevent excessive currents flowing in a circuit.
Trip switch - A safely device that automatically switches off a circuit when the current becomes too high.
The earth wire - is a safety wire connected to the metal casing of an appliance and to the ground. It's designed to provide a low-resistance path for current to flow in case of a fault.

**Resources -**
Trip switch - Short video
Fuse - Short video
Earth wire needed for fuse to work : video

Q1 - Describe what safey issues are showin in the diagram below

Q2 - Sometimes, when a fuse breaks, people replace it with a piece of metal foil.
a. Explain the operation of a fuse
b. Explain why the fuse is a safety device
c. State the sequence of events that leads to the fuse melting.
A - As heavy current flows, the wire gets heated and exceeds the melting point of the metal leading to the melting of the wire.

Q3 - Explain the working of a trip switch.
A - Trip switch goes down under two circumstances, overloading and short circuit.
During over loading - the bimetallic plate bends due to heating and lifts the switch by mechaninc lifling
During short circuit - As heavy current flows in the solenoid, strong magnetic field is genertated which results in a force that lifts the switch.

Q4 - Someone is operating an electric hedge cutter whilst standing on wet grass. The cable is cut by accident. Explain why it is unlikely that a fuse will save the life of the operator.
A - Though the wire gets cut accidently, the current takes the path of a human body to reach the earth. Hence it if unlikely that the fuse will save the life of an operator.

Q5 - A fuse relies on the earth wire to work. State why some devices must have an earth wire, whilst others do not require one.
A - Watch related resouces from the link above.
- Normally, the earth wire carries little to no current.
- When a fault occurs (e.g., a live wire inside an appliance comes into contact with the metal casing), a large fault current will flow through the earth wire and back to the source.
- This high fault current will also flow through the fuse.
- The fuse, designed to melt at a specific current level, will blow, breaking the circuit and preventing further current flow

**Resource** - Physics - workbook - David Sang and Darrell Hamilton - by Cambridge University Press.