Author: Mauro César Zanella

English Version: Marco Aurélio Lotz

Design: Ricardo Enz

OH MAN! ICH WOLLTE NUR MINECRAFT SPIELEN!
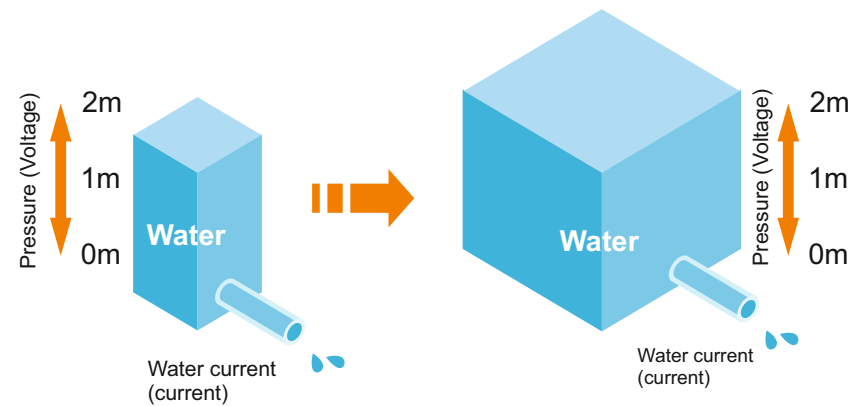
WASSER
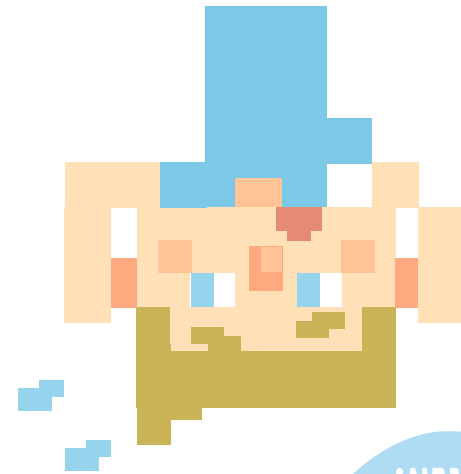
Pressure (Voltage) What is that?

Battery
Pressure is the voltage
Volume is the capacity
Water current is eletrical current

Pressure (Voltage)

2m

1m

0m

Water capacity
(Current per hour)

Water

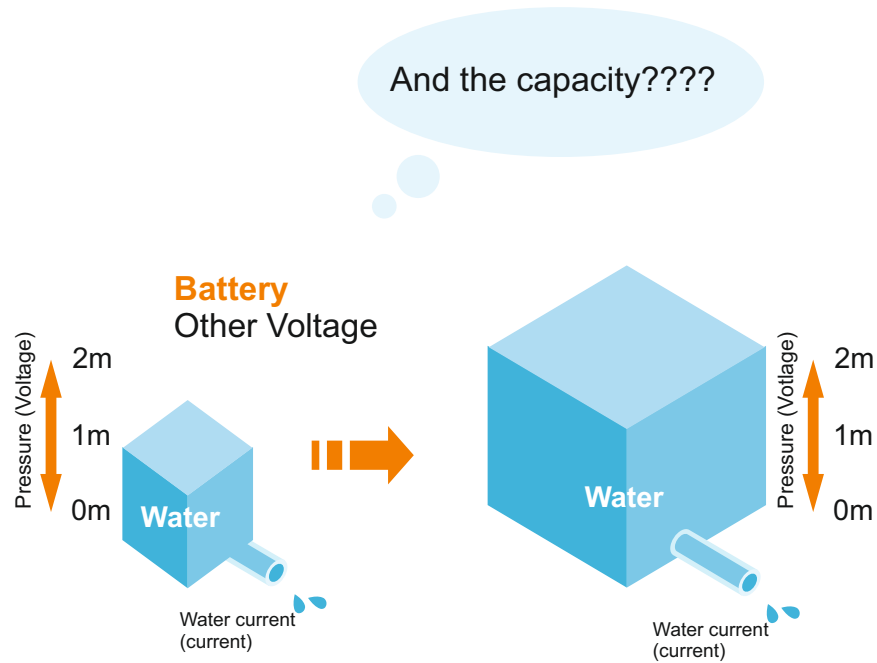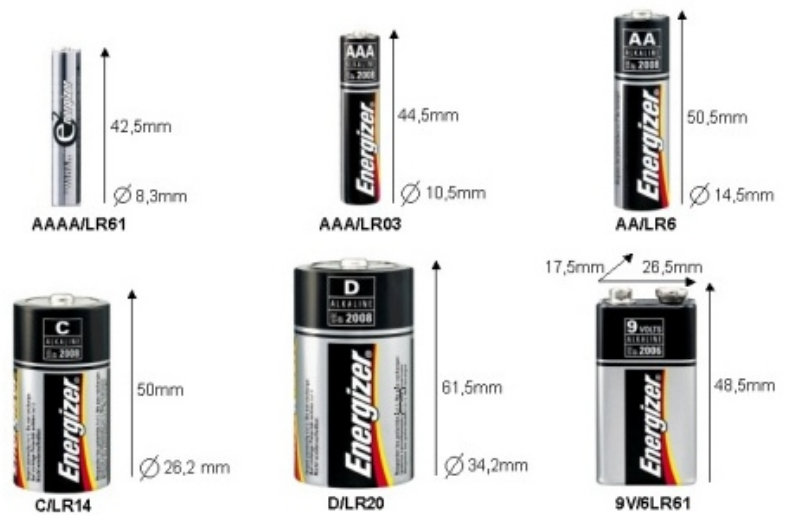Water current
(Eletrical current)
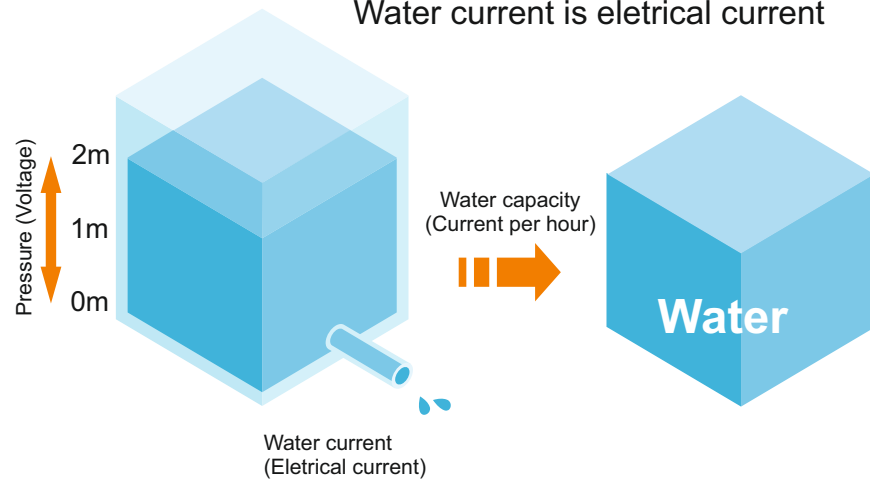
Pressure (Voltage) Capacity?
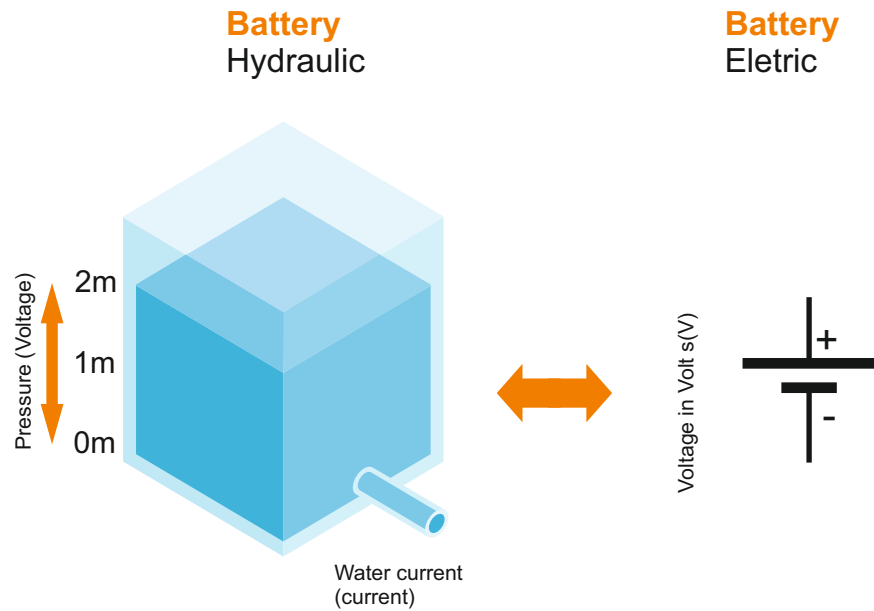
Battery
Same voltages
But different capacities

Pressure (Voltage)

2m

1m

0m

Water

Water current
(current)

Water

Pressure (Voltage)

2m

1m

0m

Water current
(current)

Pressure (Voltage)

And the capacity????

