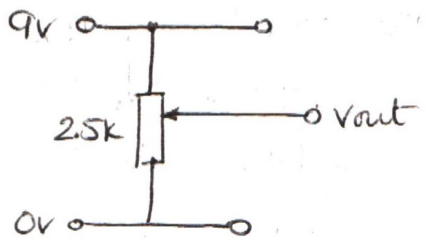
Homework 1.4.



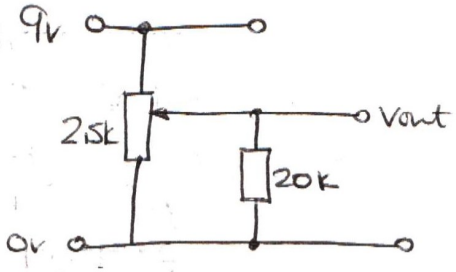
a) 4/5 of 2.5kΩ

$= 2k\Omega$

b) 4/5 of 9v

$= 7.2V$

c)(i)



$V = I \times R$

$I = \frac{V}{R}$

$I = \frac{9}{22000}$

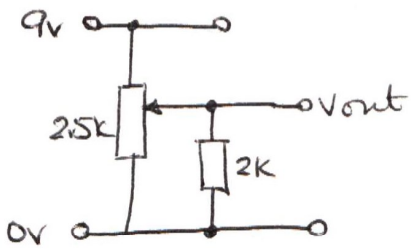
$I = 4.09 \times 10^{-4} A$

$V = I \times R$

$V = (4.09 \times 10^{-4}) \times 20000$

$V = 8.18V$

(ii)



$V = I \times R$

$I = \frac{V}{R}$

$I = \frac{9}{4000}$

$I = 2.25mA$

$V = I \times R$

$V = (2.25 \times 10^{-3}) \times 2000$

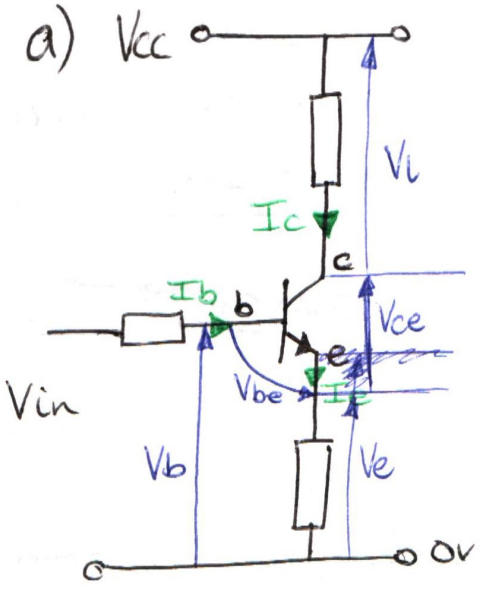
$V = 4.5V$

(iii) When the load resistance is 20kΩ the output voltage is greater, and when the load resistance is 2kΩ the output voltage is smaller.

This is due to $V = I \times R$, increase the resistance and the voltage also increases.

Homework 1.5

a)



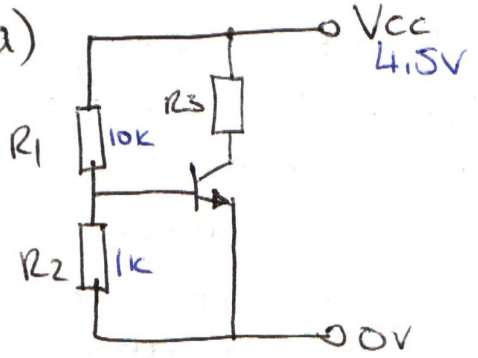
b)

c)

d) As Vin increases, the transistor is off, until Vin reaches 0.7v. At this point the transistor saturates, switches on, and no matter how much Vin increases to, it does not effect the operation of the transistor. When Vin then falls below 0.7v, the transistor will switch off.

Homework 1.6

a)



$V = I \times R$

$I = \frac{V}{R}$

$I = \frac{4.5}{11000}$

$I = 4.09 \times 10^{-4} A$

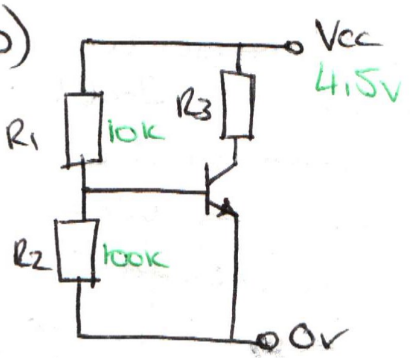
$V = I \times R$

$V = (4.09 \times 10^{-4}) \times 1000$

$V = 0.41 V$

TRANSISTOR OFF

b)



$V = I \times R$

$I = \frac{V}{R}$

$I = \frac{4.5}{110000}$

$I = 4.09 \times 10^{-5} A$

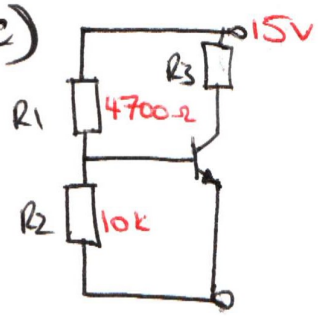
$V = I \times R$

$V = (4.09 \times 10^{-5}) \times 100000$

$V = 4.09 V$

TRANSISTOR ON

c)



$V = I \times R$

$I = \frac{V}{R}$

$I = \frac{15}{14700}$

$I = 1.02 \times 10^{-3} A$

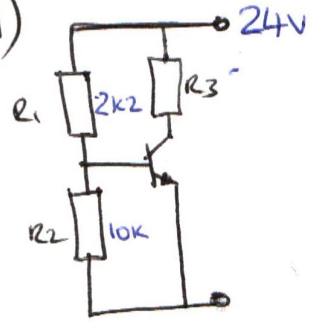
$V = I \times R$

$V = (1.02 \times 10^{-3}) \times 10000$

$V = 10.2 V$

TRANSISTOR ON

d)



$V = I \times R$

$I = \frac{V}{R}$

$I = \frac{24}{12200}$

$I = 1.97 \times 10^{-3} A$

$V = I \times R$

$V = (1.97 \times 10^{-3}) \times 10000$

$V = 19.67 V$

TRANSISTOR ON.