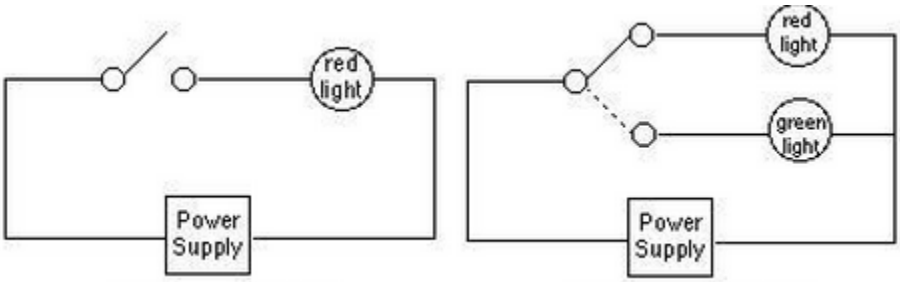
STE: Types of Switches

A **pole** is the number of circuits controlled by a switch. A **throw** is the number of contacts made by a switch.

We'll consider four types:

(1) Single pole-single throw
(2) Single pole-double throw
(3) Double pole-single throw
(4) Double pole-double throw

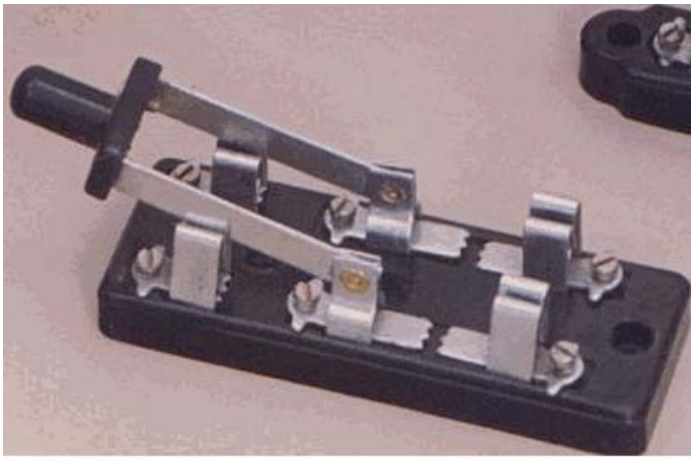
Example 1 **a) Match two of the above with the following**



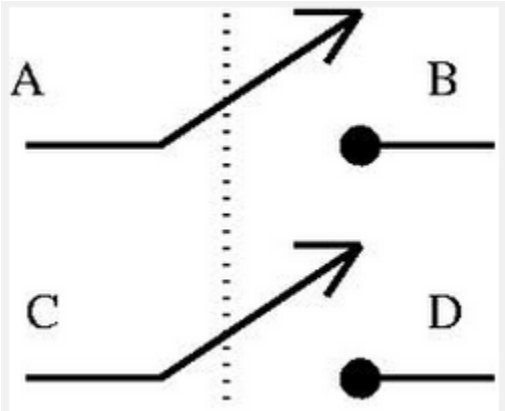
b) What advantage does the second switch have over the first one?

c) If the red and green lights have the same resistance, what's the power consumption of the red light, if a current of 50 mA flows through the green light when the voltage is 500mV?

Example 2 **a)** What kind of switch is this?



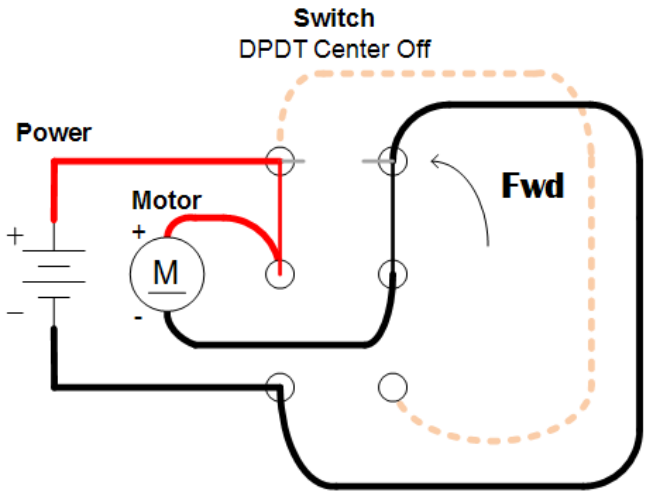
b) Draw a circuit diagram that has a double-pole single throw switch.