Battery
Other Voltage

Pressure (Voltage)

2m

1m

0m Water

Water current
(current)

Water

Pressure (Voltage)

2m

1m

0m

Water current
(current)

Do I understand the batteries from the supermarket?

The size
(A, AA, AAA ...)

Capacity in mA

Voltage in V

BTR Ni-MH
AA 900mAh 1.2V

42,5mm
Ø 8,3mm
AAAA/LR61

44,5mm
Ø 10,5mm
AAA/LR03

50,5mm
Ø 14,5mm
AA/LR6

50mm
Ø 26,2 mm
C/LR14

61,5mm
Ø 34,2mm
D/LR20

17,5mm 26,5mm
48,5mm
9V/6LR61
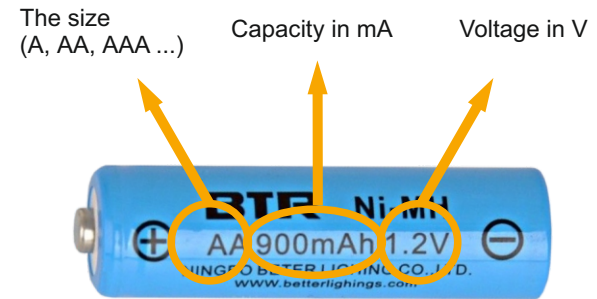
Pressure versus Voltage
Hydraulic versus Electric

Connections

Battery
Hydraulic

Battery
Eletric

Connecting Elements
Hydraulic
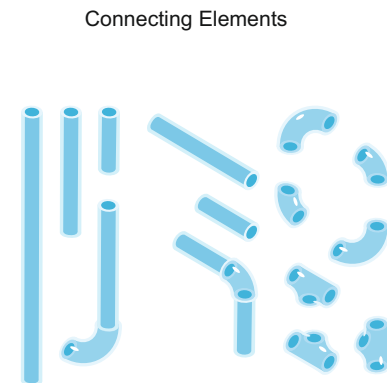
Connecting Elements
Electric

Connecting Elements

Pressure (Voltage)

2m

1m

0m

Water current
(current)

Voltage in Volt s(V)

+

-

No connection

Connected

The Resistance
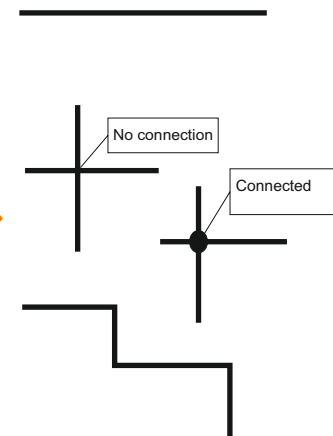
Small and large resistance

Resistance
Hydraulic

Rocks with sand
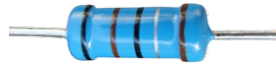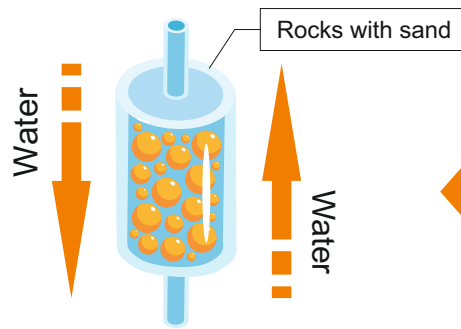
Water

Water

The water can flow in both directions

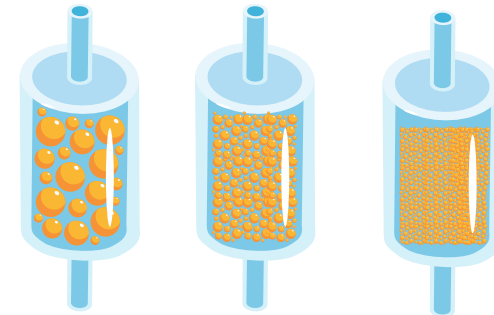**Resistance**
Electric

resistance in Ohms (Ω)

Resistance
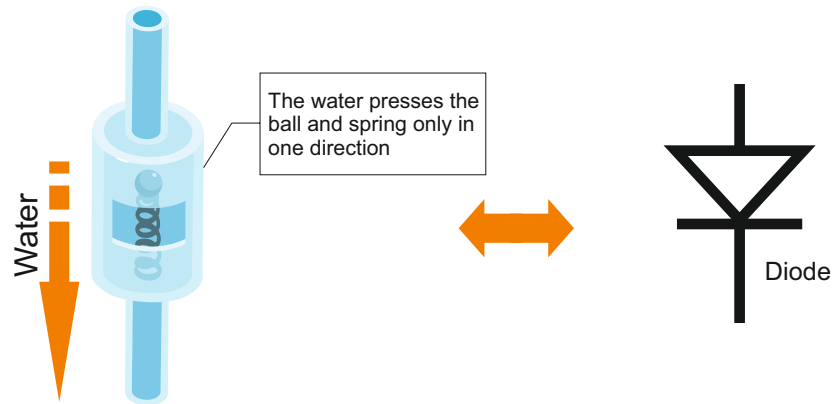Hydraulic -
Are all the resistors equal?
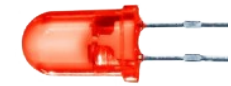

Which one has the largest resitance?

Diode

LED

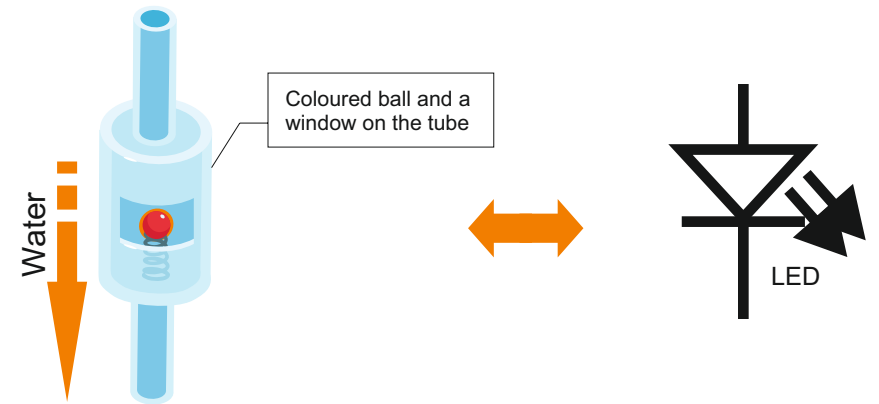### Directional Barrier
How can I determine the water direction?

Directional Barrier
Electric

The water presses the ball and spring only in one direction

Water

Diode

Directional Barrier
And a LED???

