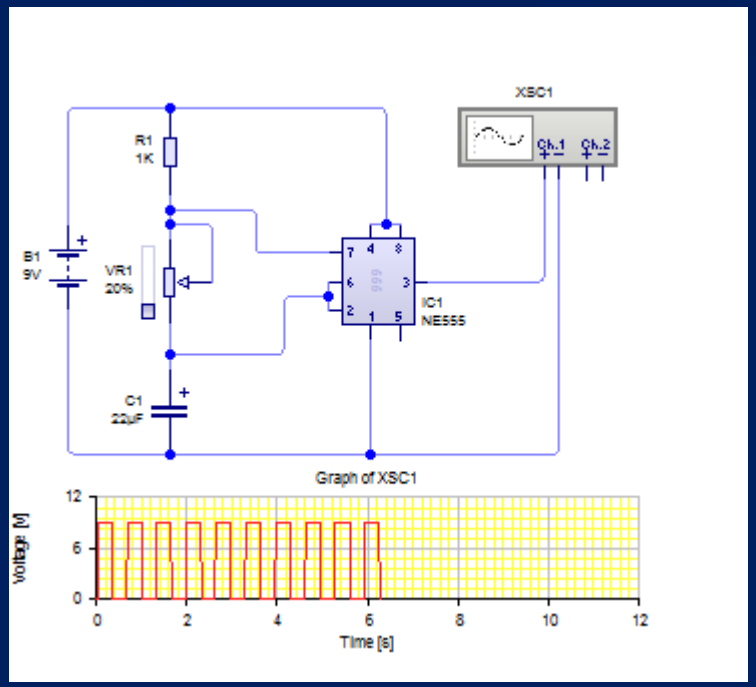
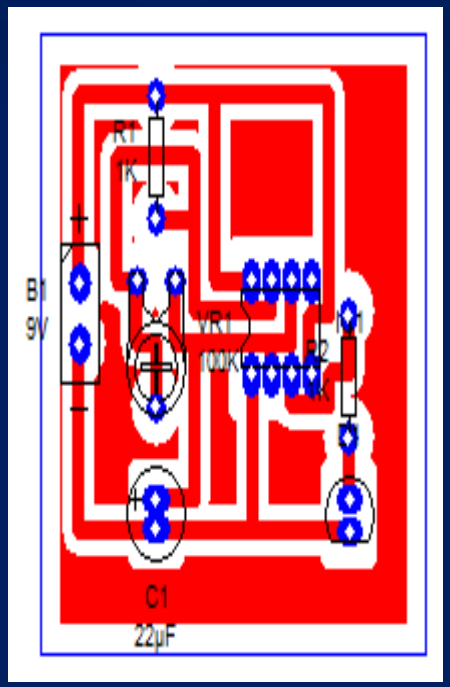
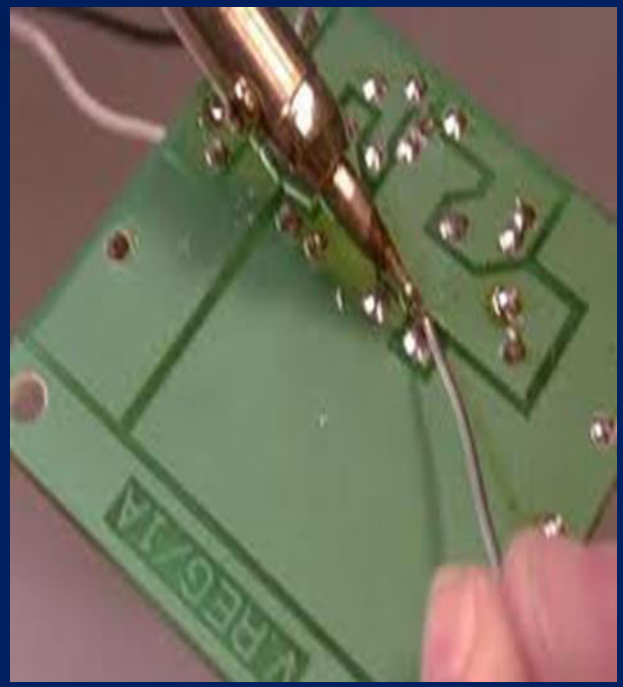
Welcome to GCSE ELECTRONICS







