POTENTIAL DIVIDERS

Comparators often have potential dividers providing voltages to compare against, sometimes with sensors in. Below are some potential dividers. Begin by following the instructions below to calculate voltages in them.

For each divider, do the following:

1 - Check voltages top and bottom (to get the total voltages

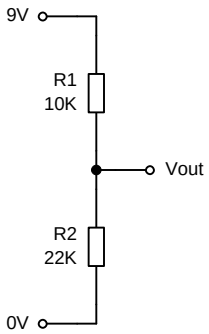
2 - Add up all the resistors to get the total resistance, R.

3 - Calculate the current in the divider by using I = V / R

4 - Now find the voltages across each resistor by using V = I x R where I is the current from before and R is the resistor you want to find the voltage across.

Vout will be the voltage across R2 (or the resistor/s below Vout) plus the voltage applied the other end (usually 0v so answer is the same).

EXAMPLE



V = 9 - 0 = 9v

R = 10K + 22K = 33K

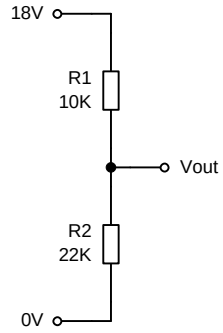
I = V / R
= 9 / 32000
= 0.00028125

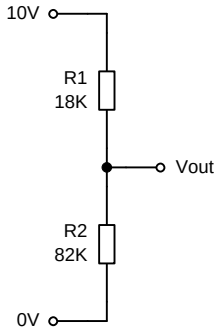
V = I x R
V_{R1} = 0.00028125 x 10000 = **2.81v**
V_{R2} = 0.00028125 x 22000 = **6.19v**

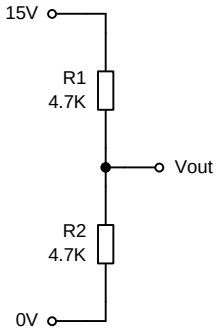
Vout = (6.19v + 0v) = **6.19v**

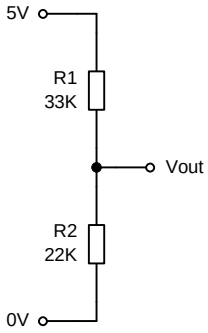
In the following potential dividers, work out the voltages across R1 (VR1) and across R2 (VR2), and Vout in exactly the same way. They are fairly straight forward but follow the procedure above carefully.

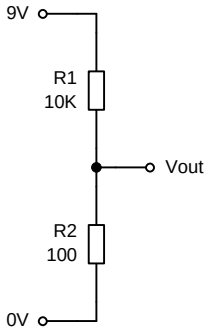
Draw out the circuit and show ALL working





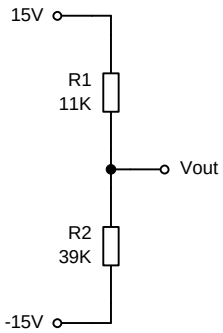


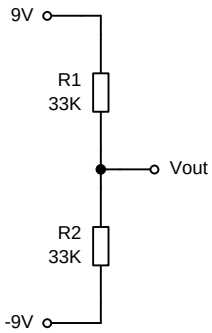


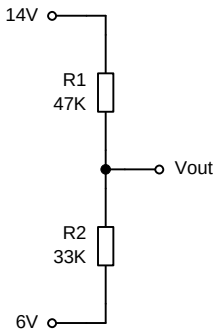


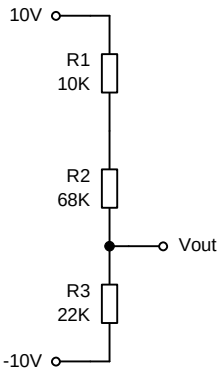
The following have been designed to catch you out.
Just follow the steps above carefully and you should get through them ok.