Directional Barrier
Electric

Coloured ball and a window on the tube

Water

LED

The Capacitor

The Button

Pression Memory
The pression will be loaded and then released

loading

releasing
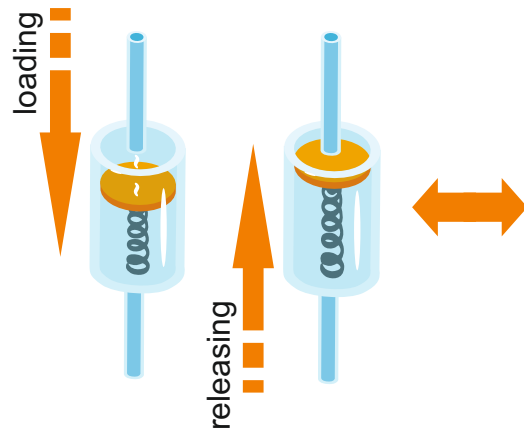
Voltage Memory
Electric

Capacitor in Farad (F)

Small

Large

+

-

Water Barrier
Water On/Off

Blocked

Flowing

Button
Electric

Off

On

The Transistor

BC549C Pinout
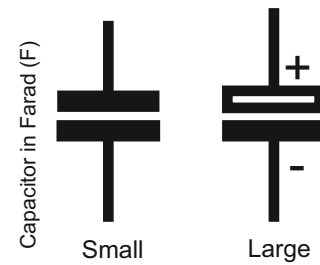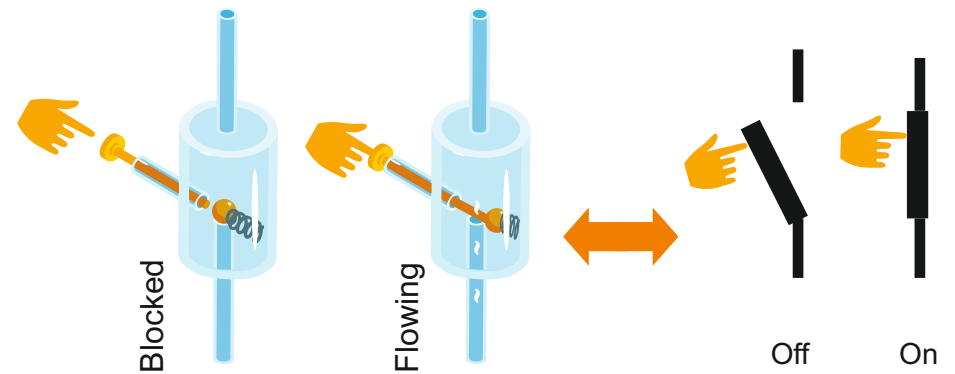
Water Barrier
Water On/Off
Automatically???

Transistor
Electric

Water

Collector(c)

Current

Base (b)

Emitter (e)

Water
Control

Transistor
Electric

Water

Collector(c)

Current
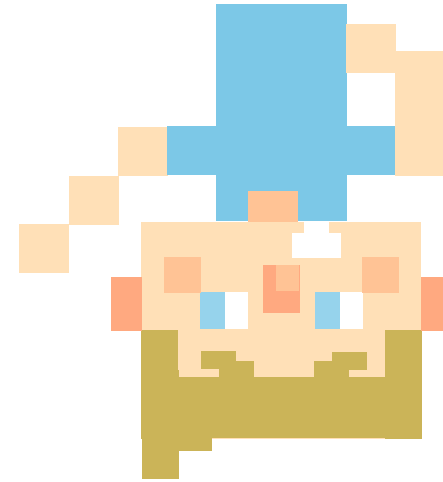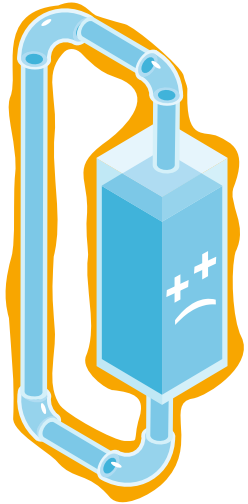
Base (b)

Emitter (e)

Water
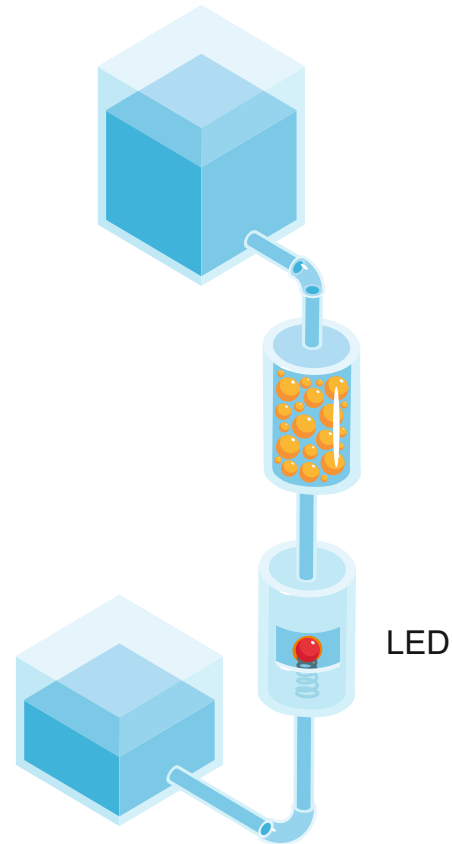Control
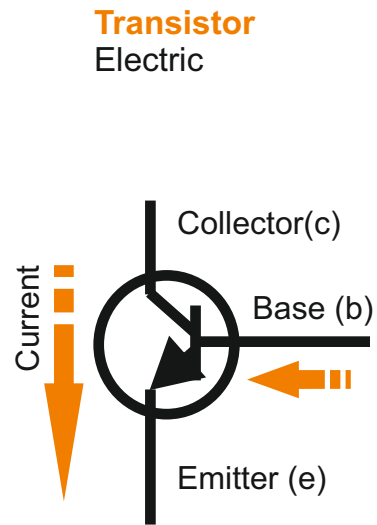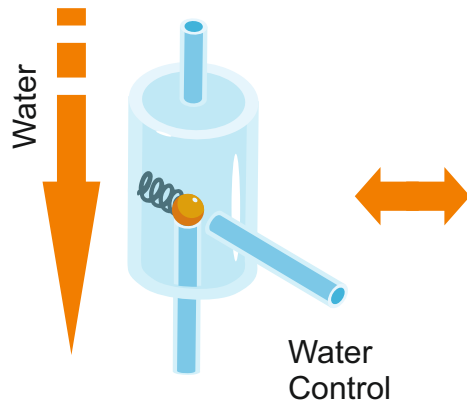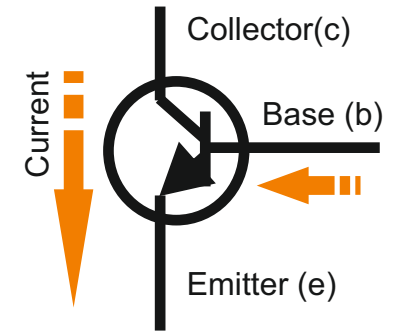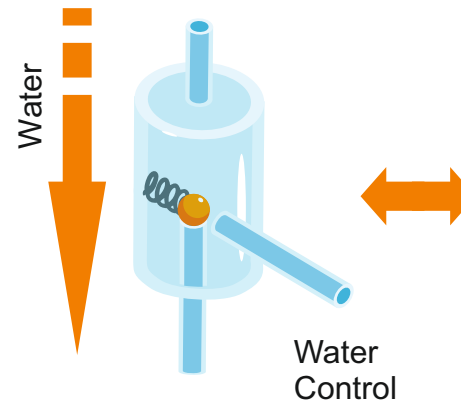
Take a Note:

WARNING!
This can be dangerous

Experiment 01

Theorie:
Turning on
a LED

LED

Questions:

What happens when the LED is connected differently?

What happens when we don't use the resistor?

