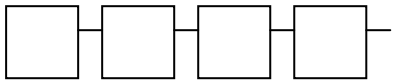
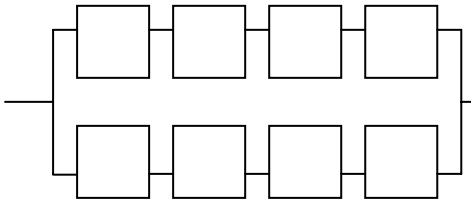
Worksheet 3 - Cell Interconnection

Information:

The diagram below shows a string of solar cells



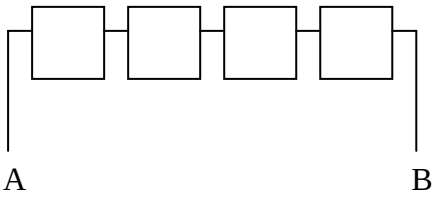
When cells are in series:
Voltages of each cell add
Current limited by lowest current in string



When cells or strings are in parallel:
Voltage is equal to the voltage of one string (everything in parallel has the same voltage
Current in each string is as above and the overall current is equal to the sum of the current from each string

Questions

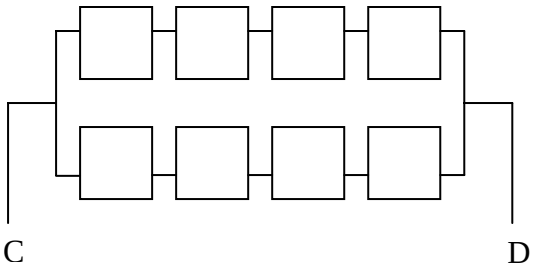
a)



The voltage of each cell is 0.6 volts and current is 0.25A

What is the output current and voltage of the string AB

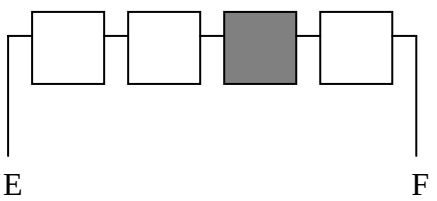
b)



The voltage of each cell is 0.6V and the current is 0.25A

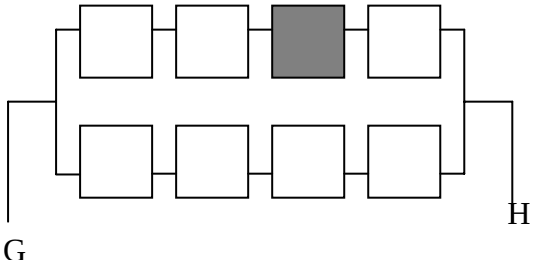
What is the output voltage and current of the parallel strings CD

c)



The voltage of each unshaded cell is 0.6V and the current is 0.25A. The shaded cell has the current reduced to 0.125A
What is the current output of the string EF

d)

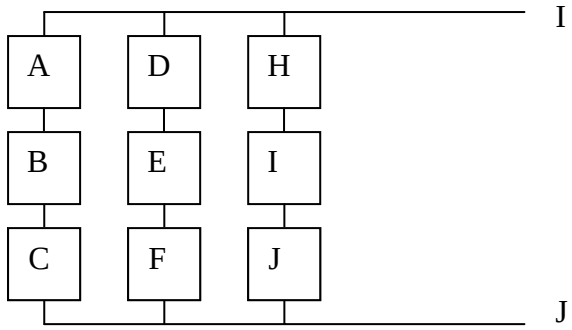


The current of the unshaded cell is 0.25A. The shaded cell is half cover by bird droppings and the current output drops by half to 0.125A.

What is the current at the output GH

From these questions it can be seen that current is limiting for power output when cells are connected in series. It can also be seen that by connecting string in parallel large voltages and currents can be achieved. This is noticeable between a) and b) where string are connected to achieve higher currents. To achieve higher voltages more cells are connected in series.

Now for a more complex cell interconnection pattern
e)



The voltages and currents of each cell are shown below:

	Voltage	Current
Cell A,D,H	0.6V	0.31A
Cell B,E,I	0.6V	0.30A
Cell C,F,J	0.5V	0.25A

What is the output current and voltage over IJ.