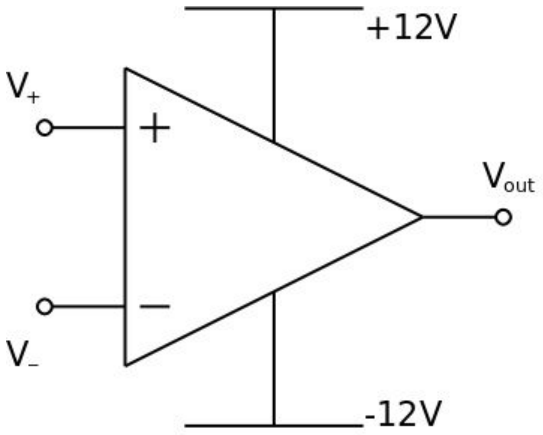
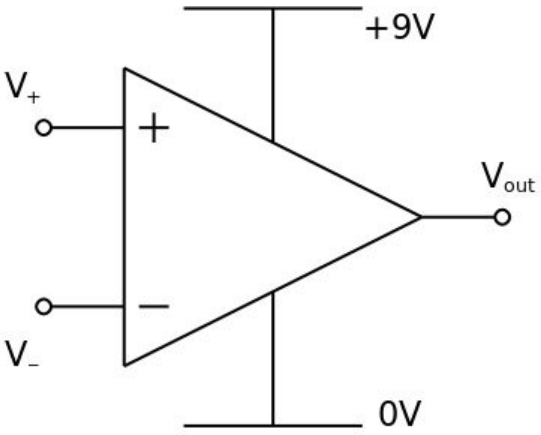
Comparator Exercises

Question 1

Consider the circuits shown below:



Circuit 1



Circuit 2

What is the value of V_{out} when:

A. V_+ = +2 V and V_- = +3 V in circuit 1?

B. V_+ = +3 V and V_- = +2 V in circuit 1?

C. V_+ = -2 V and V_- = +3 V in circuit 1?

D. V_+ = -2 V and V_- = -3 V in circuit 1?

E. V_+ = +4 V and V_- = +5 V in circuit 2?

F. V_+ = +5 V and V_- = +3 V in circuit 2?

G. V_+ = +6 V and V_- = +3 V in circuit 2?

H. V_+ = +3 V and V_- = +6 V in circuit 2?

I. V_+ = +2 V and V_- = +2 V in circuit 1?

J. V_+ = -2 V and V_- = -2 V in circuit 1?

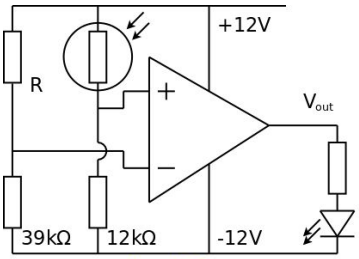
K. V_+ = 0 V and V_- = 0 V in circuit 1?

Question 2

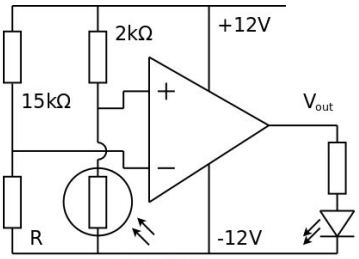
Consider the comparator circuits shown below.

When the light intensity is **600 Lux**, the resistance of the LDR is **4 kΩ**.

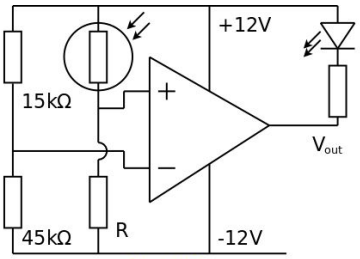
In each circuit the LED changes state (goes from ON to being OFF or from OFF to being ON) when the light level is 600 Lux.



Circuit 3



Circuit 4



Circuit 5

A. In circuit 3, what is the state of the LED when the light level is 800 Lux?

B. In circuit 3, what is the value of the resistor labelled R?

C. In circuit 4, what is the state of the LED when the light level is 800 Lux?

D. In circuit 4, what is the value of the resistor labelled R?

E. In circuit 5, what is the state of the LED when the light level is 800 Lux?

F. In circuit 5, what is the value of the resistor labelled R?

Comparator Exercises Answers

Question 1

A.	-10 V	It should be -12 V but V_{out} is always 2 V away from the power supply
B.	+10 V	
C.	-10 V	-2 < +3
D.	+10 V	-2 > -3
E.	+2 V	It should be 0 V but V_{out} is always 2 V away from the power supply
F.	+7 V	
G.	+7 V	
H.	+2 V	
I.	0 V	There is no difference between the inputs
J.	0 V	
K.	0 V	

Question 2

A.	ON	Light intensity is greater, resistance of the LDR is less, V_+ is higher
B.	13 kΩ	AT 600 Lux, 4 kΩ : 12 kΩ = R : 39 kΩ, R = 13 kΩ (ratio 1:3)
C.	OFF	
D.	30 kΩ	
E.	OFF	As for question A., V_+ is higher, V_{out} = +10V, the LED is OFF
F.	12 kΩ	