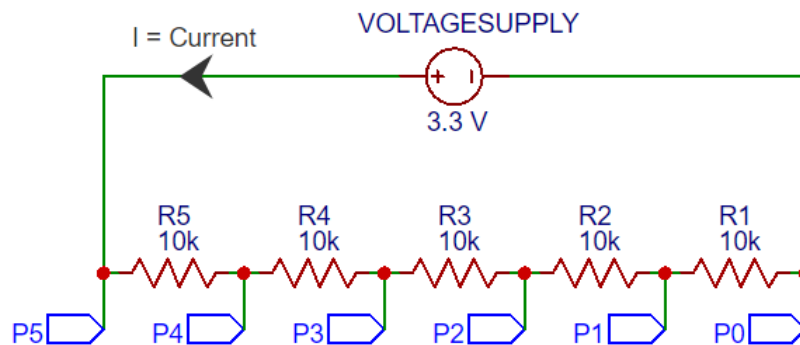


Practical Exercise

Potential Divider Circuit and Electricity



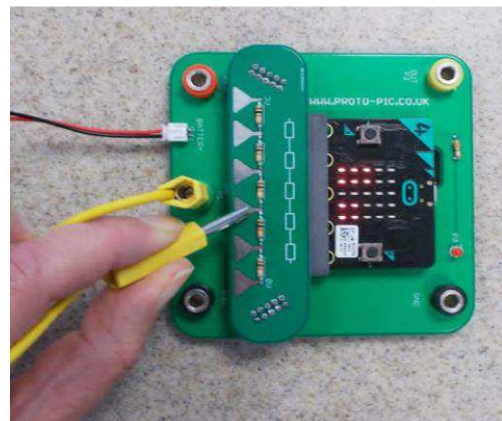
Background

A potential divider circuit has multiple uses in electronics. For example, it can divide a larger input voltage to a smaller output voltage for use in a circuit. A potential divider can also use a variable resistance sensor to identify an event when something has become wet, or hot, etc. There are many such sensors that can be used for a variety of purposes, e.g. safety systems, automated systems, alarms, etc.

The word 'potential' is used because **voltage is defined as the 'potential difference between 2 points.'** We can get into this later but think of the potential difference between the +ve and -ve terminals of a battery.

Study Material

1. Pre-programmed Micro:Bit
2. Battery
3. Phys:Bit Carrier board
4. Phys:Bit Potential divider test board
5. Test lead and resistor



Basic Use

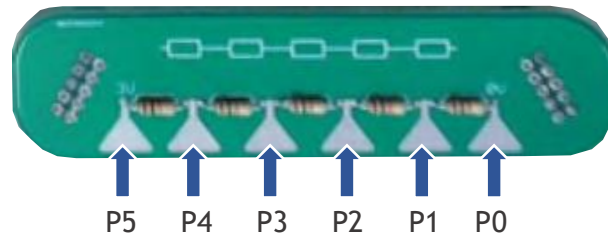
1. Connect the circuit as shown opposite.
2. The test lead is connected to the central (Green) connector.
3. The resistor from the test lead is connected to the Ground (Black) connector.
4. To select each test **Press B** on the Micro:Bit.
5. To move back by one test **Press A**.

Start-up

1. Switch on the Micro:Bit and an 'Introduction Message' is displayed.
2. **Press B to move to Test 1.**

Test 1: Check the Board is Working

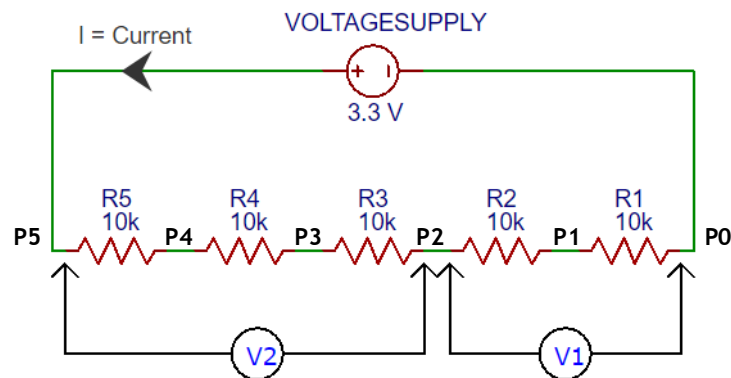
1. A Zero will be displayed on the Micro:Bit.
2. Connect the test lead to test points P0 to P5 shown below.
3. If the test is working, then you will see a number (0 to 5) shown on the Micro:Bit display corresponding to each test point.
4. Once you have confirmed the board is working, **Press B to move to Test 2.**



Is the equipment working?	YES / NO
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Test 2: Potential Difference

1. For Test 2 you will see a bar on the left and right side of the display that shows the relative voltages V2 and V1. The bar height (0 to 5) represents the voltage level.



2. Connect the test lead to test points P0 to P5 and record how the bar height for V2 and V1 varies from 0 to 5 for each test point.

Test Point	V2 bar height (left hand)					V1 bar height (right hand)						
P0	0	1	2	3	4	5	0	1	2	3	4	5
P1	0	1	2	3	4	5	0	1	2	3	4	5
P2	0	1	2	3	4	5	0	1	2	3	4	5
P3	0	1	2	3	4	5	0	1	2	3	4	5
P4	0	1	2	3	4	5	0	1	2	3	4	5
P5	0	1	2	3	4	5	0	1	2	3	4	5

Circle the number for each bar reading (V2 and V1) for test points P0 to P5.