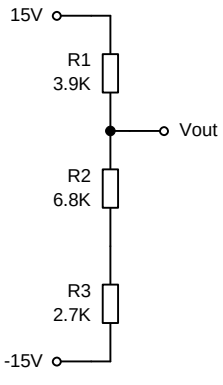
Draw out the circuit and show ALL working



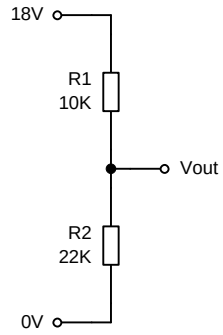








Answers as follows.

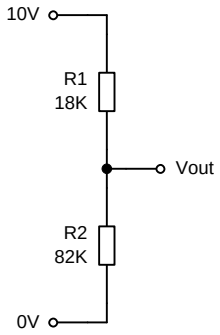


I = 0.000563A
= 563uA

V1 = 5.625 V

V2 = 12.375 V

Vout= 12.375 V

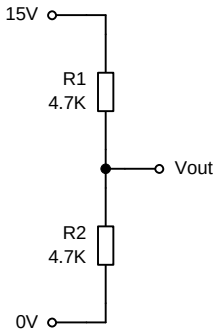


I = 0.0001A
= 100uA

V1 = 1.8 V

V2 = 8.2 V

Vout= 8.2 V

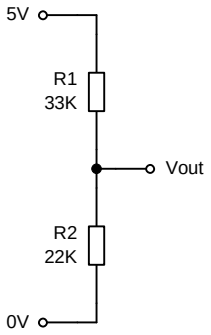


I = 0.00156A
= 1.56mA

V1 = 7.5 V

V2 = 7.5 V

Vout= 7.5 V

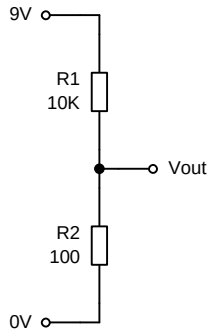


I = 0.000091A
= 91uA

V1 = 3 V

V2 = 2 V

Vout=2 V

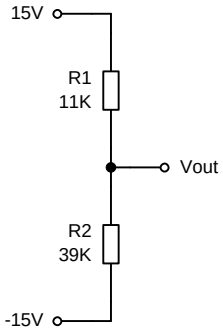


I = 0.000891A
= 891uA

V1 = 8.911 V

V2 = 0.089 V
= 89mV

Vout= 0.089 V

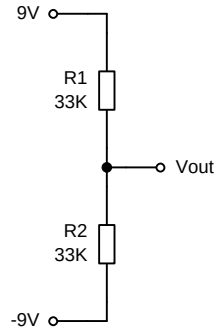


I = 0.0006A
= 600uA

V1 = 6.6 V

V2 = 23.4 V

Vout= 8.4 V

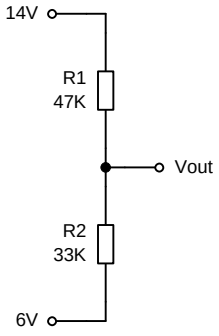


I = 0.000273A
= 273uA

V1 = 9 V

V2 = 9 V

Vout= 0 V

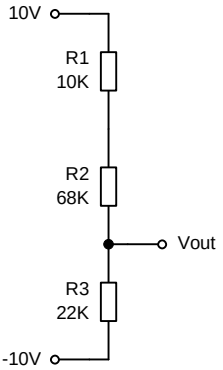


I = 0.0001A
= 100uA

V1 = 4.7 V

V2 = 3.3 V

Vout= 9.3 V



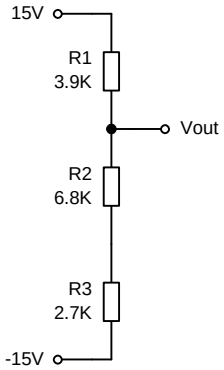
I = 0.0002A
= 200uA

V1 = 2 V

V2 = 13.6 V

V3 = 4.4 V

Vout= -5.6 V



I = 0.00224A
= 2.24mA

V1 = 8.73 V

V2 = 15.22 V

V3 = 6.05 V

Vout= 6.27 V