



Self-study of Transistor-

10532 Osmond

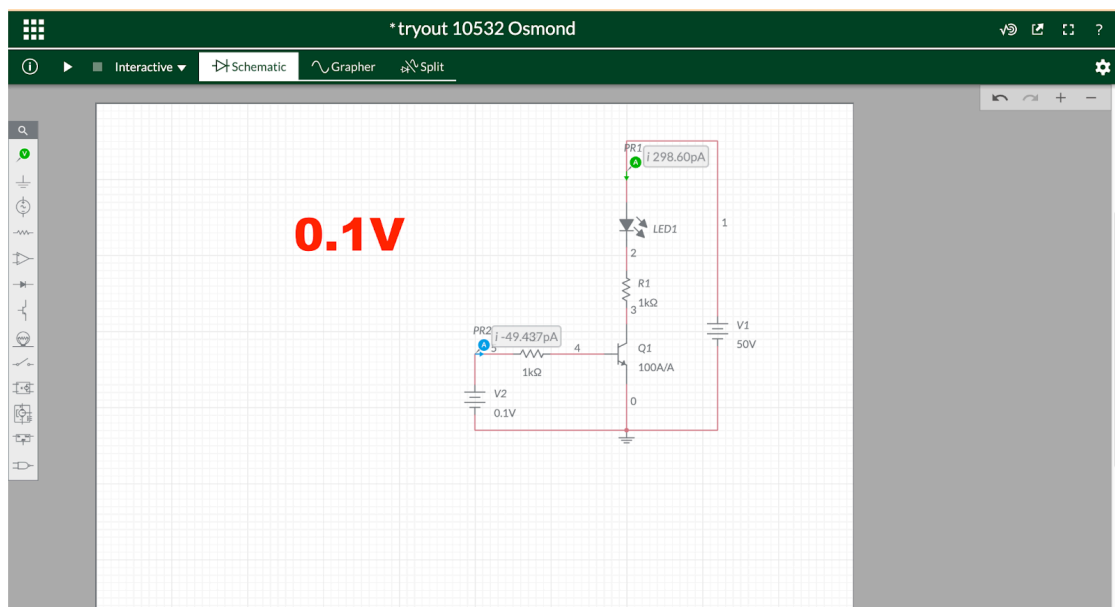
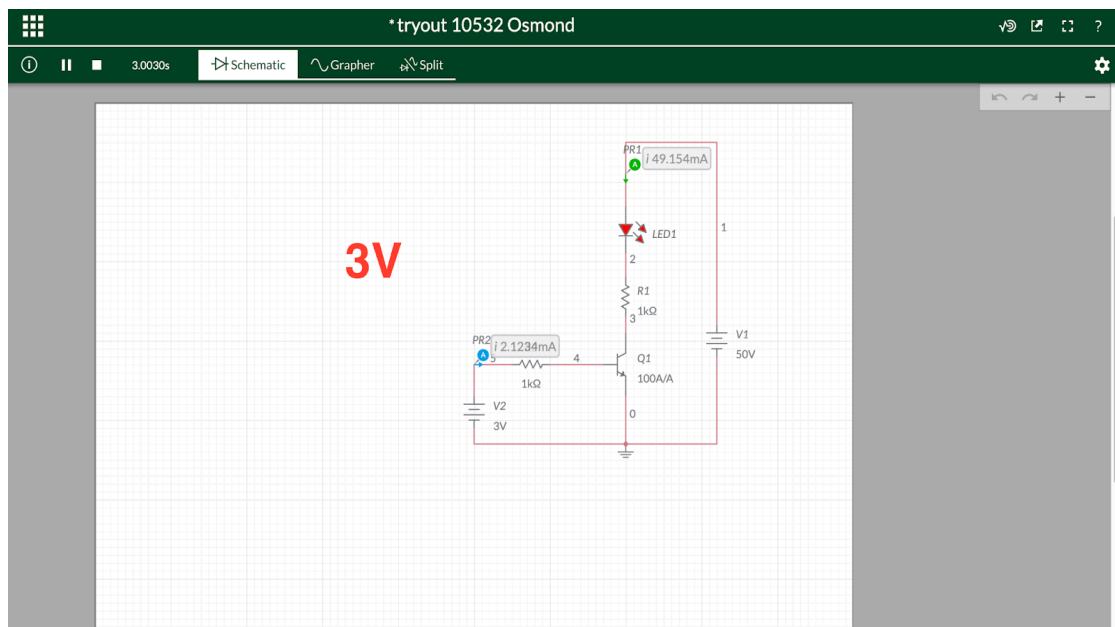
A: The concept of transistors

V(voltage)	PR1(current)	PR2(current)	LED
3	49.154mA	2.1234mA	
2.5	49.145mA	1.6239mA	
2.0	49.130mA	1.1244mA	
1.5	49.091mA	624.95μA	
1.2	33.497mA	334.97μA	
0.9	7.4019mA	74.018μA	
0.7	55.542μA	555.37nA	
0.5	25.167nA	200.58pA	
0.1	298.60pA	-49.437pA	



*PR: proportional-resonant(used to analysis performance, e.g. current)

*LED: Light-emitting diode

While documenting all these data coming from different values of voltage, I had come up with a few takeaways. All in all, Transistor can directly affect and even just determine the values of PR1 and PR2; however, to be more specific and practical, the higher the value of voltage is, the higher the current is. In other words, the higher the value of voltage is, the more chance the given LED can work.