What happens when the pressure is too high?
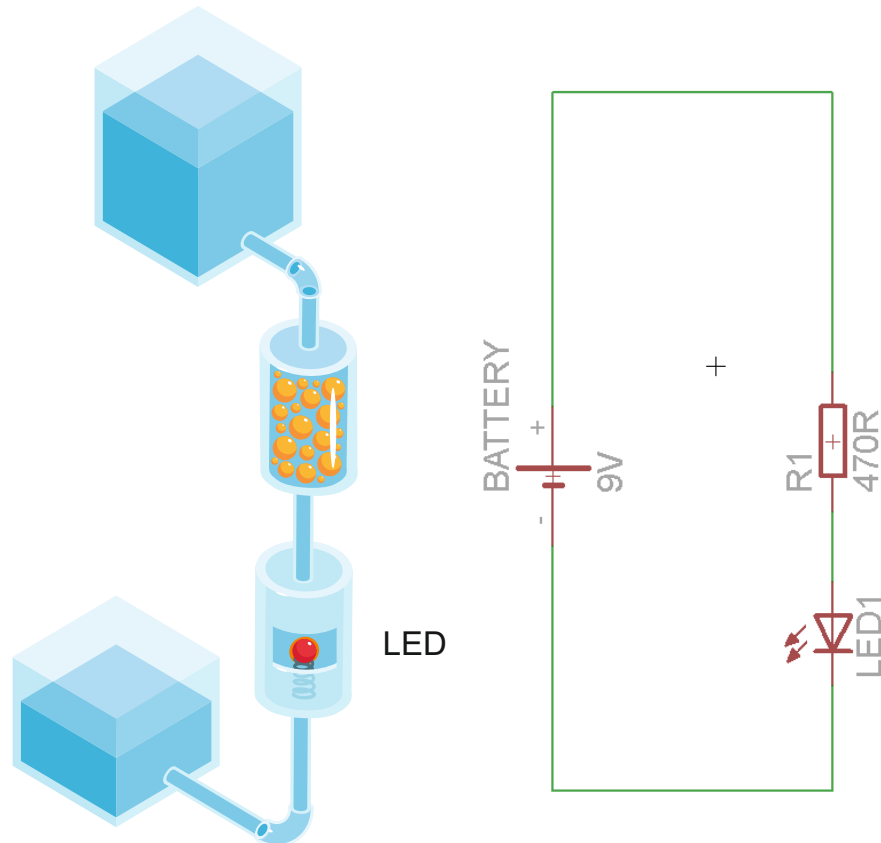
What happens when the resistance is too small?

What happens when the resistance is too large?

Questions, questions and more questions...

Experiment 01

Practic: Turning on a LED

LED

Task V = R.I

Building the circuit.
Did it work?
The turn the LED orientation.
Change the resistance from 470 Ohms to 1000 Ohms.
What happenedt? Why are we using 470 Ohms?

Is it clear to you, that the LED depends on both the current and the voltage?

Then we write that:
- The voltage from the Battery cannot be changed
- The Baterry we buy already assembled in the supermarket.
- The LED we also buy ready. (The "spring force"
is known by the manufacturer, and its value is measured in current - A)

The voltage and the current we know, GREAT! Now only the resistance is missing.
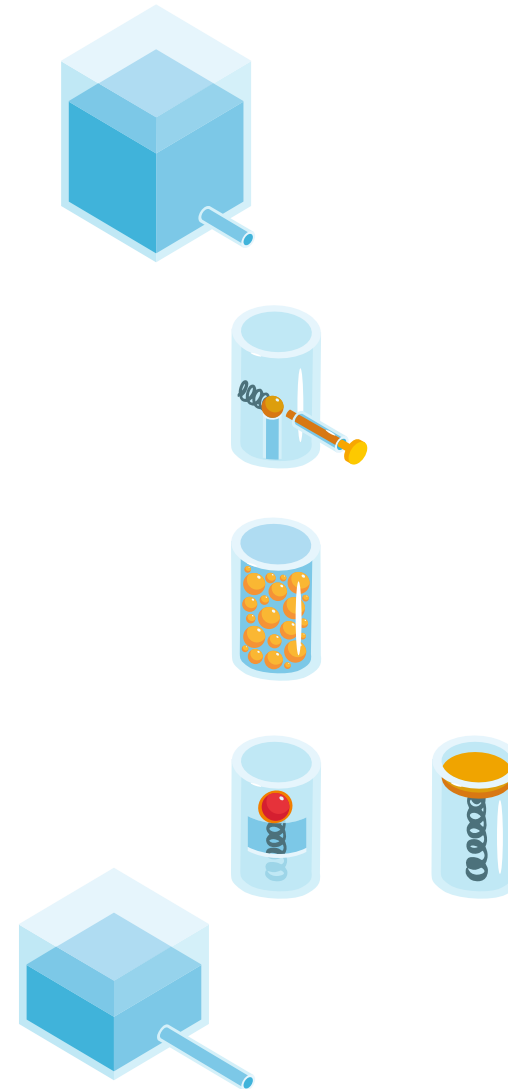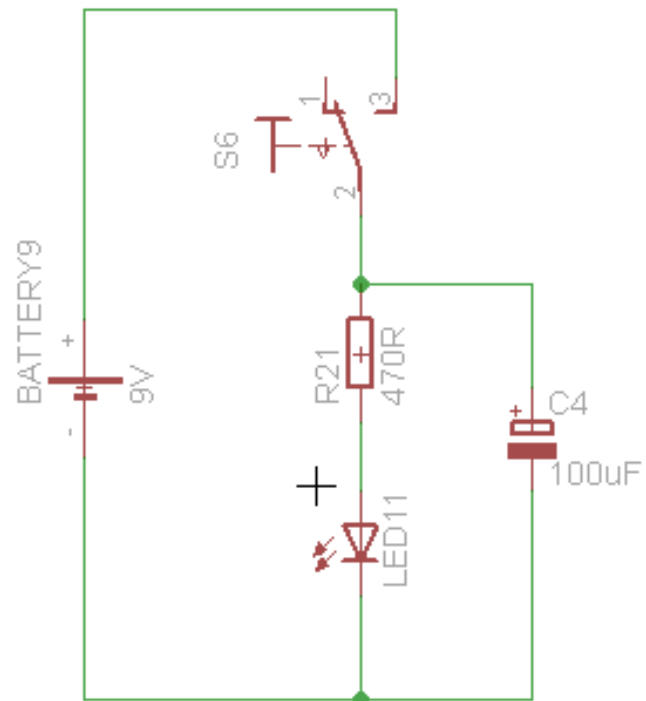
So it comes that:
The resistance of R1 = Voltage (in V) / Current (in A)

