

















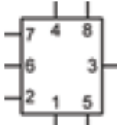





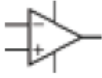




















# Circuit Symbols

These are the circuit symbols you **MUST MEMORISE** as drawn by the exam board

## Circuit Symbols

Candidates should be taught to recognise and draw the circuit symbols shown below:

					9V 
Cell	Light emitting diode	Push to make switch	Diode	Bell	0V 
					
Battery	Flashing light emitting diode	Push to break switch	Thyristor	Microphone	Earth
					
Resistor	Bi-colour light emitting diode	Single pole single throw switch	NPN transistor	Buzzer	555 timer IC
					
Variable resistor	Tri-colour light emitting diode	Single pole double throw switch	Field effect transistor	Loudspeaker	Operational Amplifier
					
Potentiometer	Photo transistor	Capacitor	AND gate	Lamp	Voltage regulator
					
Thermistor	Opto-isolator	Electrolytic capacitor	OR gate	Motor	Crossing of conductors
					
Light dependent resistor		Piezo crystal oscillator	NOT gate	Voltmeter	Joined Conductors
					
				Ammeter	

# Calculations

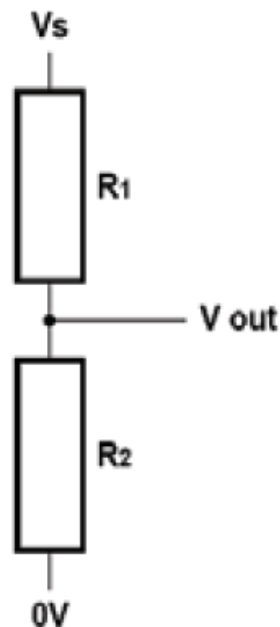
These are the formulae which you **DO NOT NEED TO MEMORISE**. They will be in the paper! You need to be able to use them though!

(these formulae will be listed in the examination paper);

Potential Difference      Potential Difference = Current  $\times$  Resistance      ( $V = I \times R$ )

Series Resistors       $R_{total} = R1 + R2 + R3$  etc

Potential Divider



$$V_{out} = \frac{R2}{R1 + R2} \times V_s$$

where     $V_{out}$  = signal value  
          $V_s$  = supply voltage  
          $R1$  and  $R2$  are resistance values

Time Constant      Time Constant  $\approx$  Resistance  $\times$  Capacitance      ( $T \approx R \times C$ )

Astable Frequency for 555

$$f = \frac{1.44}{(R1 + 2R2) \times C}$$

Mark Space Ratio

$$= \frac{\text{Time high}}{\text{Time low}}$$

Time High

$$= 0.693 \times (R1 + R2) \times C$$

Time Low

$$= 0.693 \times R2 \times C$$

Inverting Op.Amps

$$\text{Gain} = \frac{-R_f}{R_{in}} \quad \begin{array}{l} \text{Where } R_f = \text{feedback resistor value} \\ \text{Where } R_{in} = \text{input resistor value} \end{array}$$