National 5 PHYSICS
ELECTRICITY & ELECTRONICS

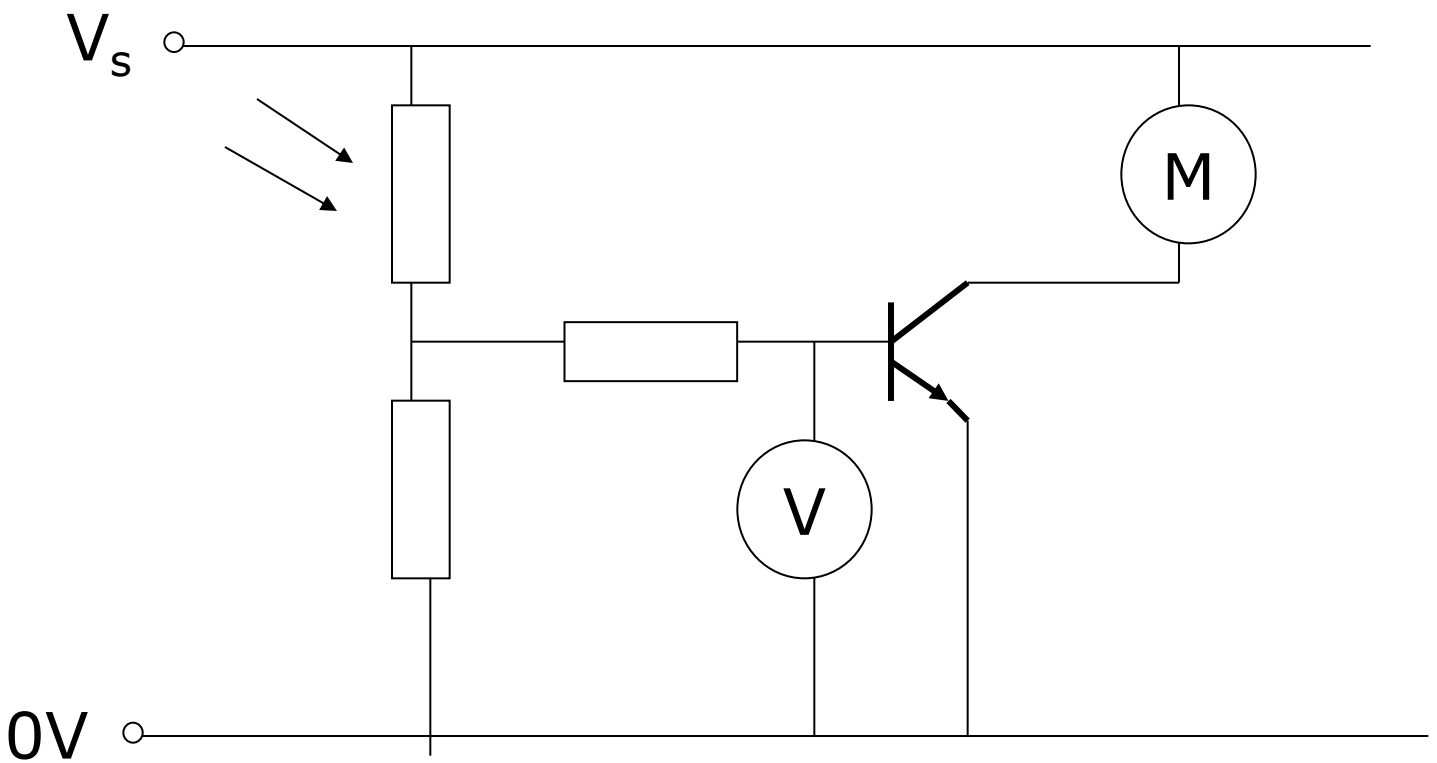
Ways to work out voltage divider circuits.

