JOHN EDMONDSON HIGH SCHOOL
Assessment Notification

Faculty: Science  Course: Physics  Year: 12

Assessment Task: Research Task

Assessment Weighting: 20%  Due: Term 3  Week 3  Date: 9/08/2019

Task Type: Hand in Task ☐  In Class Task ☑  Practical Task ☐

Outcomes assessed (NESA)

| PH11/12-4 selects and processes appropriate qualitative and quantitative data and information using a range of appropriate media |
| PH11/12-6 solves scientific problems using primary and secondary data, critical thinking skills and scientific processes |
| PH11/12-7 communicates scientific understanding using suitable language and terminology for a specific audience or purpose |
| PH12-15 explains and analyses the evidence supporting the relationship between astronomical events and the nucleosynthesis of atoms and relates these to the development of the current model of the atom |

Task Description/Overview

TASK: Prior to the above date, research topic Module 8: From the Universe to the Atom Properties of the Nucleus
Inquiry question 4: How can the energy of the atomic nucleus be harnessed?

Students:
- analyse the spontaneous decay of unstable nuclei, and the properties of the alpha, beta and gamma radiation emitted (ACSPH028, ACSPH030)
- examine the model of half-life in radioactive decay and make quantitative predictions about the activity or amount of a radioactive sample using the following relationships:
  - \( N_t = N_0 e^{-\lambda t} \)
  - \( \lambda = \ln 2 t^{1/2} \)
  where \( N_t = \) number of particles at time \( t \), \( N_0 = \) number of particles present at \( t = 0 \), \( \lambda = \) decay constant, \( t^{1/2} = \) time for half the radioactive amount to decay (ACSPH029)
- model and explain the process of nuclear fission, including the concepts of controlled and uncontrolled chain reactions, and account for the release of energy in the process (ACSPH033, ACSPH034)
- analyse relationships that represent conservation of mass-energy in spontaneous and artificial nuclear transmutations, including alpha decay, beta decay, nuclear fission and nuclear fusion (ACSPH032)
- account for the release of energy in the process of nuclear fusion (ACSPH035, ACSPH036)
- predict quantitatively the energy released in nuclear decays or transmutations, including nuclear fission and nuclear fusion, by applying: (ACSPH031, ACSPH035, ACSPH036)
  - the law of conservation of energy
  - mass defect
  - binding energy
– Einstein’s mass–energy equivalence relationship $E=mc^2$

Your ASSESSMENT TASK will require you to answer a series of questions based (in-class test) on the inquiry question, using the information you have researched.

You will need to bring your printed information to complete the in-class test. This task will be completed during period 6, Friday 9th August 2019 Physics lesson. You are not permitted to use a computer during the scheduled period. All research and preparation of your written resource sheets must be done prior to the assessment task period.

Length of task: 45 minutes

### Detailed Assessment Task Description

**INFORMATION:** You may bring a maximum of TWO A4 double sided sheets of paper containing information you want to use during the task. You should use textbooks, other books, class notes, pages from the internet, journal articles and written work (own notes) to prepare your written resource.

Use at least 3 different sources and record the list of resources you have used for the bibliography (bring this list to the assessment task period this will not form part of your two A4 sheets). Your prepared information sheets will be handed in with your completed task.

**INSTRUCTIONS:** In your answers, include all relevant formulae and diagrams. Use your own wording and sentences. Refer to the NESA regulations about plagiarism: “All my own Work”. A bibliography is required so ensure you have a record of websites, books and any other sources you have used referenced as per school website.

Equipment: Pens (blue or black), pencils, rubber, ruler, board approved calculator, data and formula sheet provided

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<thead>
<tr>
<th>Assessment Criteria</th>
<th>Grade</th>
<th>Description</th>
<th>Mark Range</th>
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<tbody>
<tr>
<td><strong>Outstanding (O)</strong></td>
<td></td>
<td>The student has an extensive knowledge and understanding of the content and can readily apply this knowledge. In addition, the student has achieved a very high level of competence in the processes and skills and can apply these skills to new situations.</td>
<td>79.5-100 %</td>
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<tr>
<td><strong>High (H)</strong></td>
<td></td>
<td>The student has a thorough knowledge and understanding of the content and a high level of competence in the processes and skills. In addition, the student is able to apply this knowledge and these skills to most situations.</td>
<td>69.5-79</td>
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<td><strong>Sound (S)</strong></td>
<td></td>
<td>The student has a sound knowledge and understanding of the content and has achieved a good level of competence in the processes and skills.</td>
<td>49.5-69</td>
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<td><strong>Basic (B)</strong></td>
<td></td>
<td>The student has a basic knowledge and understanding of the content and has achieved a basic level of competence in the processes and skills.</td>
<td>19.5-49</td>
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<td><strong>Limited (L)</strong></td>
<td></td>
<td>The student has an elementary knowledge and understanding in a few areas of the content and still requires further work to achieve competence in the processes and skills.</td>
<td>0-19</td>
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Satisfactory completion of courses
A course has been satisfactorily completed, when the student has:
• Followed the course developed/endorsed by the NSW Educational Standards Authority (NESA)
• Applied himself/herself with diligence and sustained effort to the set tasks and experiences provided in the course.
• Achieved some or all of the course outcomes