# ORANGE HIGH SCHOOL

## ASSESSMENT TASK NOTIFICATION

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|---|---|
| **Subject** | Physics |
| **Assessment** | Assessment Task 2: Research report and review questions |
| **Topic** | Module 8 – Atom to the Universe |
| **Year** | 12 |
| **Class Teacher** | Warne |
| **Head Teacher** | Routh |
| **Weighting** | 35 % |
| **Date Given** | 9/5/22 |
| **Date To Be Completed** | Term 2 Week 5 Thursday Period 4 (26/05/22) |

**Assessment Outline**

This task will be marked out of 60.

Section 1 (10 marks) is a summary report that will be completed in 3 weeks outside of class (some class time will be allocated for research). The summary report will be no longer than 2 double-sided A4 sheets.

Section 2 (50 marks) are structured questions which will be answered in class in 60 minutes using the information

**Non-completion of Task:**

If you know you are going to be away on the day that the task is due, you must make alternative arrangements with Head Teacher Administration (Mrs Beeby) beforehand. If you are suddenly away on the day of the examination, you must contact the school. Upon your return to school you must bring documentation that explains the reason for your legitimate absence. (eg a medical certificate)

**Failure to follow the above procedures may result in a zero award.**

**Outcomes Assessed**

**PHY12-4** - selects and processes appropriate qualitative and quantitative data and information using a range of appropriate media

**PHY12-5** - analyses and evaluates primary and secondary data and information

**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

**Topic/Module**

*Module 8: From Atom to the Universe*

**Content**

Module 8:

Beginning in the late 19th and early 20th centuries, experimental discoveries revolutionised the accepted understanding of the nature of matter on an atomic scale. Experimental investigations of the nucleus have led to an understanding of radioactive decay, the ability to extract energy from nuclear fission and fusion, and a deeper understanding of the atomic model.

This task will be marked out of 60.

**Section 1** (10 marks) is a summary report that will be completed in 2 weeks outside of class (some class time will be allocated for research). The summary report will be no longer than 3 double-sided A4 sheets.

**Section 2** (50 marks) are structured questions which will be answered in class in 60 minutes using the information you have gathered in Section 1. Students will answer in the space provided.

Your teacher will advise you of any variation to these conditions.

| NAME: |
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## Task

SECTION 1

**Develop a summary report that is no longer than 2 double-sided A4 sheets. You will use this information to answer questions as part of the assessment in class on its due date.**

You are to complete research in and out of class time, over **two weeks**, in the following area:

***Inquiry question*** *How can the energy of the atomic nucleus be harnessed?*

You are to:

- 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:

    - $N_t = N_0 e^{-\lambda t}$

    - $\lambda = ln2 / t_{1/2}$

    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 $E = mc^2$

## Task Preparation

- To complete this task you should use available evidence from different aspects of your study of this module, as well as other information that you have gathered.

- You must familiarise yourself with the marking schedule and ensure that you address the criteria.

- You will be asked to bring the information that you have gathered and processed to class, where you will be given the second part of the task to complete on this day. This task will consist of a number of short and extended response type questions.

- You should present a summary of your research of no more than two A4 pages and it should include a reference list of all sources used.

- Your information should cover all aspects of the task, in appropriate detail, to be able to complete the in-class task. The information you have gathered and processed in Section 1 will be collected after the completion of Section 2 and will be marked according to the marking criteria shown.

| Criteria | Marks |
|---|---|
| • Research uses at least five different sources.<br>• Research presented in own words.<br>• Consistent use of scientific notations and terminology.<br>• Bibliography correctly written.<br>Book: Author, Title, Date, Publisher.<br>Web: Author or web address, Title, Date of last access.<br>• Research done within 2 x A4 limit. | 10 |
| • Research uses at least five different sources.<br>• Research presented in own words.<br>• Consistent use of scientific notations and terminology.<br>• Bibliography attempted.<br>• Research done within 2 x A4 limit. | 9 |
| • Research uses at least four different sources.<br>• Research presented mostly in own words.<br>• Regular use of scientific notations and terminology.<br>• Bibliography correctly written.<br>Book: Author, Title, Date, Publisher.<br>Web: Author or web address, Title, Date of last access.<br>• Research done within 2 x A4 limit. | 8 |
| • Research uses at least four different sources.<br>• Research presented mostly in own words.<br>• Regular use of scientific notations and terminology.<br>• Bibliography attempted.<br>• Research done within 2 x A4 limit. | 7 |
| • Research uses at least three different sources.<br>• Research presented not in own words.<br>• Regular use of scientific notations and terminology.<br>• Research at appropriate level.<br>• Bibliography attempted.<br>• Research done within 2 x A4 limit. | 6 |
| • Research uses at least three different sources.<br>• Research presented not in own words.<br>• Occasional use of scientific notations and terminology.<br>• Bibliography not attempted.<br>• Research done within 2 x A4 limit. | 5 |
| • Research uses at least two sources.<br>• Research presented mostly in own words.<br>• Occasional use of scientific notations and terminology.<br>• Bibliography attempted.<br>• Research done within 2 x A4 limit. | 4 |
| • Research uses at least two sources.<br>• Research presented not in own words.<br>• Occasional use of scientific notations and terminology.<br>• Bibliography attempted.<br>• Research done within 2 x A4 limit. | 3 |
| • Research uses at least two sources.<br>• Research presented not in own words.<br>• No use of scientific notations and terminology.<br>• Bibliography not present.<br>• Research done within 2 x A4 limit. | 2 |
| • Research done within 2 x A4 limit. | 1 |