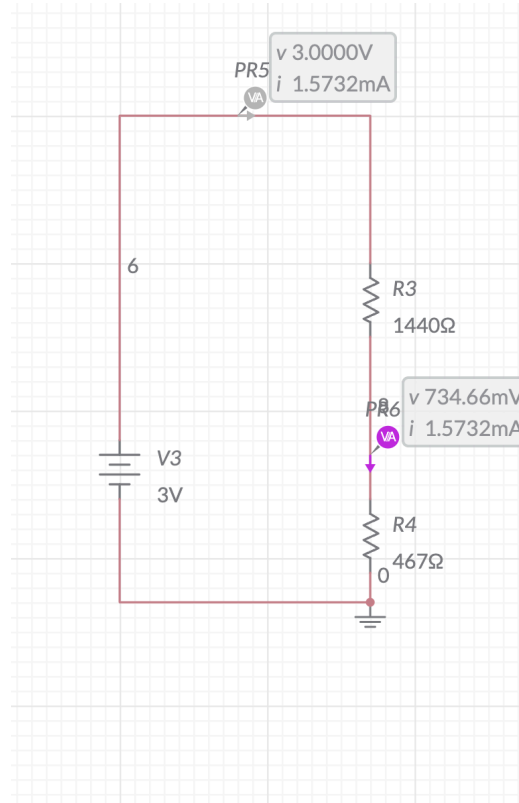
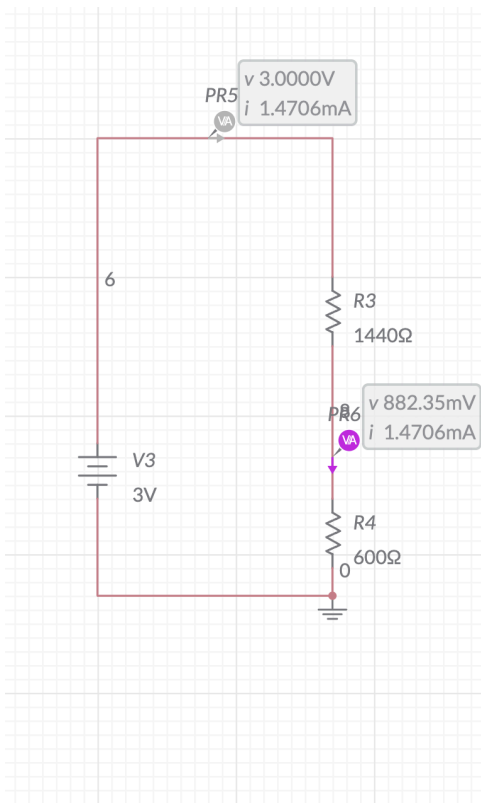


B: Voltage Divider Circuit

R3(ohm)	R4(ohm)	R3/R4	I	V2	LED
1440	600	2.4	1.4706mA	0.9	
1440	467	3.1	1.5732mA	0.7	

*According to Ohm's Law, $V=IR$

*In a series circuit, the current always remains the same. Also, $V_1+V_2=V_3$.



Photoresistor(LDR, light-dependent resistor) is a light-dependent resistor that changes its resistance when different amounts of light fall on it. As light intensity is increased, the resistance will be decreased.

Range of photoresistor(when independent): 506Ω~108kΩ(R4)

Range of photoresistor when connecting to the circuit: 87.4~106
Assorting R3 according to the given R4.

R4(ohm)	R3
1200	2880
929	

USING Tinkercad to formulate the complete circuit(night-light).

Note: I bumped into a mistake along the way, which is that the current(I) might vary when having different resistance. Also, I have to make sure that R3 remains the same when V2 is either 0.9 or 0.7.

Final project:

<https://www.tinkercad.com/things/fz5rzhZS9Av-nightlight-10532-osmond/editel?sharecode=ZHMXmZSAnXObXNyX8foU-gy5Apo6A0t6vpS6CVvPZjA>

Finally, I finished the nightlight successfully under the teacher's help; I found out that I should not connect the circuit with the multimeter if I want it to work out.