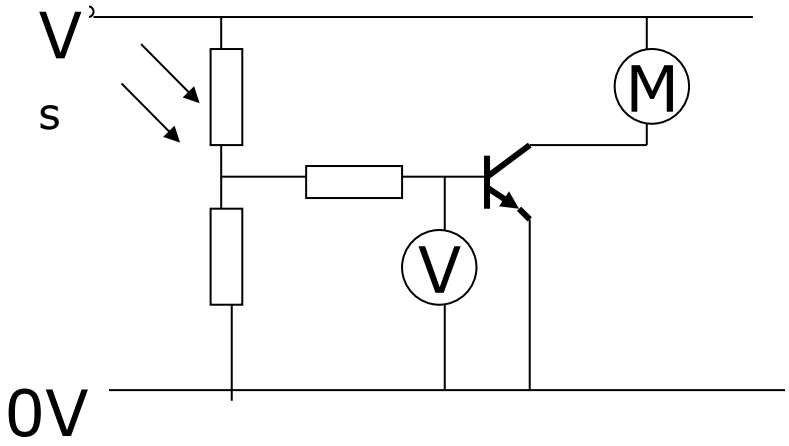
Follow the plan below:

LOCKERBIE ACADEMY PHYSICS DEPT

1. Identify the component (the input device)
2. Set the conditions
3. Decide what happens to the resistance
4. Work out the effect of the voltage across the component
5. Find the effect on V_{out}
6. Find the effect on the transistor (include the magic number)
7. Find the effect on the output device

