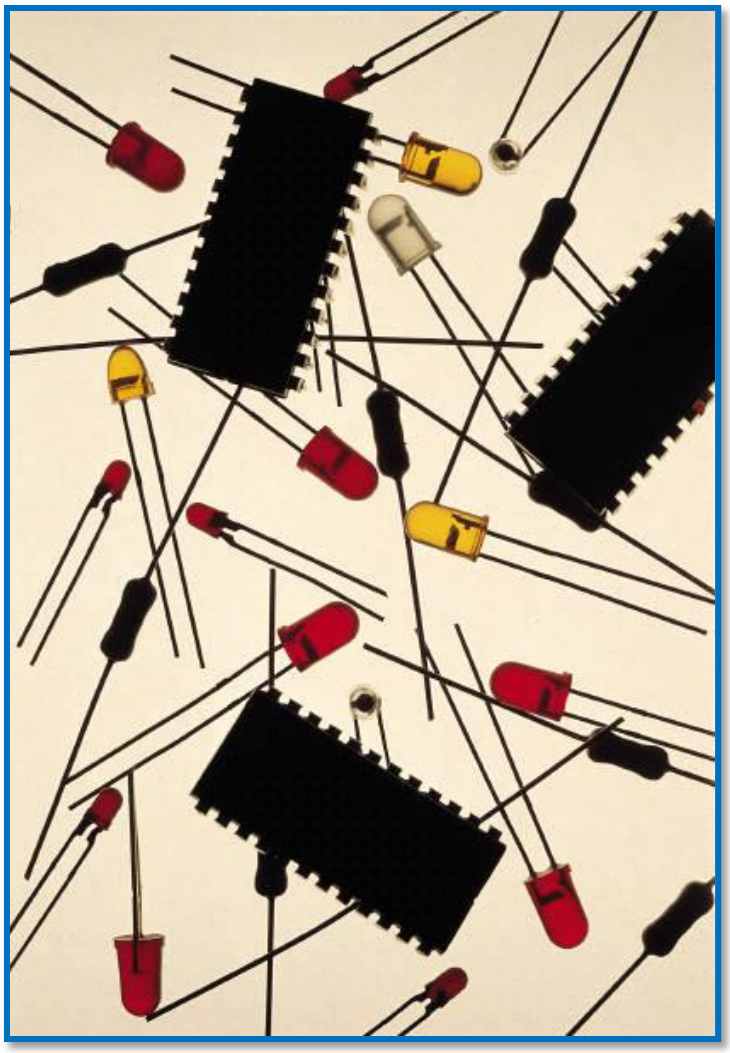
ANALOGUE AND DIGITAL ELECTRONICS

Supplementary material: WORKSHEETS



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Worksheet 1A	STUDENT A	Unit 1 (11), unit 3 (7)

Unit 1, Activity 11	Text underlined is for dictation “A to B”.

Signals in nature are analogue. For example, sound is an air pressure wave[(a)]. It is analogue because it can be any value.

_____[(b)].

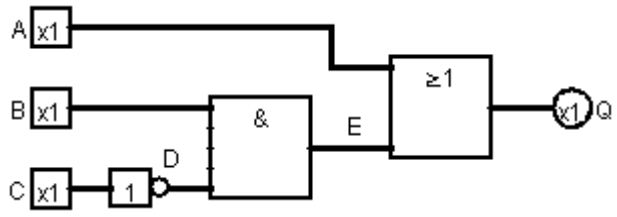
- *They can be converted to numbers and easily processed by computers [(a)].*
- *They are easy to store and to compress using mathematical algorithms.*
- *Noise _____ [(b)] as much as to analogue signals.*

*When data is transmitted, processed or stored a certain amount of **NOISE** enters into the signal [(a)].*

With an analogue signal, noise cannot _____ [(b)]. We have distortion. In a digital signal, noise will not matter, as any signal close enough to a particular value will be interpreted as that value.

Unit 3, Activity 7	Logic diagram description and solution.

Describe this diagram to your partner B.



Expression: $Q = A + B \cdot \overline{C}$

A	B	C	Q
0	0	0	0
0	0	1	0
0	1	0	1
0	1	1	0
1	0	0	1
1	0	1	1
1	1	0	1
1	1	1	1

Worksheet 1B	STUDENT B	Unit 1 (11), unit 3 (7)

Unit 1, Activity 11	Text underlined is for dictation “B to A”.