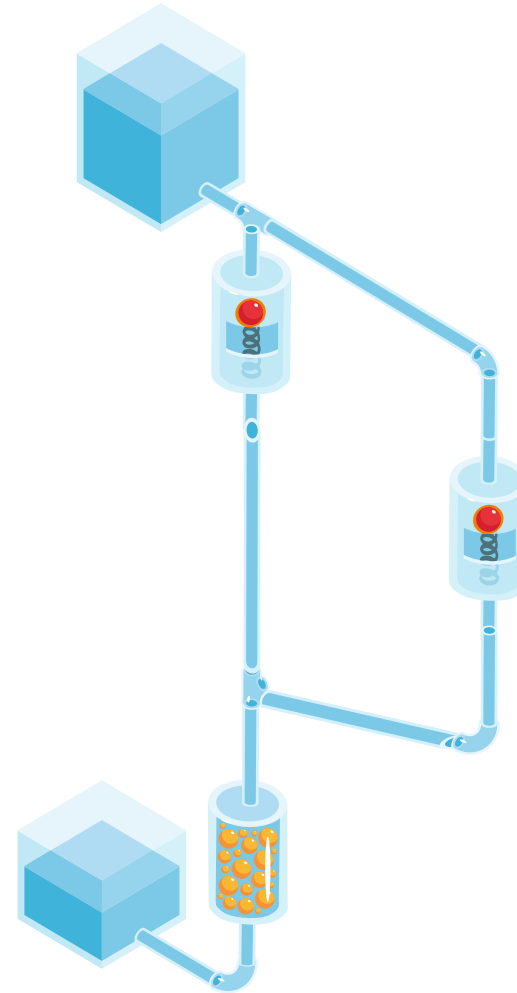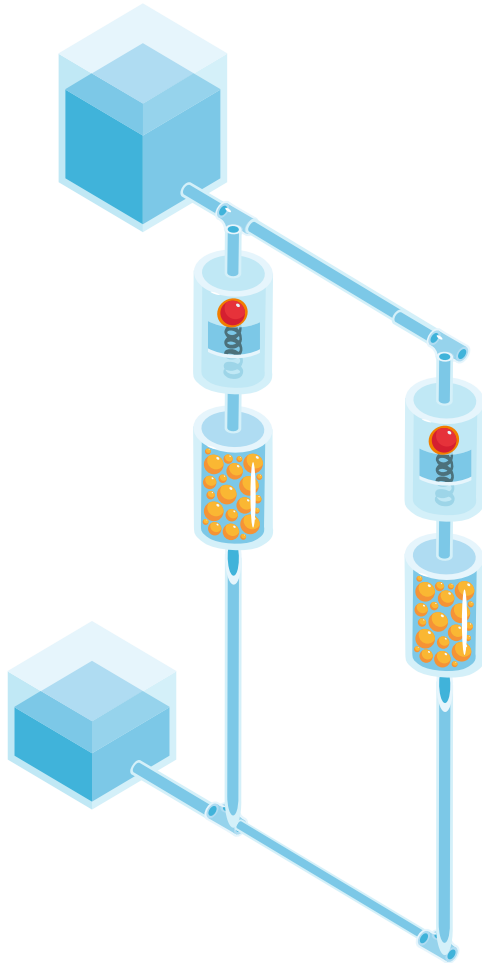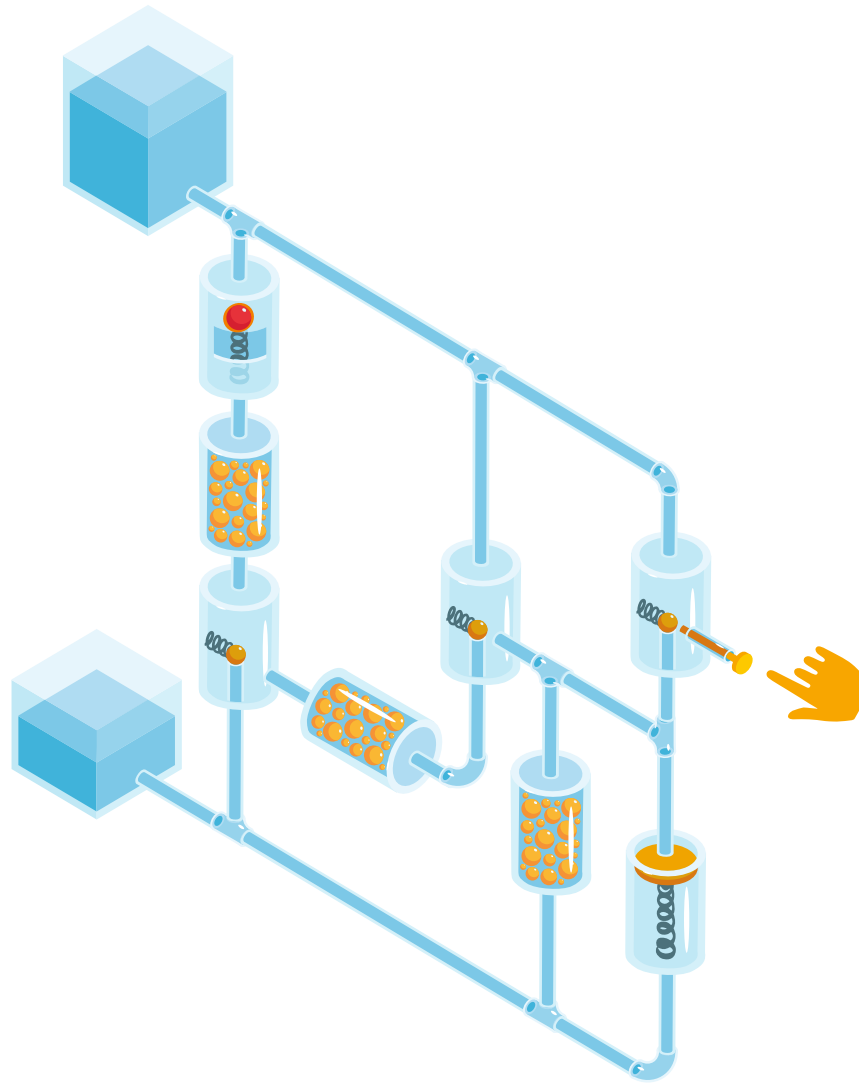Try to do it yourself :-) If it is not easy, you can use a calculator.