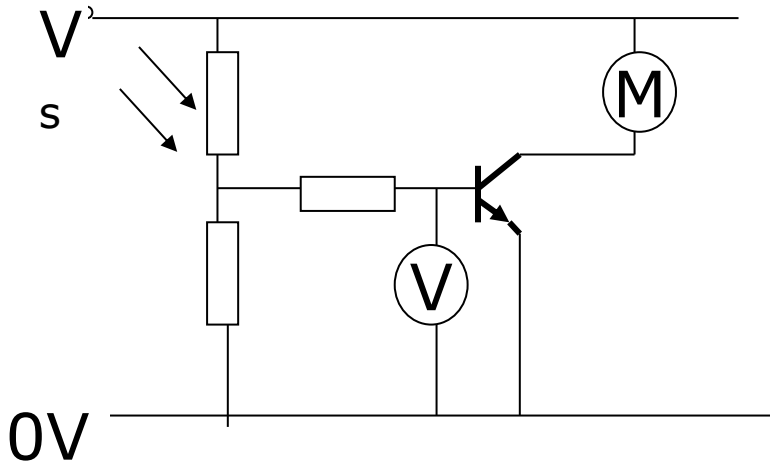
LOCKERBIE ACADEMY PHYSICS DEPT





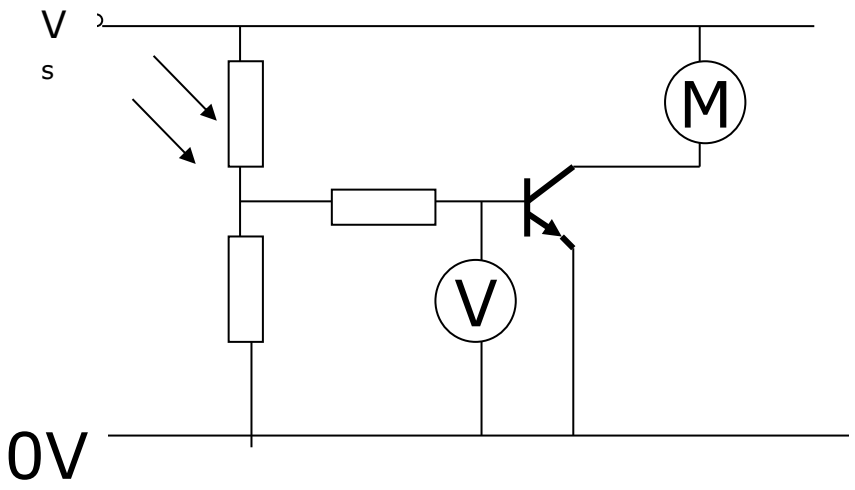
1. Identify the component

LDR



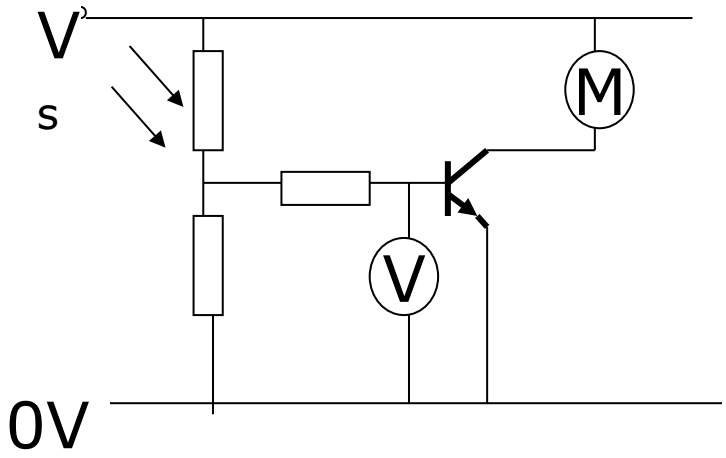
2. Set the conditions

As light increases



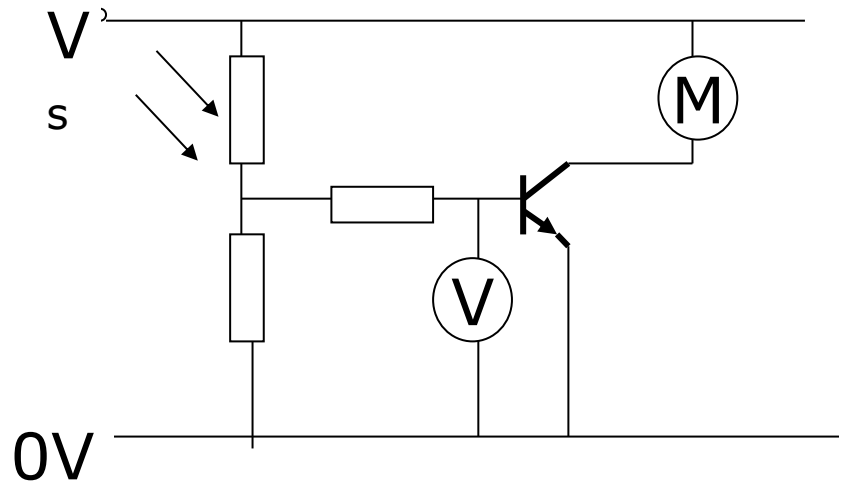
3. Decide what happens to the resistance

As light increases RESISTANCE decreases



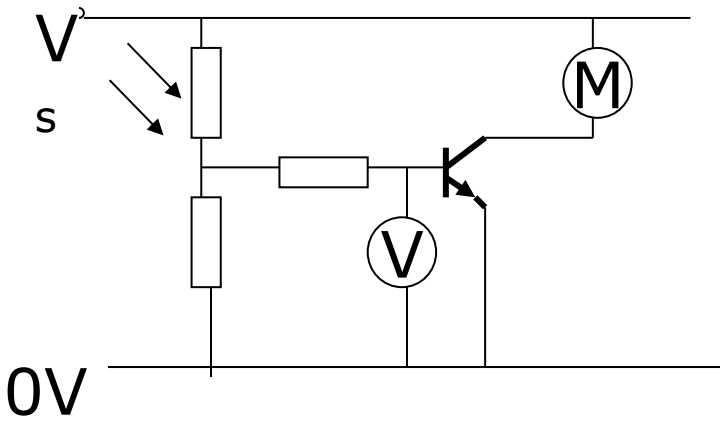
4. Work out the effect of the voltage across the component

