

Course Title: BTEC Level 3 National Extended Certificate in Engineering.

A Level equivalency: 1.0

How will this course be assessed? 2 externally assessed written exams and 2 internally marked and assessed units of coursework

Units to be covered:

Unit 1 - Engineering Principles – mainly mathematics and engineering theory.

Unit 2 - Delivery of Engineering Processes Safely as a Team - exploring how processes are undertaken by teams to create engineered products (No practical work).

Unit 3 - Engineering Product Design and Manufacture - exploring engineering product design and manufacturing processes (No practical work).

Unit 19 - Electronic Devices and Circuits - exploring the operation of electronic devices and their uses in circuits through simulation and practical exercises to build and test physical analogue and digital circuits (Approximately 40% practical work).

Course outline:

During Year 12, you will be taking 2 units for this qualification, Units 1 and 2. Unit 1 is an externally assessed unit and you will be studying the unit content from September 2018 until June 2019 when you will be taking the exam.

The exam papers consist of three sections, section A covers applied mathematics, section B covers mechanical principles, while section C covers electrical/electronic principles.

Performance in the exam is graded as Pass, Merit or Distinction and to achieve a Pass you will need to score a minimum of 25 out of the maximum of 80 marks. You have to pass the exam to achieve the full qualification.

Unit 2 is made up from internally marked and assessed assignments, which you will be studying in parallel with unit 1, from September 2018 until February 2019; again each assignment will be graded as pass, merit or distinction.

In Year 13 you will take a further 2 units, Units 3 and 19. Unit 3 involves an 8 hour written external assessment and Unit 19 is made up from internally marked and assessed assignments

You will sit the Unit 3 exam in January 2020, and just like Unit 1, you have to pass this exam to achieve the full qualification.

Task:

Since this course is reliant on both mathematics and science, the first exercise will help you find out which areas of maths you need to work on before you start your BTEC course in engineering, while the second exercise will help you find out which areas of science you need to revise before you start your course.

Your answers can be in Word or PowerPoint or it can be hand written, you will need to show your working out and you may be expected to present part of it to the group when you come to NTC in September.

First exercise:

1) Which of the following are integers?

4 -3.5 0.3 $\frac{4}{5}$ 8.99 -10 205 0

2) Which of the following values are rational, and which are irrational?

5.9^{\square} π $\sqrt{7}$ $\frac{1}{5}$ -6 $\sqrt{4}$ 13.978 2.1

3) Solve the following:

a) $5x - 2 = 8$

b) $3(x - 6) = 2(x - 4)$

4) Solve the following by factorising:

a) $x^2 - 3x + 2 = 0$

b) $2x^2 - 3x - 5 = 0$

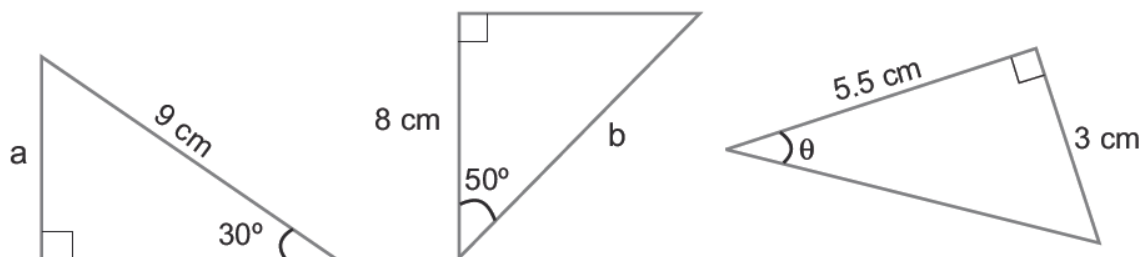
5) Simplify the following:

$$\frac{15a^3b^3}{5a^2b}$$

6) Solve the following simultaneous equations:

a) $2x + y = 2$ and $x - 3y = 8$

7) Find the unknowns in each of these triangles. Give your answers to 1 decimal place.



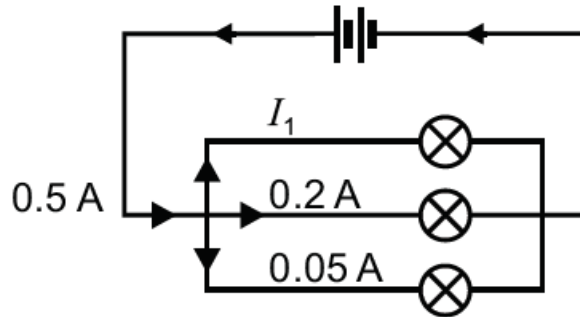
Second exercise:

8) A car pulls a caravan of mass 840 kg. If the car accelerates at 0.50 ms^{-2} , what force will the caravan experience?

9) An arrow of mass 0.125 kg is travelling at a speed of 72.0 ms^{-1} . What is its kinetic energy?

10) An upwards force of 25 newtons lifts an object 44 metres. What is the work done?

- 11) How long does it take to transfer 12 C of charge if the average current is 3.0 A?
- 12) The potential difference across a bulb is 1.5 V. How much work is done to pass 9.2 C through the bulb?
- 13) What is the value of I_1 ?



- 14) What is the resistance of a component if 1.5 volts drives a current of 24 milliamps through it?
- 15) What is the power output of a 2.4 k Ω component if the current through it is 1.2 A?