ENGINEERING TRANSITION WORK

JOHN LEGGOTT COLLEGE

SUMMER TASK FOR STUDENTS STARTING SEPTEMBER 2024
We look forward to seeing you in our Science Department this September!

PLEASE COMPLETE THE FOLLOWING TASKS:

Work to be completed over summer. **Deadline: Your 1st lesson in September. Covers GCSE Maths skills. You may need to research to complete things, attempt all questions. Please alongside this remember to bring a folder, a notebook and a calculator to the lesson.**

1. We use various unit quantities in engineering to show the size of numbers. Order the following numbers from smallest to largest.
    A. 6000nm
    B. 3μm
    C. 0.03cm
    D. 1m
    E. 0.0004km

2. In engineering, we use the standard form notation to write large numbers in a simpler form. What is the number 724000000 in correct standard form notation?
    A. 7.24×10^6
    B. 7×10^8
    C. 724×10^6
    D. 7.24×10^8
    E. 7×10^6

3. SI units are the base units of measurement for a quantity. For example, the SI unit we use to measure length in science is metres, rather than kilometres. Which of the following is not an SI unit? To follow up, write down all 7 SI base units.
    A. Newton
    B. Candela
    C. Second
    D. Kilogram
    E. Kelvin

4. We can break down all non-SI units into some combination of SI units. For example, a joule, the unit of energy, can be broken down into the SI unit combination kgm^2s^{-2}. Can you find out online the SI unit combination that make up the unit of volts?
    A. $kgm^{-2}s^{-1}A^{-1}$
    B. $kgm^{-1}s^{-3}A^{-1}$
    C. $kgm^2s^{-3}A^{-1}$

5. In engineering, an equation we commonly use is $V = IR$, where the voltage of a component (V) in a circuit is equal to the current through it (I) multiplied by the resistance of it (R). Rearrange this equation to make R the subject.

6. If you are given a voltage of 5V (volts) and a current of 0.2A (amps) - What would the resistance of the component in the previous question be?

7. If you were given a value of 0.2mA (milliamps) instead in the previous question, how would the resistance value you calculate change? (Hint: What is 0.2mA in amps?)
    A. It gets bigger.
    B. It gets smaller.
    C. It doesn't change.

8. Often in engineering we use significant figures to specify or vary the level of accuracy (that is to say, decimal places) with which we show numbers. Round the following numbers.
    A. 0.987654321 to 3 significant figures.
    B. 0.564732 to 2 significant figures.
    C. 4226793222 to 2 significant figures.
    D. 2.993738264 to 1 significant figure.

9. In a previous question, we discussed the equation $V = IR$. Another common equation used in circuit questions is $P = VI$, where P represents power. If you are given a circuit with a voltage supply of 6V and a resistance across the component we are looking at totalling 2Ω, what is the total power across the component? Show your working out. (Hint: This is a two stage calculation. What quantities do you need to calculate power?)

10. The terms accuracy and precision are not used interchangeably in science-based subjects. Find out and explain in your own words the difference between these two terms in engineering.

—------End of Questions—-------

If you cannot do a question, don't panic. These questions are to familiarise you with the basic skills we often use in engineering so they are a little less alien when you show up for your first lessons. Give all the questions a good go and we will cover all of these topics properly at the beginning of your course!