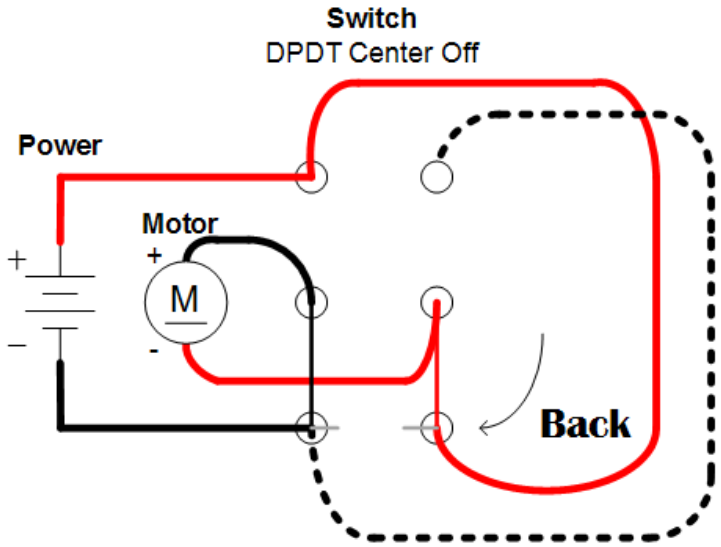


Example 3 **Draw a circuit with a double pole, double-throw switch.**

Example 4 **a)** **What is the switch doing to the motor?**

b) How is it tied in to magnetism?





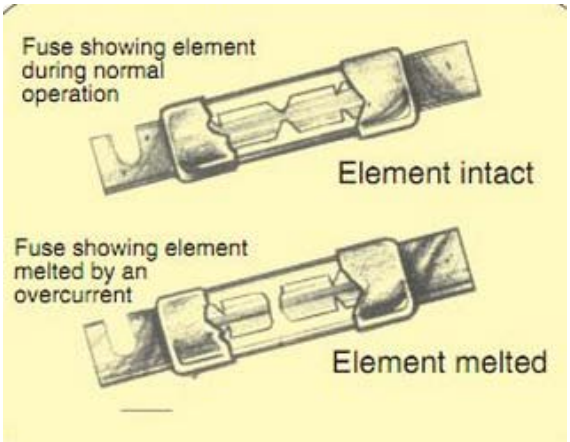
Switches in Breakers

a) Why does total current sometimes get too high in your home?

b) What was the old-fashioned solution to this problem?

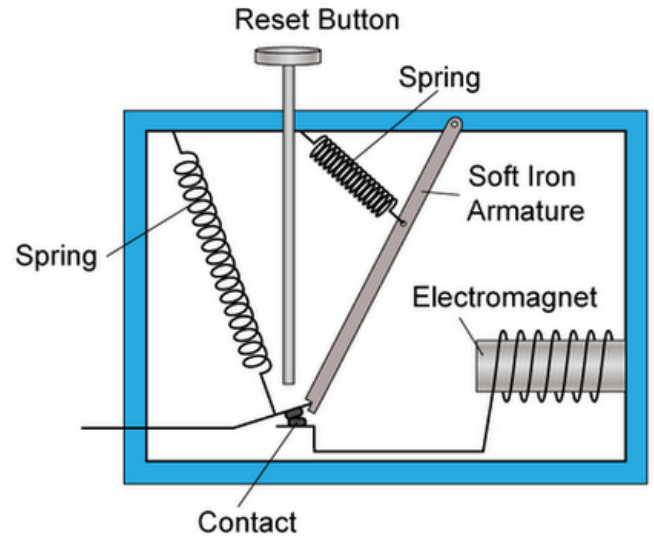
c) How did they work?

d) What was their disadvantage?



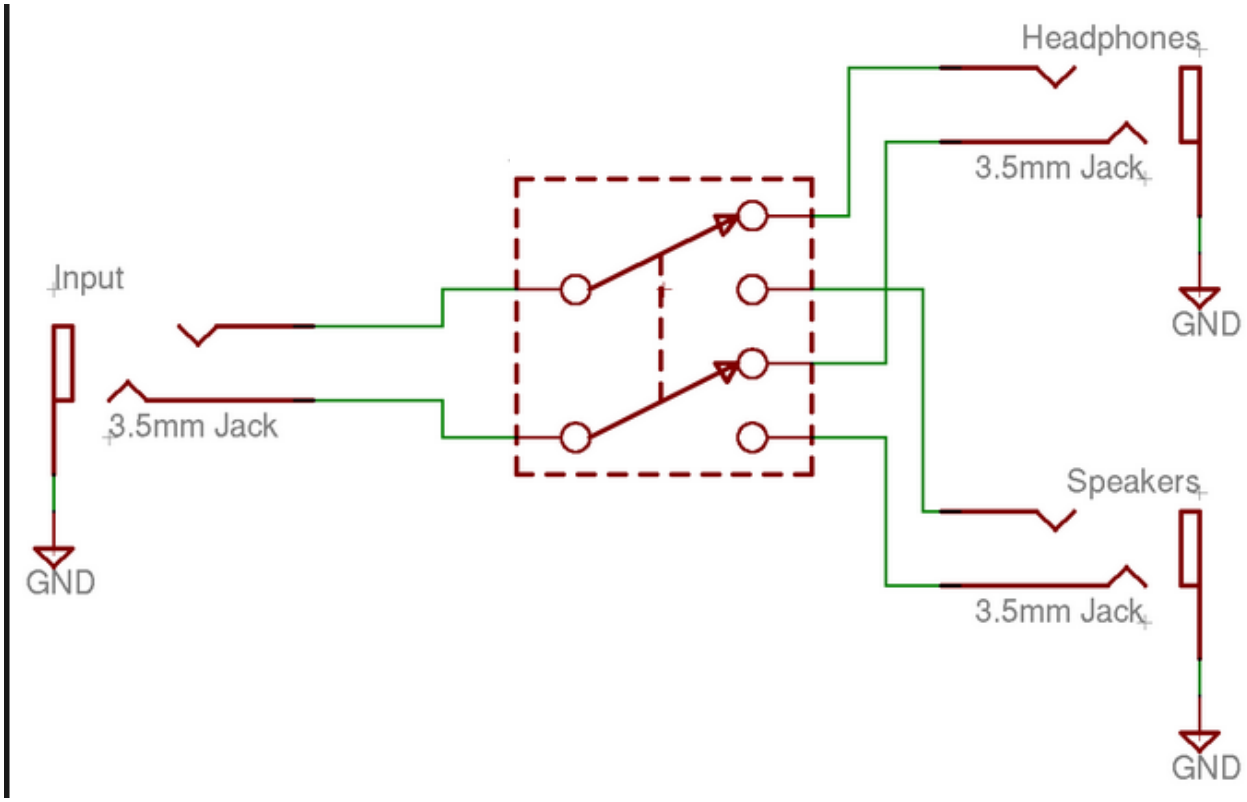
e) **The Modern Solution**---read the following and identify what is being described:

