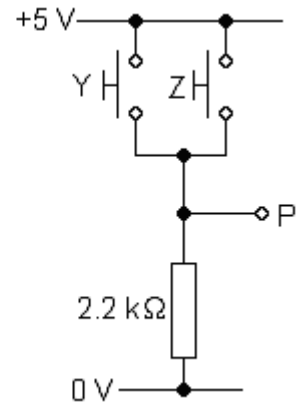
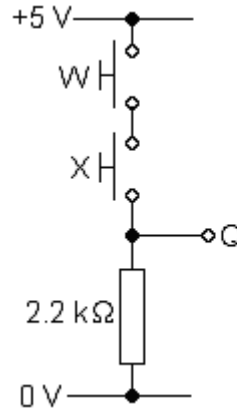


Switches in series and parallel

You are going to find out how these circuits behave.

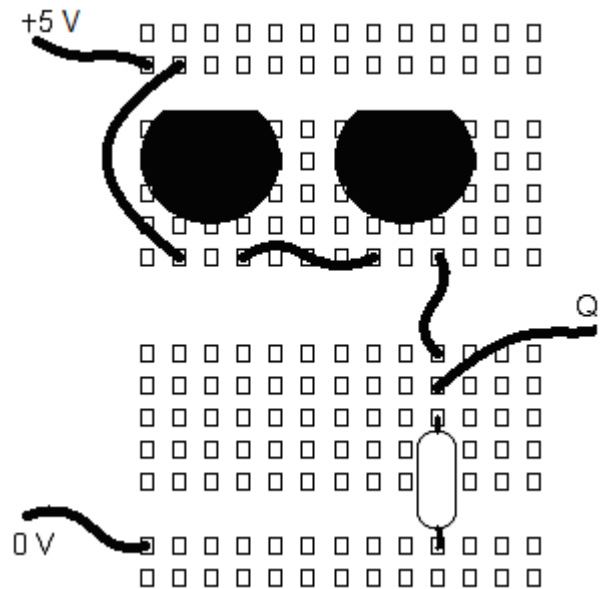
- 1 Predict the behaviour of the circuits by completing these tables. Use **high** or **low**.



switch W	switch X	output Q
open	open	
open	closed	
closed	open	
closed	closed	

switch Y	switch Z	output P
open	open	
open	closed	
closed	open	
closed	closed	

- 2 Construct the left-hand circuit on breadboard, as shown opposite. Note that the flat side of each switch must be parallel to the top of the breadboard.
- 3 Use a voltmeter to measure the voltage of the output Q. If all is well, Q should only be +5 V when both switches are pressed.
- 4 Assemble the circuit on the right. Use the switches and voltmeter to check your prediction of its behaviour.



Current in resistors

You are going to use a multimeter to measure voltage, current and resistance for three resistors.

- 1 Take any one of the resistors. It will have four coloured bands on it.
Find the red or gold band which is at one end, separate from the other three bands.
Hold the resistor with that band on the right, as shown below.



- 2 Read off the coloured bands, starting from the left.
Use the resistor colour code to work out the resistance of the resistor.
Enter the result in the table below. Repeat for the other two resistors.

first band	second band	third band	colour code resistance	multimeter value
brown	black	brown		
red	red	red		
yellow	purple	orange		

- 3 Now use the multimeter to measure the resistance of each resistor.
Enter the results in the table.
- 4 Use the multimeter to measure the voltage drop between the terminals of your 5 V supply.
- 5 Use the rule $R = V \div I$ to calculate the current in each resistor when it is connected directly across your 5 V supply. Use the resistance value given by the multimeter.
Enter the results in the table. Don't forget to include the units.

first band	second band	third band	resistance	calculated current	measured current
brown	black	brown			
red	red	red			
yellow	purple	orange			

- 6 Use the multimeter to measure the current in each resistor when it is connected directly across your 5 V supply. They should, of course, agree closely with your calculated values.