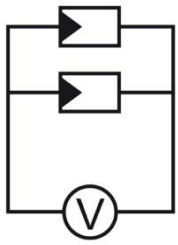
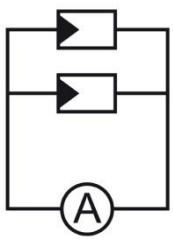
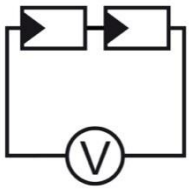
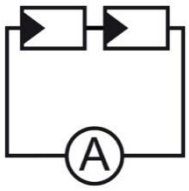
Worksheet 5 (answer sheet): How do solar cells connected in series or in parallel behave when shaded?

Solutions are only given for those tasks that have a standardized answer.

Task 2

Draw the circuit diagrams into the table. Use the circuit symbols.

Circuit diagrams

Circuit symbols		Parallel connection of solar cells		Series connection of solar cells	
		Voltage	Current	Voltage	Current
solar cell					
voltmeter					
ammeter					

Task 3

Describe the method of the experiment. Fill in the gaps of the text with the help of the words in the wordlist.

Wordlist

solar cell	measured values	shade
light	circuit diagram	both
black piece of paper	measure	parallel
shading	decrease	in series
voltage	enter	completely
current	draw	half
measurement	connect	slightly
table	hold	without
2,000 mV	200 mA	

Conducting the experiment

First we connect the solar cells in parallel. Then we set the measuring range of the multimeter to 2,000 mV and measure the voltage of the solar cells while they are completely in the light. Then we hold a black piece of paper over one solar cell so that it is shaded. We now measure the voltage when one solar cell is completely shaded and when both are half shaded.

Now we set the measuring range of the multimeter to 200 mA and measure the current for the

solar cells connected in parallel. We measure the current first without any shading, then with one solar cell completely shaded and then with two cells half shaded. The measured values are entered into the table.

Then we connect the solar cells in series and repeat all the measurements. Finally, we draw all the circuit diagrams.

Observation

With any kind of shading, the voltage only decreases slightly. The current on the other hand decreases far more with shading. The decrease of the current is particularly strong when the solar cells are connected in series and one solar cell is shaded completely.