As resistance decreases voltage across the LDR decreases



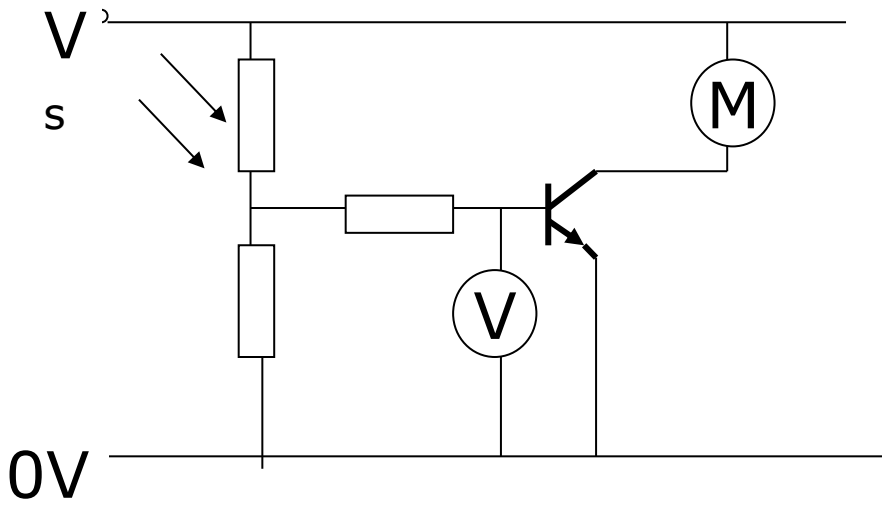
5. Find the effect on V_{out}

As V_{LDR} decreases V_{out} increases as they are not the same



6. Find the effect on the transistor (include the magic number)

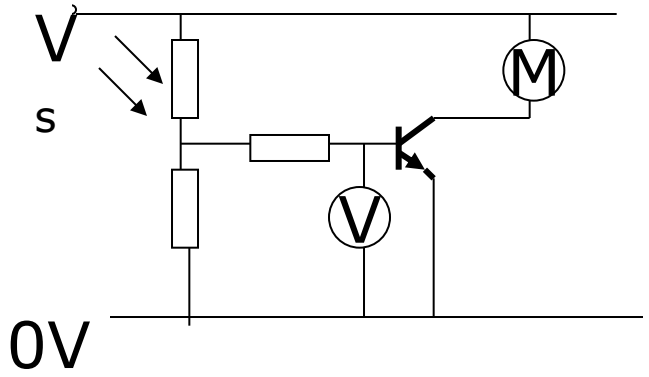
As V_{out} increases the voltage will increase above ***0.7V*** (the magic number) across the base and emitter, the transistor will ***switch on***



7. Find the effect on the output device

Charge will flow between the emitter and collector and the ***motor will be on.***

1. Identify the component
2. Set the conditions



3. Decide what happens to the resistance
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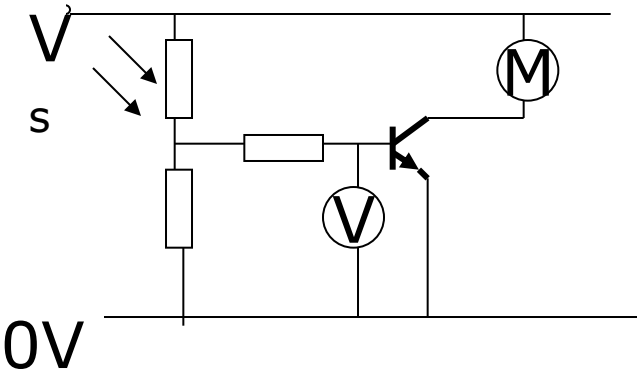
How this LDR circuit works

As light increases
RESISTANCE
decreases



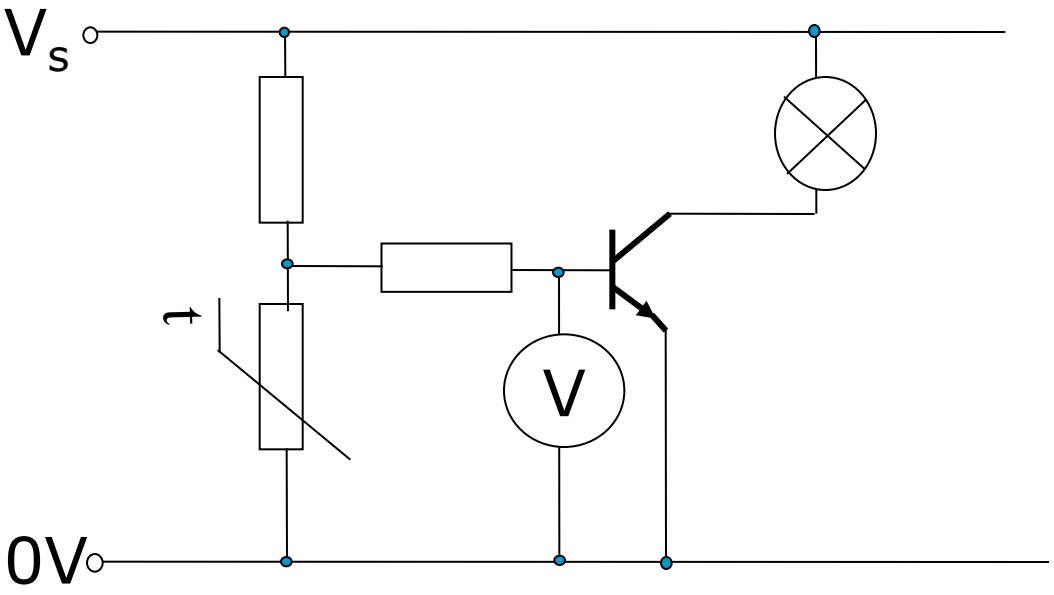
Voltage across the LDR decreases

As V_{LDR} decrease V_{out} increases as they are not the same

As V_{out} increases the voltage will increase **above** *0.7V* (the magic number), the transistor will *switch on. Charge will flow between the emitter and collector and*