Test

Can you make the hydralic model of the following circuit?
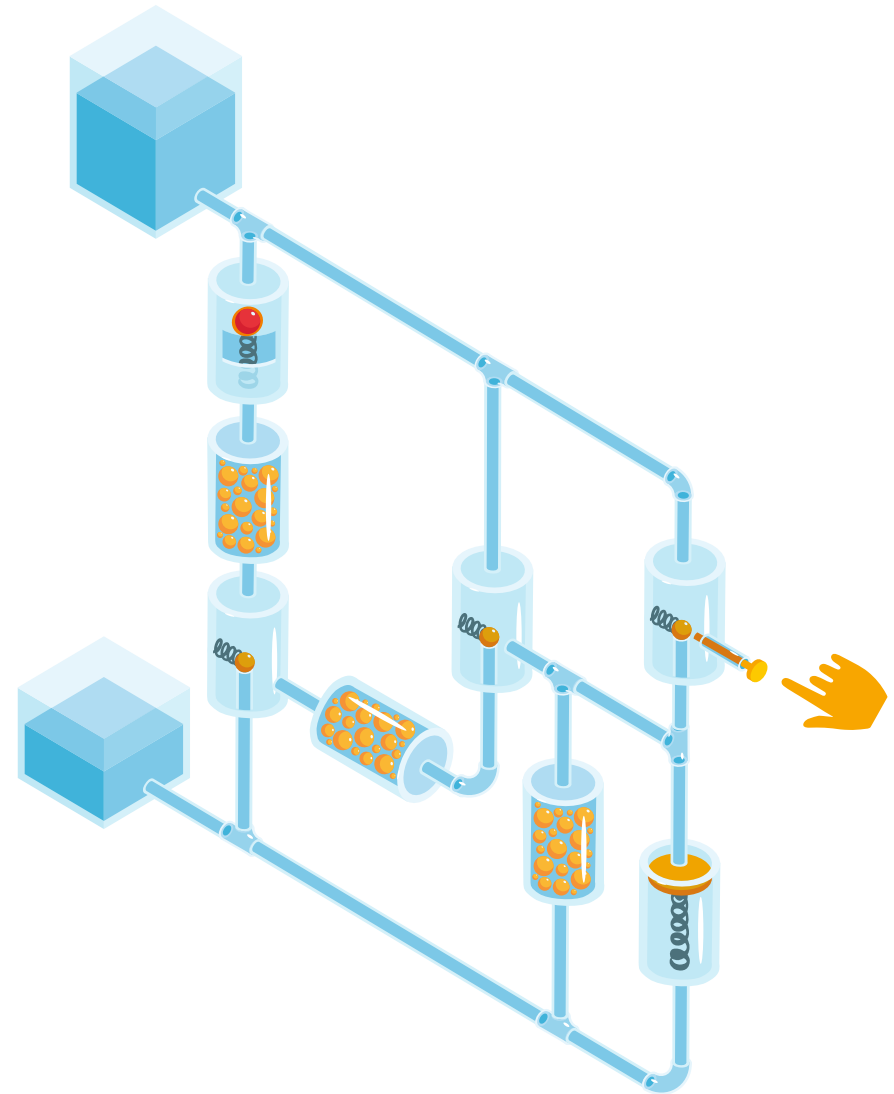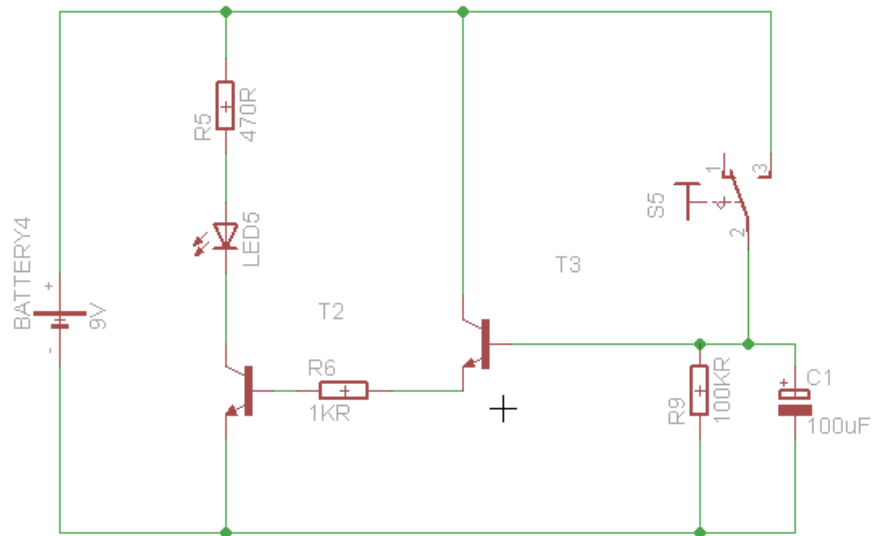**And say what this circuit makes?**
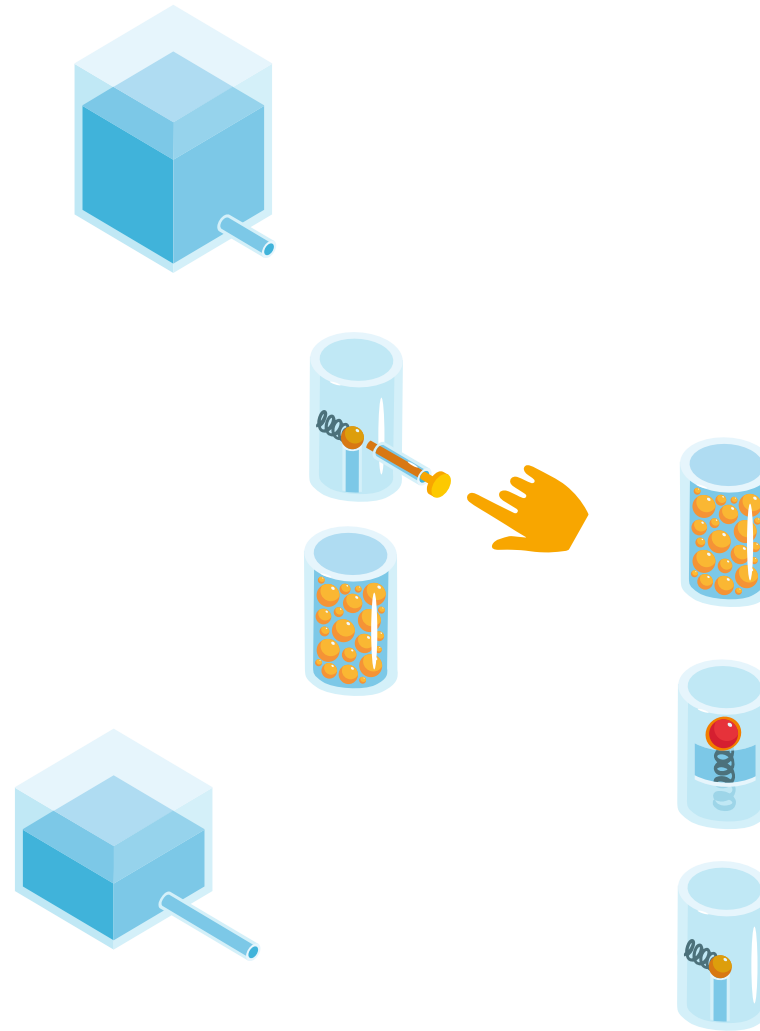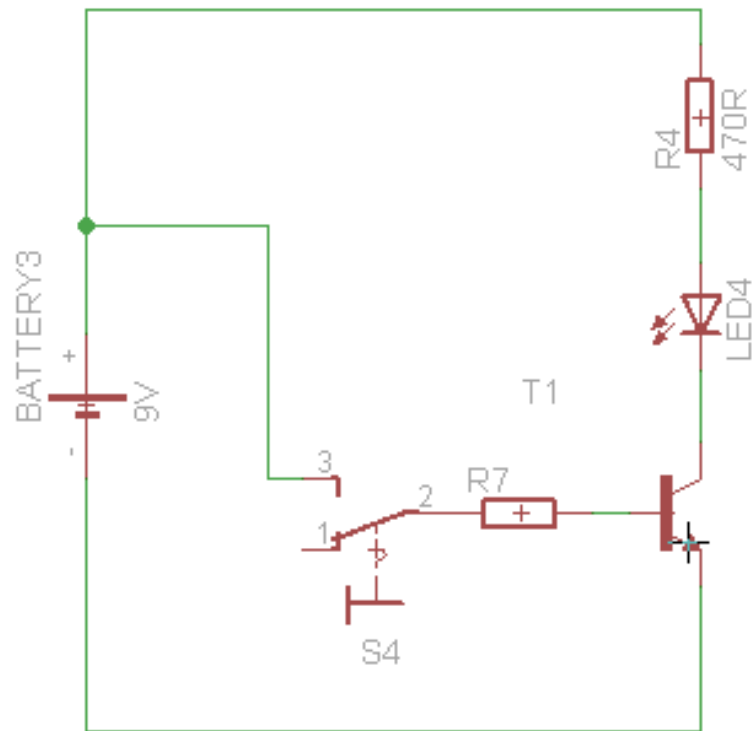
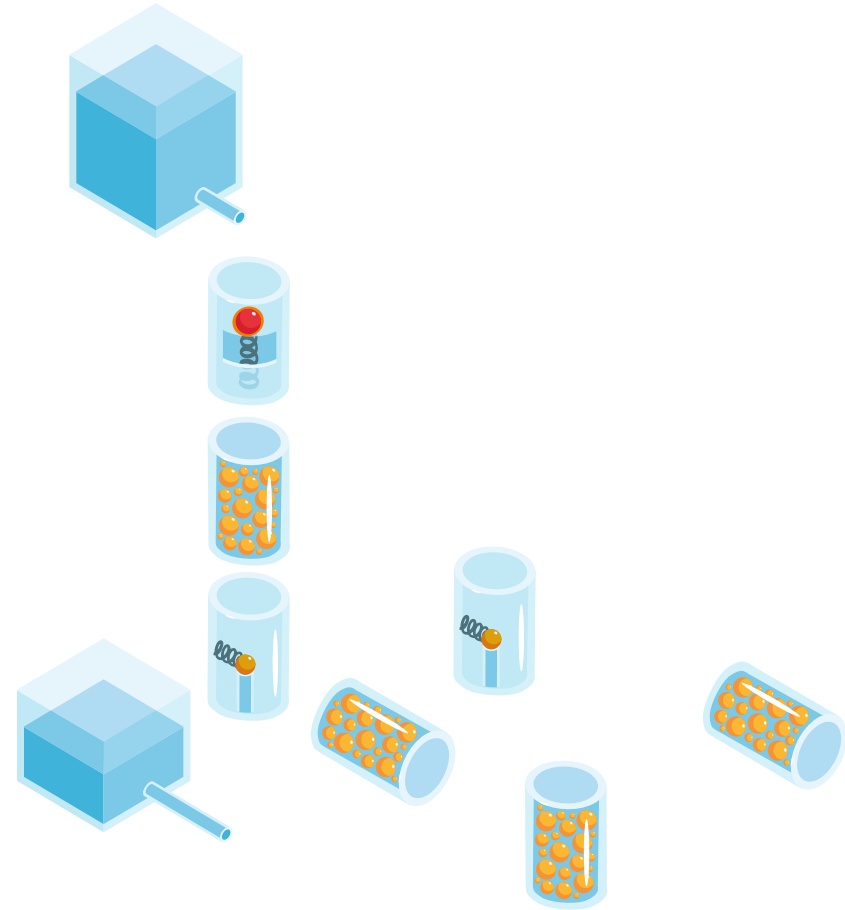# Is there a difference here?