What you will learn

- You will learn how electricity flows around a circuit and how to predict its behaviour.
- You will understand electronic system design processes.
- You will learn how to read and interpret circuit diagrams.
- You will use CAD/CAM methods to design and construct electronic circuits safely and accurately.
- You will test and diagnose the circuits and components you have built using appropriate test equipment.
- You will learn how to program your own PIC (Peripheral Interface Controller)

How you will be assessed?

Two Exam Papers – each worth 40% of the total GCSE grade

Paper 1

Discovering Electronics

Covers the following topics:

1. Electronic systems and sub-systems
2. Circuit concepts
3. Resistive components in circuits
4. Switching circuits
5. Applications of diodes
6. Combinational logic systems

Paper 2

Application of Electronics

Covers the following topics:

1. Operational amplifiers
2. Timing circuits
3. Sequential systems
4. Interfacing digital to analogue circuits
5. Control circuits

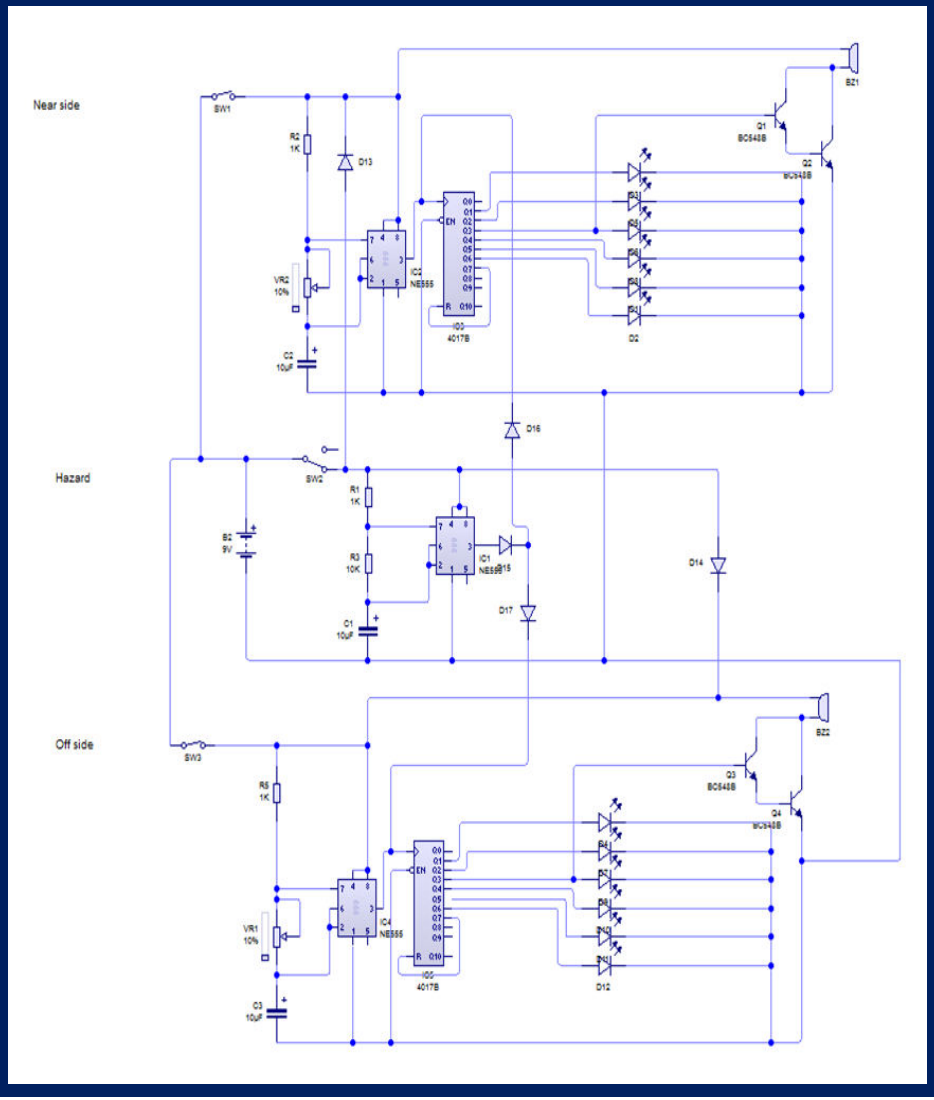
How you will be assessed?