Signals in nature are analogue. For example, _____ [(a)]. It is analogue because it can be any value.

<u>Digital signals have many advantages</u> [(b)]:

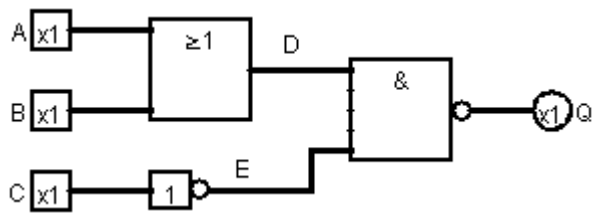
- *They can be converted to numbers and easily _____ [(a)].*
- *They are easy to store and to compress using mathematical algorithms.*
- *Noise <u>does not affect them</u> [(b)] as much as to analogue signals.*

*When data is transmitted, processed or stored a certain amount of **NOISE** _____ [(a)].*

With an analogue signal, noise cannot <u>be distinguished from the original signal</u> [(b)]. We have distortion. In a digital signal, noise will not matter, as any signal close enough to a particular value will be interpreted as that value.

Unit 3, Activity 7	Logic diagram description and solution.

Describe this diagram to your partner A.

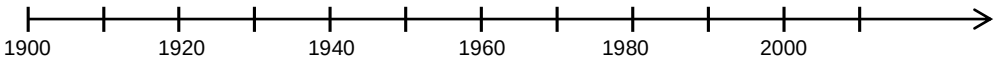


Expression: $Q = \overline{(A+B) \cdot C}$

A	B	C	Q
0	0	0	1
0	0	1	1
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	1
1	1	0	0
1	1	1	1

Name:	Group:	__/__/__

01 **a)** Place on the time line three main developments in the history of electronics.



b) Underline the right words:

- A fan is an *electrical/electronic* device because it transforms *information/energy*.
- The *process/input/output* part of a thermometer converts temperature into electric signals.
- A *digital/analogue* signal is less affected by noise.
- *Binary/analogue* signals are more difficult to manipulate and store.

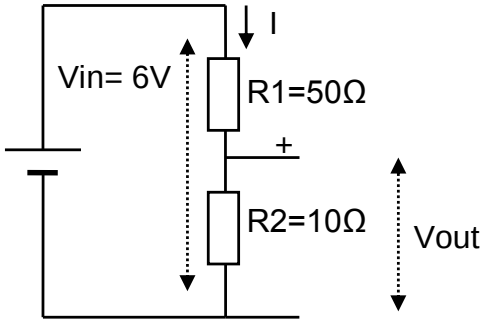
c) What is the problem with e-waste? Propose two measures to deal with it.
E-waste is...

02 a) What are the colours for a 5k6 (10%) resistor?

b) Obtain the minimum and maximum value for a resistor with these colours: brown / green / red // silver

Black	0
Brown	1
Red	2
Orange	3
Yellow	4
Green	5
Blue	6
Violet	7
Grey	8
White	9
Silver	10%
Gold	5%

c) What do we call this kind of circuit? ..... Calculate Vout.

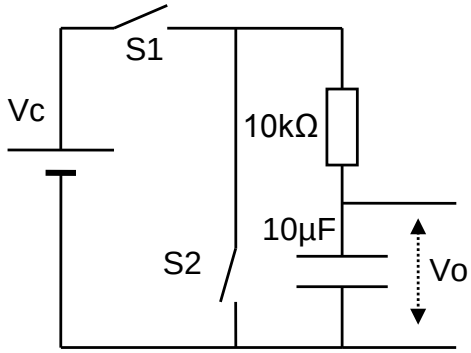


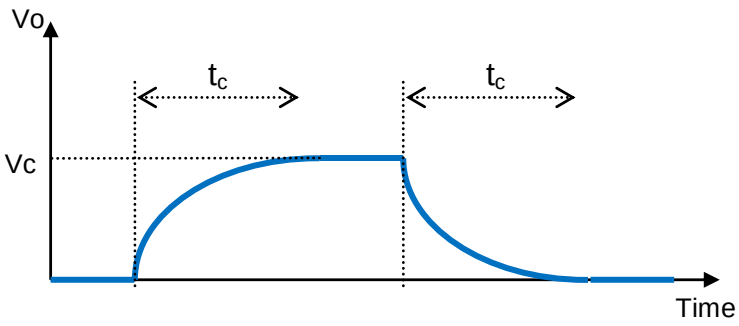
d) Explain how Vo will change depending on the temperature if R2 is a PTC?

