

Electronics – HW1

1. (a) X represents an analogue signal
Y represents a digital signal
- (b) X is analogue because there is a continuous range of values
Y is digital because only 2 values are possible.

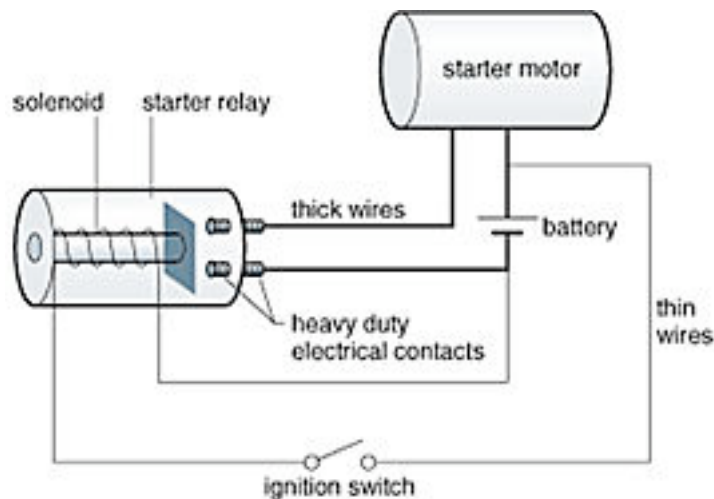
2.

Analogue	Digital
Mercury thermometer	Electronic thermometer
Cassette recorder	computer
Radio	Video-timer
Watch (clockwork)	
Moving-coil meter	

3.

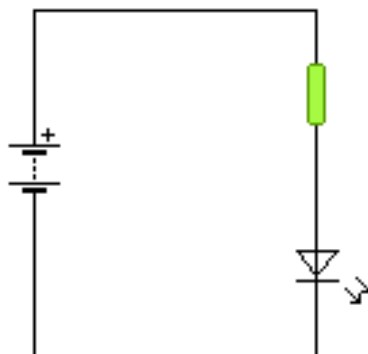
Device	Energy Change
Loudspeaker	Electrical → sound
Electric motor	Electrical → kinetic

4. (a) A relay is a switching device that is controlled by changes in signal in another circuit.
- (b) The relay is useful because;
 - it allows a circuit to be controlled remotely.
 - high current circuits can be controlled by safer, low current circuits.
5. Solenoids are used in car starter motors.



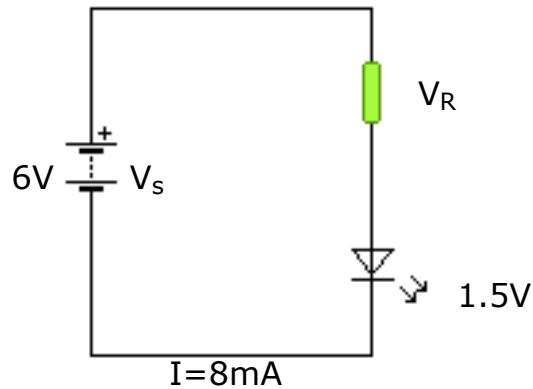
When the ignition key is turned, the ignition switch is closed and current flows round the ignition circuit. When current passes through the solenoid coil, a magnetic field is produced. The magnetic field interacts with the permanent magnetic field of the armature, pushing the armature out of the solenoid casing until the plate connects the 2 heavy-duty contacts, closing the high current circuit containing the starter motor.

6. (a)



6. (b) The series resistor is included to protect the LED from large currents.

(c)



$$V_S = V_R + V_{LED}$$

$$V_R = V_S - V_{LED}$$

so

$$V_R = 6V - 1.5V = 4.5V$$

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

$$R = \frac{4.5}{0.008}$$

$$R = 562.5\Omega$$

The size of the series resistor is 562.5Ω.

7.

Decimal number	Segments lit						
	a	b	c	d	e	f	g
4	0	1	1	0	0	1	1
2	1	1	0	1	1	0	1