Test 2 Observations

Describe how V2 and V1 change relative to one another for the different test points?

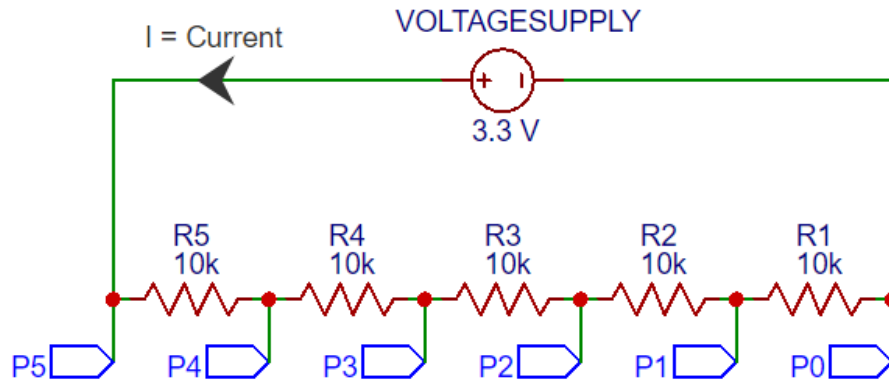
Test 2 Conclusions

Explain as best as possible why the voltages V2 and V1 are changing as observed?

Once you have finished Test 2, then **Press B to move to Test 3.**

Test 3: Voltage Measurements

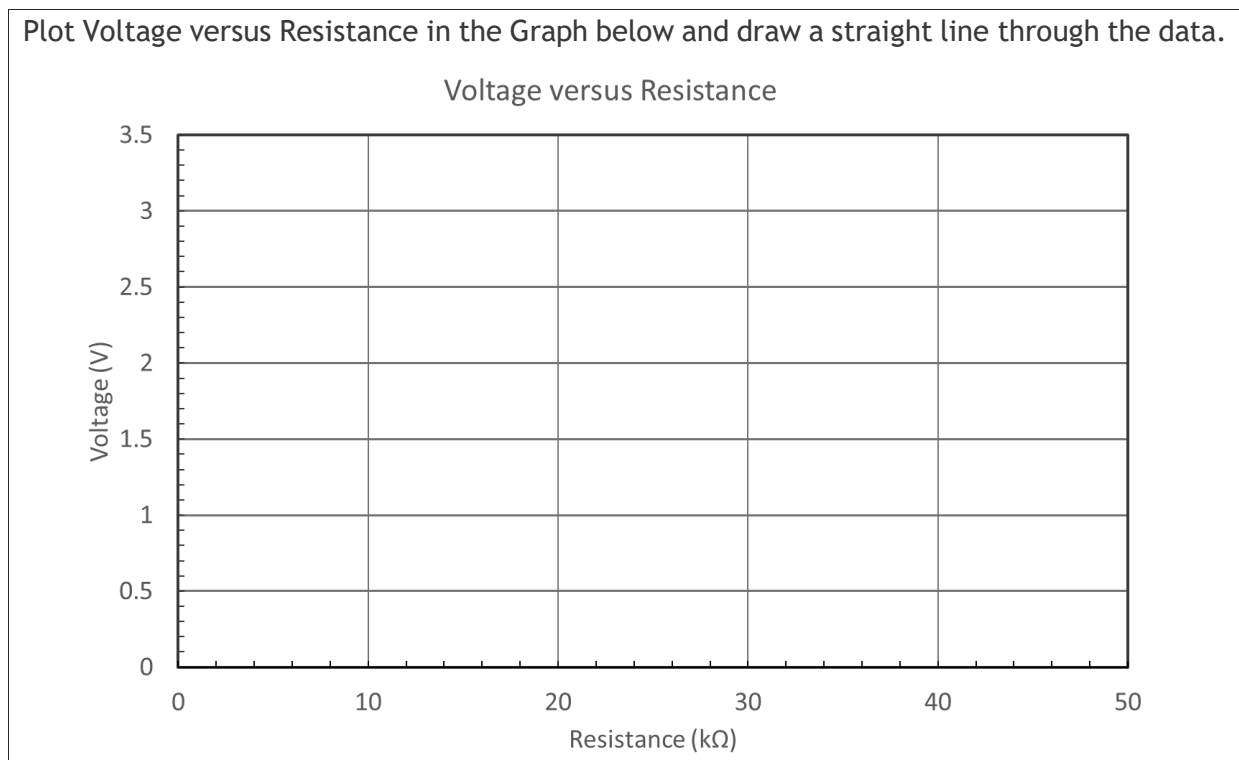
1. For Test 3 connect the test lead to test points P0 to P5 and you will see a different voltage number (V) on the Micro:Bit for each test point.
2. Record the voltage V for each test point in the table below.



Test Point	P5	P4	P3	P2	P1	P0
V (Volts)						
R (Ω)	50 kΩ	40 kΩ	30 kΩ	20 kΩ	10 kΩ	0 kΩ
Resistors	R5+R4+R3 +R2+R1	R4+R3+R2 +R1	R3+R2+R1	R2+R1	R1	---

Test 3 Results Analysis

Plot Voltage versus Resistance in the Graph below and draw a straight line through the data.



Test 3 Conclusions

Can you explain why there is a straight line through the data in the Voltage versus Resistance graph. (Hint: Ohm's law)

Once you have finished Test 3, then you are complete, or **Press A to redo any work above.**