"Increasing current boosts the electromagnet's magnetic force, and decreasing current lowers the magnetism. When the current jumps to unsafe levels, the electromagnet is strong enough to pull down a metal lever connected to the switch linkage. The entire linkage shifts, tilting the moving contact away from the stationary contact to break the circuit. The electricity shuts off."



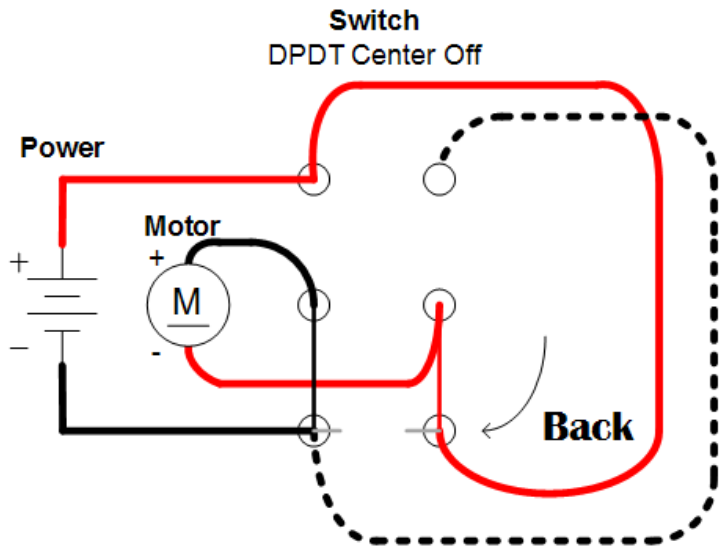
Exercises

1. a) What kind of switch is shown below?
   b) What purpose does it serve?



2. Draw a circuit with a single pole-double throw switch. In one of the connections two 10 Ω resistors lead to a total resistance of 5 Ω. In the other "throw", three 5 Ω resistors have a total resistance of 7.5 Ω.

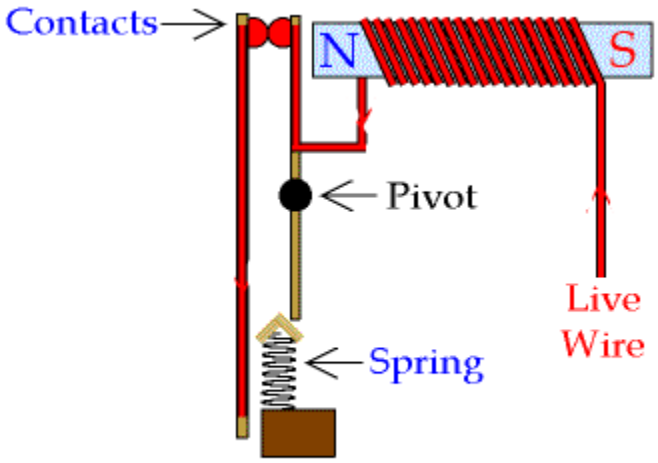
3. Examine the diagram:



Why does the broken-line option shut the motor?

4. a) What is shown below?
b) Which part will break contact? Indicate on diagram.

c) In which direction is electricity flowing?



d) What adjustments did the manufacturers make to ensure that a dangerous current would indeed lead the electromagnet to break contact?

Flashback.

Many grade 11 students are already talking about the limo they're renting for their prom at the castle that really isn't a castle, which explains why they got this grade 10 problem wrong. Embarrass them by showing you can do it.

Calculate the volume of 0.10 M $CuSO_{4(s)}$ required to completely consume 3 iron nails with a total mass of 4.00 g.

$$CuSO_4 + Fe \rightarrow FeSO_4 + Cu$$