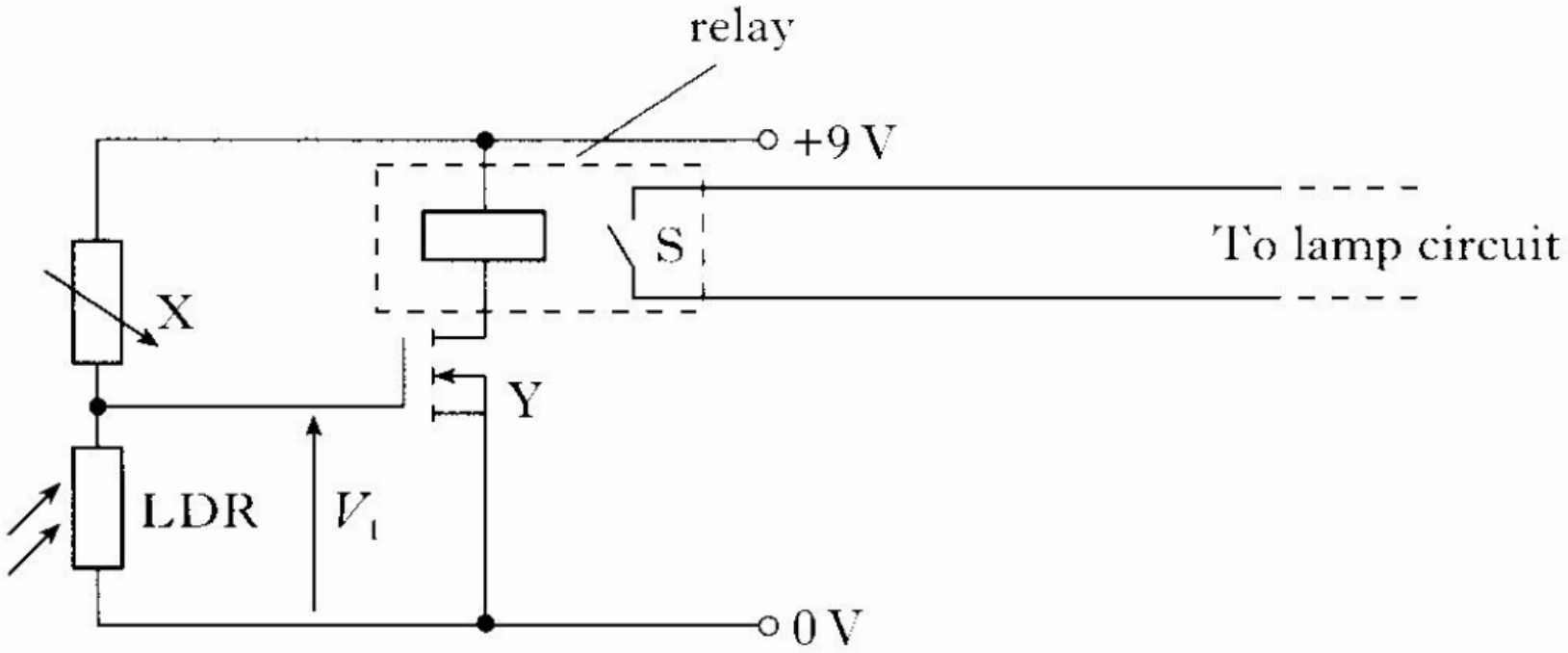
the motor will be on

Now try this one yourself



Other TRANSISTORS

- N-channel enhancement MOSFETS work in a similar way but the SWITCHING VOLTAGE is 1.8V


relay
+9 V
S
To lamp circuit
X
Y
LDR
V_1
0 V

Past Paper Q