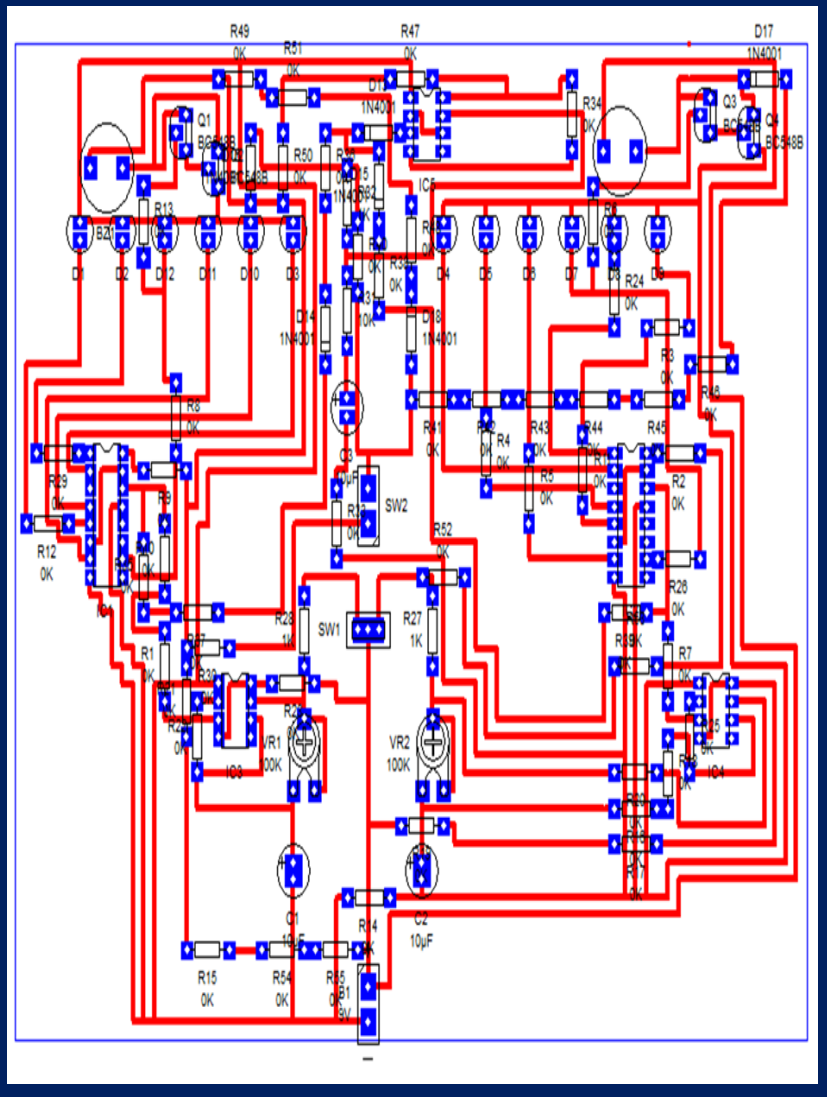
NEA (Non Examined Assessment)
In Electronics the NEA is worth the remaining 20 % of the qualification.
You will be asked to do the following:

- Identify a problem that you think can be solved with an electronic solution
- Research into the circumstances/causes of the problem.
- Design an electronic solution and test on a Computer Aided Design (CAD) programme
- Convert your design to a Printed Circuit Board (PCB) using PCB design software
- Build your electronic solution circuit
- Test and fault find your circuit solution
- Evaluate

All of the above are recorded in an NEA booklet which is internally assessed in school and a representative sample sent to EDUQAS for external moderation.

