FOURTH FORM CSEC ASSIGNMENT   **SUMMER 2017**

DUE DATE – Week 1, Friday, September 15th 2017

PHYSICS

Welcome to Year 2 of your preparation for the CSEC Examination in Physics.

Nine weeks is a long break so we have prepared the following worksheet to keep you engaged over the holiday.

Note the following:

1. There are twelve (12) questions for a total of 100 marks.

2. These questions require you to do some independent work.

3. Please review how to plot your graphs as half of the worksheet involves graph work. *On our website go to* **CCSLC** *Third Form link* **"Graph Work".**

4. Heed to the amount of marks awarded for each question.

5. The marks from this worksheet go towards your midterm mark.

6. You will be tested on the material within the first term of fifth form.

Pace yourself, work consistently and review your work. It will help prepare you all for the upcoming CSEC Examination in 2018.

Mechanics – Hooke's Law

1. For a spring that obeys Hooke's Law, the amount of extension, **x**, is proportional to the force, **F**, causing the extension.

   *In equation form, **F = kx**, where **k** is a constant.*

   In investigating this relationship, a student obtained the following set of data:

Extension, x / mm	1.1	2.1	3.0	3.9	4.9	6.1	7.1
Force, F/ N	0.80	1.61	2.40	3.15	4.02	4.79	5.59

   a) Plot a graph of **F** *against* **x** on a sheet of graph paper.   *(9-marks)*
   b) Determine the gradient and y-intercept of your best-fit line.   *(4-marks)*
   c) Determine the constant **k**.   *(1-mark)*
   d) What is the unit of **k**?   *(1-mark)*

Thermal Physics and Kinetic Theory – Pressure Law

2. A physics student in investigating the relationship between the volume of a fixed mass of gas and its temperature, at a constant pressure of 1 atmosphere, obtained the following results:

Temperature/ ^oC	30	60	110	160	210	260
Volume / cm^3	50.6	55.6	64.0	72.3	80.7	89.0

   a) Plot a graph of the volume of the gas against its temperature.   *(9-marks)*
      (Use a range of -300°C to 300°C on the temperature scale)
   b) From your graph, determine the volume when the temperature is -100°C.   *(1-mark)*
   c) From your graph, determine the temperature when the volume is zero.   *(1-mark)*
   d) Determine the gradient of your straight line and state its units.   *(4-marks)*

Electricity & Magnetism - Ohm's Law

3. A physics student in investigating the relationship between the potential difference across a conductor and the current flowing through it. The circuit was set up in the Physics Laboratory and the following data was obtained: -

V/V	2.50	3.50	4.50	5.50	6.50	7.50	8.50	9.50
I/ mA	5.0	7.2	9.4	11.1	12.0	15.0	17.0	19.1

   a) Plot a graph of **V** *against* **I.**   *(9-marks)*
   b) Determine the slope of the line and state its units.   *(4-marks)*
   c) State Ohm's law.   *(2-marks)*

Mechanics - Dynamics: Motion in a Straight Line

4. A motor cyclist travels from UWI Cave Hill to Kensington Oval in Bridgetown, Barbados. His velocity was recorded at 10-second intervals for 60-seconds in the table below:

Velocity, v/ms^{-1}	0	8	14	29	30	37	45
Time, t/s	0	10	20	30	40	50	60

   a) Plot a graph of velocity, **v** versus time, **t**.   *(9-marks)*
   b) One of the readings was incorrectly recorded. Identify this reading
      and write a possible value.   *(2-marks)*
   c) Calculate the gradient of the graph and its units.   *(4-marks)*

Physics of the Atom – Models of the Atom

5. Some great scientists contributed to the modern-day view of the model of the atom. Two of these were J.J. Thompson and Ernest Rutherford.

   For each of these scientists, describe briefly TWO main ideas they put
   forward concerning the nature of the atom, including the name of each of
   their models.   *(6-marks)*

6. A hundred years ago, Geiger and Marsden performed the now famous
   gold foil experiment at the suggestion of Rutherford.

   Describe this experiment and explain how it established the nuclear
   structure of the atom.   *(6-marks)*

Physics of the Atom – Nuclear Energy

7. Albert Einstein put forward a theory that if the energy of a body changes,
   then its mass also changes.

   State the equation which relates these changes, clearly identifying the symbols
   or letters used in the equation.   *(3-marks)*

8. State **TWO** arguments **EACH; for** and **against** the utilization of nuclear energy. *(4-marks)*

Physics of the Atom - Radioactivity

9. State the nature and symbols of the three types of radioactive emissions.   *(3-marks)*

10. Using a labelled diagram, describe the appearance of the tracks of these

    radioactive emissions in a cloud chamber.   *(5-marks)*

11. State the range in air of the three types of radioactive emissions.   *(3-marks)*

12. Plot a best fit curve graph of count rate against time for the following table: *(10-marks)*

Count rate	534	282	157	94	62	47	37	31	29
Time, t / s	0	60	120	180	240	300	360	420	480

END FOURTH FORM CSEC ASSIGNMENT SUMMER 2017

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