If temperature ..... then R2 will .....

If R2 .....

03 a) Calculate the charge and discharge time (t_c) for this circuit:



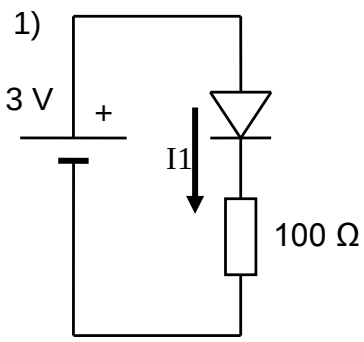


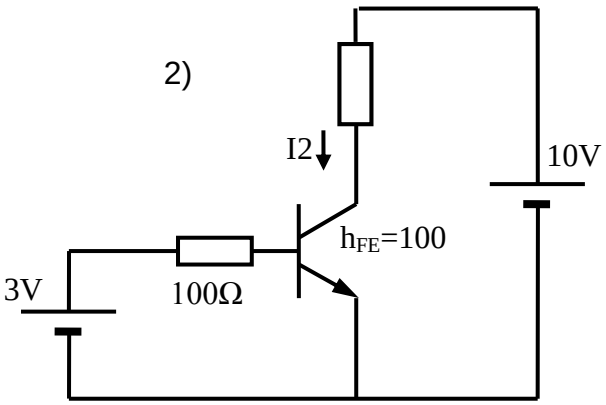
b) Underline the right words:

A *transistor/capacitor/diode* is a semiconductor device that allows current to flow in one direction. The current can only flow from *base/anode* to *cathode/collector*.

A *transistor/capacitor* is a semiconductor device used to *charge/amplify* electronic signals. It has *two/three* terminals for connection to an external circuit.

c) Calculate the currents in this circuit



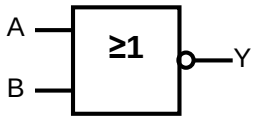


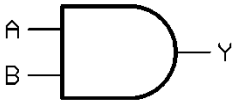
04 a) Convert “a” from binary to digital and “b” from digital to binary.

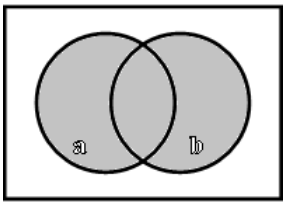
	Binary	Binary weight					Decimal
		16	*8*	*4*	*2*	*1*	
a)	01110						
b)							5

b) Add them in binary.

c) Identify the type of gates which these diagrams represent.

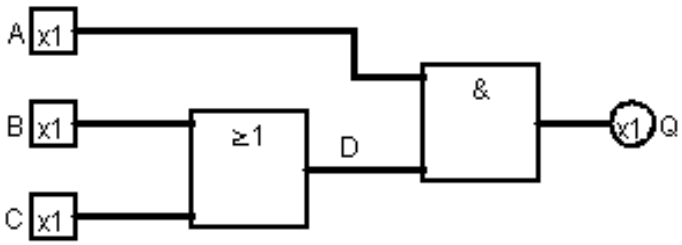






A	B	Y
0	0	**0**
0	1	**1**
1	0	**1**
1	1	**0**

05 a) Find the expression for this logic system and fill in the truth table.



Expression:

A	B	C	Q
0	0	0	
0	0	1	
0	1	0	
0	1	1	
1	0	0	
1	0	1	
1	1	0	
1	1	1	

b) Design a logic system for a water supply system. The water pump must be on when the deposit is empty or when the tap is open. Find the expression, the circuit with IEC symbols and the truth table. Circle the combination in which the deposit is empty and the tap closed.

Inputs:

A: deposit (0 empty, 1 full)

B: tap (0 closed, 1 open)

Output:

Q= pump (0 off, 1 on)

Expression:

A	B	Q
0	0	
0	1	
1	0	
1	1	