

Transistor Circuit.

There are two types of transistor, NPN and PNP. In our projects we will only use NPN type. Transistors are used in two ways, as a switch to turn components on/off and as an amplifier to enable components to receive a larger current.

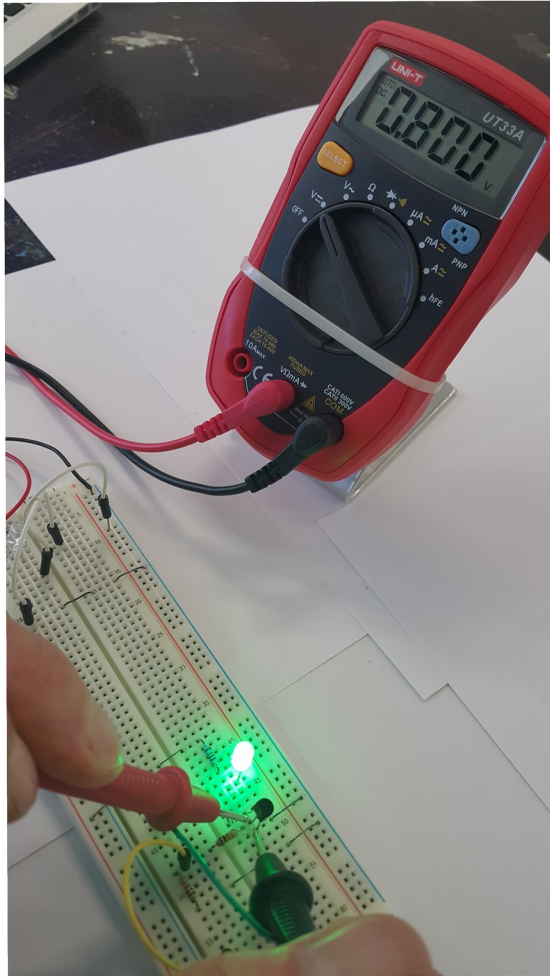
Voltage (volts/millivolts) is the amount of energy available to power the circuit. **Current** (amps/milliamps) is the measurement of the amount of energy flowing through the circuit.

Task 2:

- Using Tinkercad circuits, draw the transistor circuit labeling all components and then Build the circuit on your breadboard use the breadboard photo shown here as a guide (use a multimeter set to Ω to measure the resistor values)
- Use connector links made from 47K resistors to construct the breadboard neatly, two hook-up wires are used for the switch, to enable the circuit to remain on, the switch wires can be plugged into a common row as shown

Add a new slide, title - **Transistor Circuit**

When it is working, take a photo of your transistor circuit on your breadboard, add this to your slide (similar to the photo shown on the left)

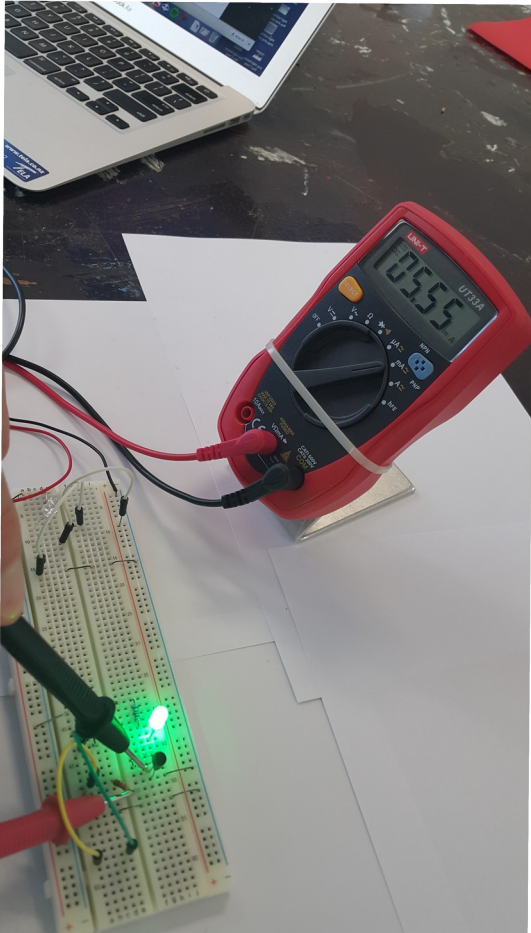


Use a multimeter to make the measurements then answer the questions by inserting the question then adding the answer below the question:

1. Turn the transistor **ON** using the switch wires, set your multimeter to measure Voltage (DC -)
Voltage =
2. Measure the voltage between the BASE and EMITTER legs
Voltage =

Q/ What is the level of voltage needed to turn the transistor on?
Voltage =

Q/ Why is a 1k resistor placed inline with the base leg of the transistor?



Task 3:

Carefully lift the lead of the 1K resistor connected to the transistor base leg out of the breadboard (the LED will go off)
Set the multimeter dial to measure **mA** (milliamps)

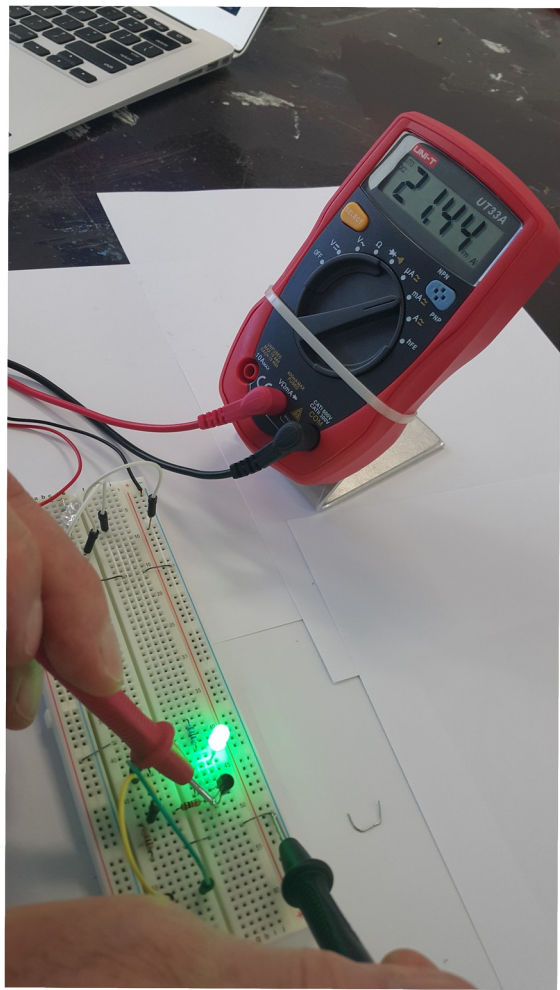
Connect the red multimeter lead to the 1k resistor lead that is now out of the breadboard (fingers can be used to do this)
connect the black meter lead to the transistor base leg (the LED should be on now)

Q/ What is the current reading in milliamps?

After noting the reading, re-insert the 1k resistor lead next to the base leg (the LED should now be on)

Remove the breadboard connection between the transistor EMITTER leg and the negative rail (the LED will go off)

With the meter set to measure mA, place the red lead onto the EMITTER leg and the black lead to the negative rail on the breadboard, note the reading on the meter



Insert the readings on the meter to the questions below;

Q/ What is the reading in milliamps between the 1K resistor and the transistor base?

(this is the BASE CURRENT) =

Q/ What is the reading in milliamps between the transistor EMITTER and the negative rail

(this is the EMITTER CURRENT) =

Divide the BASE CURRENT into the EMITTER CURRENT, this will give you and ratio (example, if the base current is 10 and the emitter current is 100 the ratio will be 10) How much has the transistor amplified the current at the base leg compared to the current at the emitter leg?

This ratio is called the TRANSISTOR GAIN