And what makes this circuit?

Timer
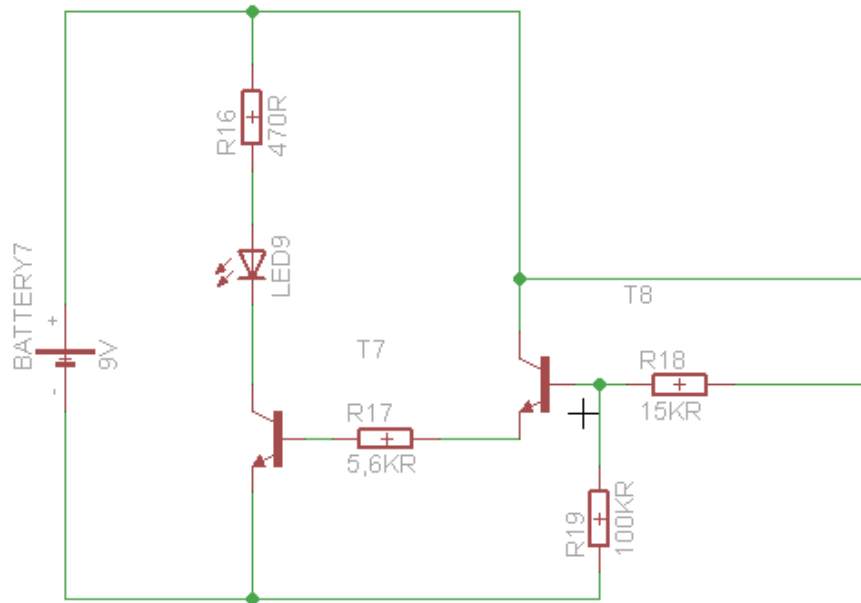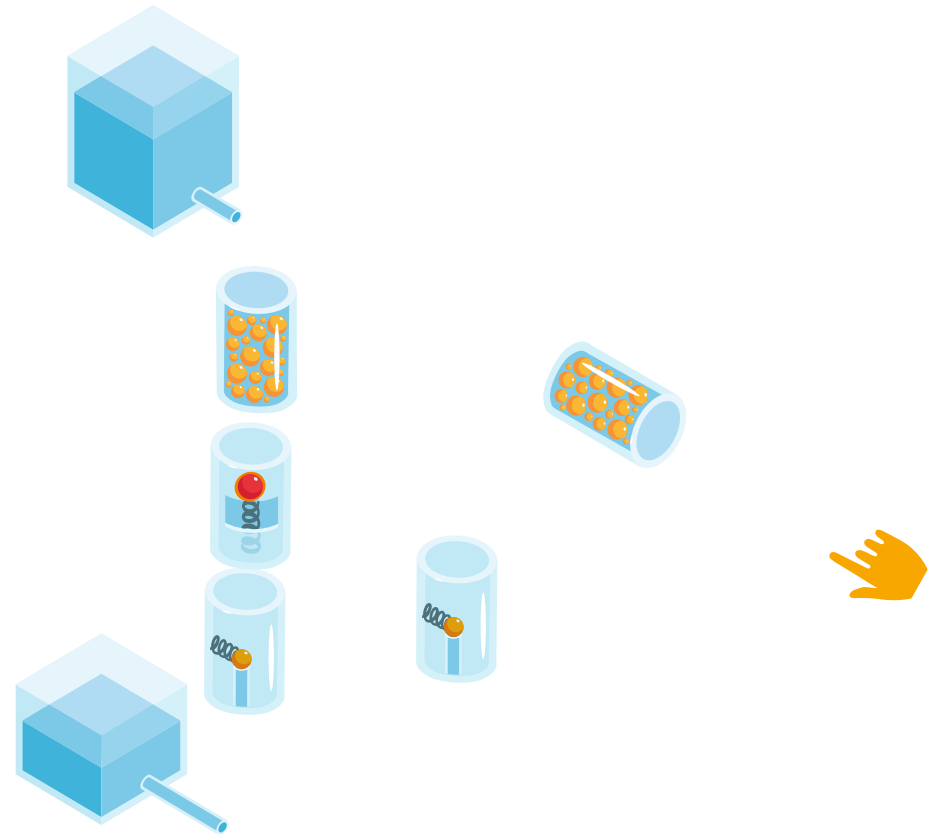
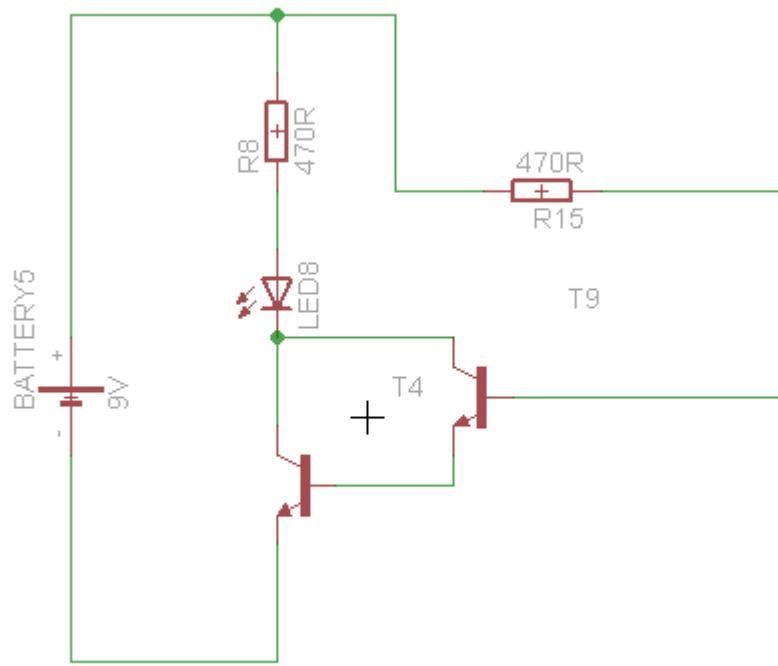# The Transistor
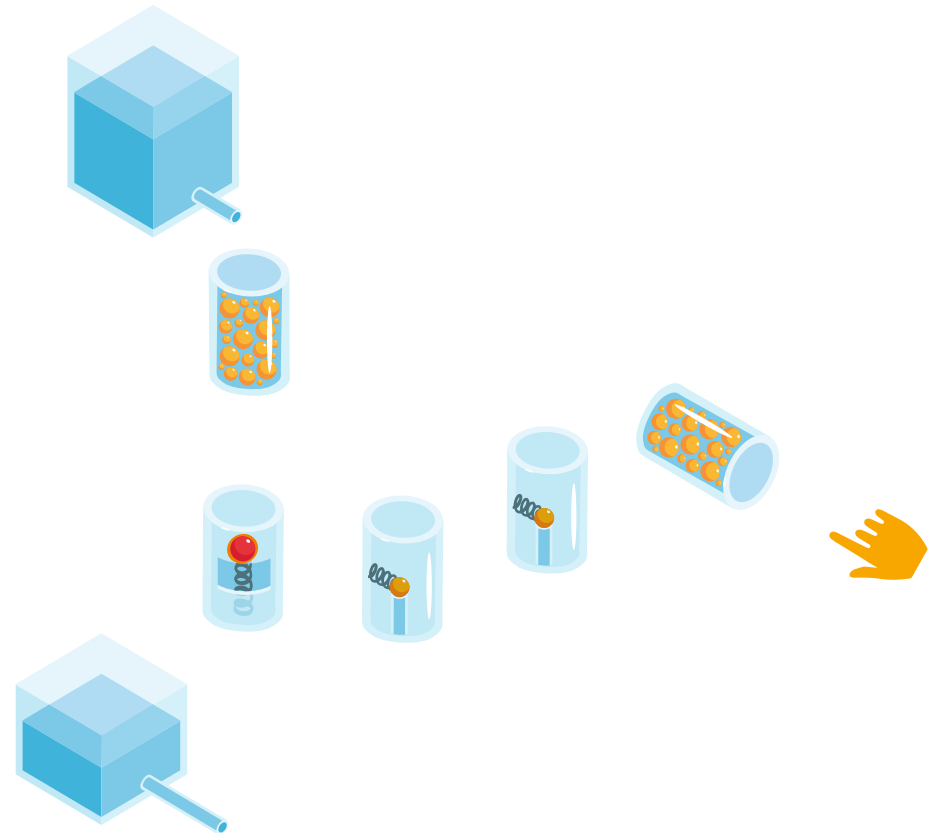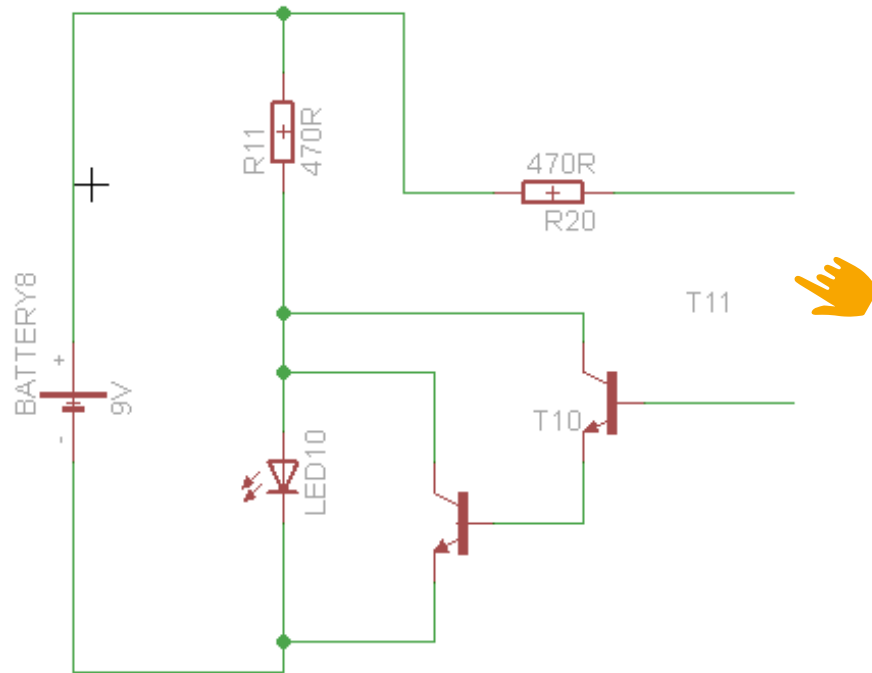
Can you finish it?
And explain?