Student circuit simulations and PCB design





Sample examination question from Paper 1

INFORMATION SHEET

This information may be of use in answering the questions.

Resistor Colour Codes

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

The fourth band colour gives the tolerance as follows:

GOLD ± 5%

SILVER ± 10%

Resistors E24 series values

10, 11, 12, 13, 15, 16, 18, 20, 22, 24, 27, 30, 33, 36, 39, 43, 47, 51, 56, 62, 68, 75, 82, 91.

Useful equations

$$P = \frac{V^2}{R} \qquad G = 1 + \frac{R_F}{R_1}$$

$$V_{OUT} = \frac{R_2}{R_1 + R_2} V_{IN} \qquad G = -\frac{R_F}{R_{IN}}$$

$$I_D = g_M (V_{GS} - 3) \qquad V_{OUT} = -R_F \left(\frac{V_1}{R_1} + \frac{V_2}{R_2} + \cdots \right)$$

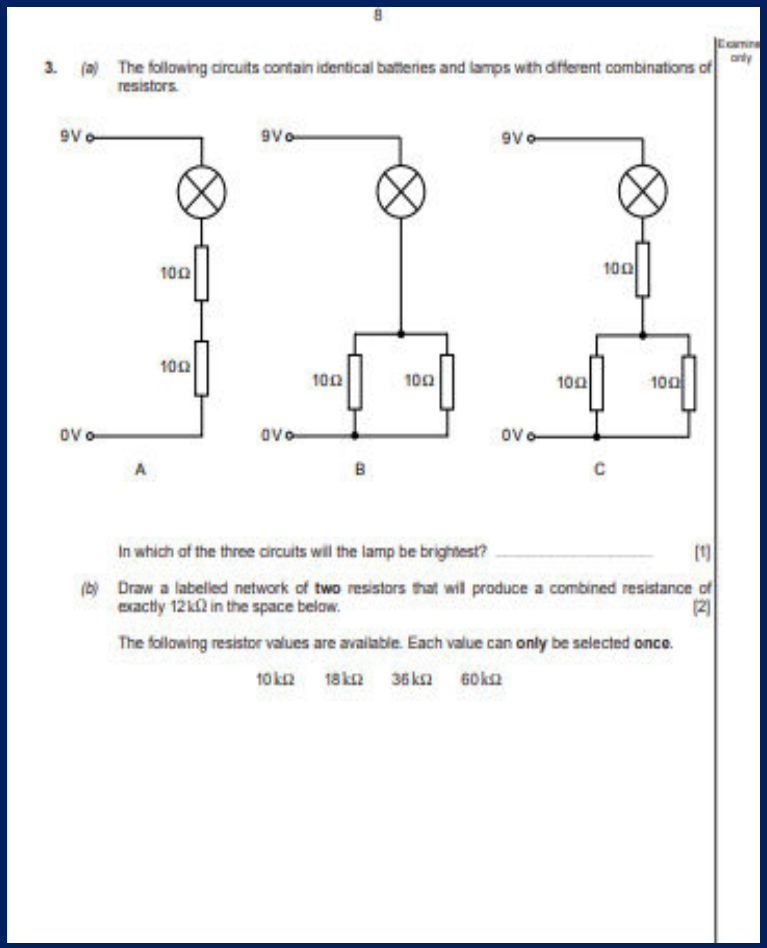
$$I_C = h_{FE} I_B \qquad T = 1.1RC$$

$$\overline{A + B} = \overline{A}.\overline{B} \qquad f = \frac{1}{T}$$

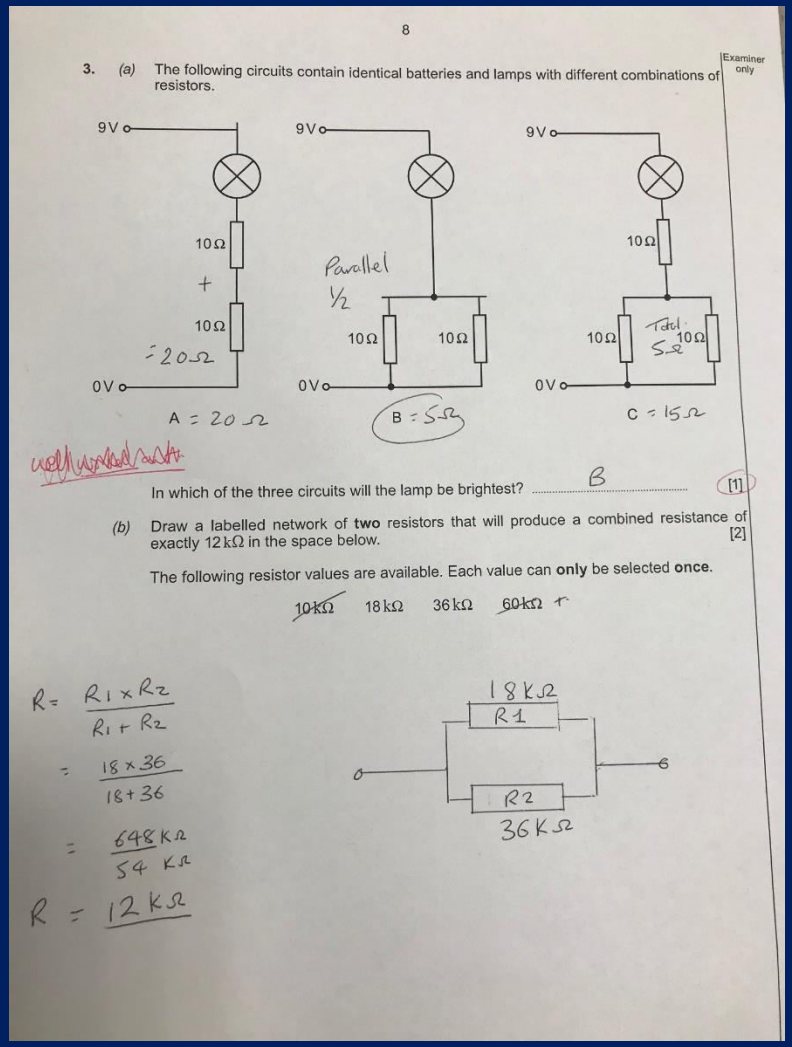
$$\overline{A.B} = \overline{A} + \overline{B} \qquad f = \frac{1.44}{(R_1 + 2R_2)C}$$

$$G = \frac{V_{OUT}}{V_{IN}} \qquad \frac{T_{ON}}{T_{OFF}} = \frac{R_1 + R_2}{R_2}$$

Information sheet provided in the exam



2019 paper 1
Question 3



Solution

To answer this question the student draws upon his knowledge of series and parallel resistor networks to calculate which network has the least resistance and therefore will let the most current through to increase the brightness of the lamp. In this case lamp B

For part B the student selects the correct formula for resistors in parallel from the formula sheet provided and correctly calculates that a parallel network of an 18KΩ and 36KΩ will give a combined resitance of 12KΩ.

Skills developed

Electronic theory is vey Maths/Science orientated.

You will have to be VERY comfortable with using numbers of up to 9 decimal places and the use of many different Electronic formulae to predict how electricity will flow through electronic systems.

Circuit design and manufacture using CAD/CAM and soldering.

Fault finding using a digital multimeter or an oscilloscope.

NEA support booklet detailing the design and manufacture process plus any simulations or calculations which will support the operation of your circuit.