



ZIMBABWE SCHOOL EXAMINATIONS COUNCIL
General Certificate of Education Advanced Level

MATHEMATICS
PAPER 4

9164/4

JUNE 2014 SESSION

3 hours

Additional materials:
Answer paper
Graph paper
List of Formulae

TIME 3 hours

INSTRUCTIONS TO CANDIDATES

Write your name, Centre number and candidate number in the spaces provided on the answer paper/answer booklet.

There is no restriction on the number of questions which you may attempt.

If a numerical answer cannot be given exactly, and the accuracy required is not specified in the question, then in the case of an angle it should be given to the nearest degree, and in other cases it should be given correct to 2 significant figures.

If a numerical value for g is necessary, take $g = 9.81 \text{ ms}^{-2}$.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets [] at the end of each question or part question.

The total number of marks for this paper is 120.

Within each section of the paper, questions are printed in the order of their mark allocations and candidates are advised, within each section, to attempt questions sequentially.

The use of an electronic calculator is expected, where appropriate.

You are reminded of the need for clear presentation in your answers.

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Paperenglish Zimsec 2014 June

Hussin A.Rothana



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Unveiling the Power of Verbal Artistry: An Emotional Sojourn through **Paperenglish Zimsec 2014 June**

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nuclear chemistry is the subfield of chemistry dealing with radioactivity nuclear processes such as nuclear transmutation and nuclear properties it is the chemistry of radioactive elements such as the actinides radium and radon together with the chemistry associated with equipment such as nuclear reactors which are designed to perform

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unlike a normal chemical reaction that forms molecules nuclear reactions result in the transformation of one element into another this property of nuclear reactions is used in nuclear power plants to gather nuclear energy the three common types of radiations are explained below

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a nuclear reactor consists of the following a nuclear fuel a fissionable isotope must be present in large enough quantities to sustain a controlled chain reaction the radioactive isotope is contained in tubes called fuel rods a moderator

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transmutation the changing of one chemical element into another transmutation involves a change in the nucleus or core of an atom and is therefore a nuclear reaction transformations may result from nuclear decay of radioactive isotopes or they can result from neutron capture

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in all accelerators the particles move in a vacuum to avoid collisions with gas molecules when neutrons are required for transmutation reactions they are usually obtained from radioactive decay reactions or from various nuclear reactions occurring in nuclear reactors

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nuclear reaction a nuclear reaction is a process in which two nuclei or a nucleus and an external subatomic particle collide to produce one or more new nuclides the nuclear reaction is a reaction that involves nucleoids the reactant nucleoid called the parent nucleoid usually transforms into a different nucleoid called the daughter

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