Watering flowers detector

Can you finish it?
And explain it?

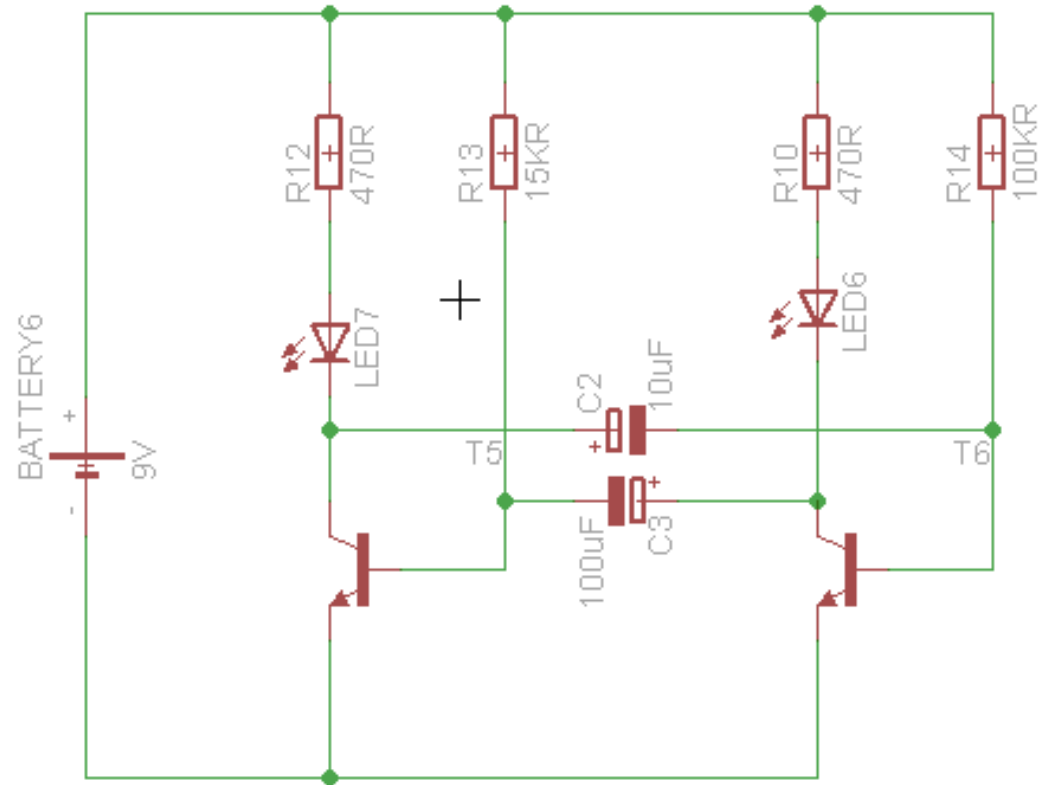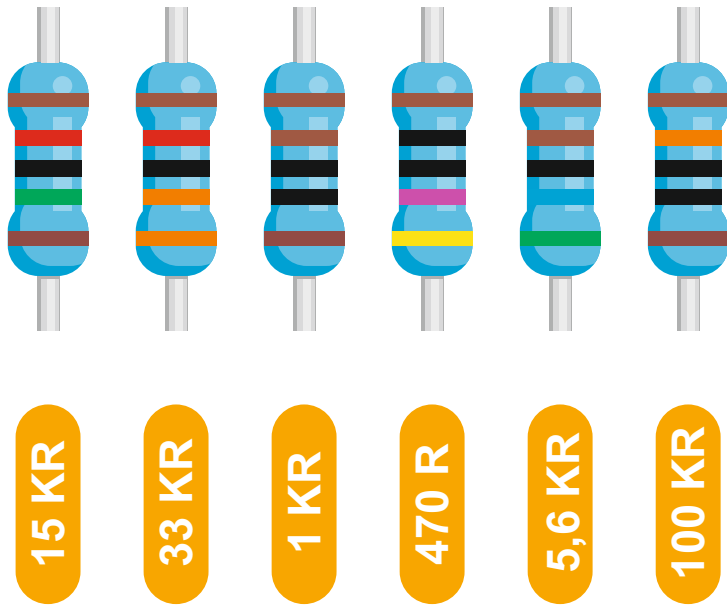# LED On

LED Off

Blinker

Resistors

15 KR

33 KR

1 KR

470 R

5,6 KR

100 KR

4-Band-Code

2%, 5%, 10%   560k Ω   ± 5%

COLOR	1ST BAND	2ND BAND	3RD BAND	MULTIPLIER	TOLERANCE	
Black	0	0	0	1Ω		
Brown	1	1	1	10Ω	± 1%	(F)
Red	2	2	2	100Ω	± 2%	(G)
Orange	3	3	3	1KΩ		
Yellow	4	4	4	10KΩ		
Green	5	5	5	100KΩ	± 0.5%	(D)
Blue	6	6	6	1MΩ	± 0.25%	(C)
Violet	7	7	7	10MΩ	± 0.10%	(B)
Grey	8	8	8		± 0.05%	
White	9	9	9			
Gold				0.1Ω	± 5%	(J)
Silver				0.01Ω	± 10%	(K)

0.1%, 0.25%, 0.5%, 1%   237 Ω   ± 1%

5-Band-Code