# U1 and U2 Assessment

## Contents


Comments on new assessment tasks 1

Assessment Task Suggestions and comments 2

- Report on a laboratory activity/ reflective annotations related to one or more practical activities/ an analysis and evaluation of generated primary and/or collated secondary data/ a critique of an experimental design, process or apparatus 2
- A modelling or simulation activity 2
- Report on the design, building, testing and evaluation of a device/explanation of a selected physics device, design or innovation 2
- Application of Physics concepts to explain a model/theory/device/design/innovation 2
- Analysis and evaluation of primary and secondary data (plotting assumptions and conclusion) 3
- report of an application of physics concepts to a real-world context and analysis, including calculations, of physics concepts applied to real-world contexts 3
- Comparison and evaluation of two solutions to a problem, two explanations of a physics phenomenon or concept, or two methods and/or findings from practical activities. 4
- Media analysis/response 4
- Infographic 4

Assessment tasks and particular areas of study 4

- U1 AOS 1 Light and Heat 4
- U1 AOS 2 Nuclear 5
- U1 AOS 3 Electricity 5
- U2 AOS 1 Motion 5
- U2 AOS 2 Options 5
- U2 AOS 3 Extended Investigation 5

Tests 6

Other comments 6


## Comments on new assessment tasks

- Need to work our students up to responding to some of these types of tasks.
- Focus on tasks that correspond to U3 and U4 assessment, not media analysis or infographic

- Need to consider time involved in preparing, presenting and assessing tasks. Also, after school presentation/exhibition events now need to consider time-in-lieu implications.
- Consider potential for students to present to those in younger years, with added benefit of inspiring them to choose Physics
- Logbook helps to show students that we are using pracs to understand concepts and improve their questioning and explaining skills as they go. OneNote can be used to create and journal a logbook, however the issue there is that students might want to just jot down notes as they go. Some graphs can be handdrawn and inserted.
- Use Socrative style approach to support reasoning skills, which in turn will support quality analysis in assessment tasks.
- Tests including exam-style questions are still helpful for grading and building of exam skills
- Excellent suggestion to use past EPI data from previous students to evaluate, compare and contrast data, eg what is better presented and why?

## Assessment Task Suggestions and comments

### Report on a laboratory activity/ reflective annotations related to one or more practical activities/ an analysis and evaluation of generated primary and/or collated secondary data/ a critique of an experimental design, process or apparatus

- Light and wave unit
  - 6 pracs, each group does the pracs contributing to same logbook. SAC is based on on pracs and their background theory. E.g. polarisation, graph between light intensity and angle.
- Relate practical activities to a series of questions to assist with annotation

### A modelling or simulation activity

- Investigate how code could be embedded into physics investigations (python or Java can be used). Might have some authentication difficulties. Could assess things such as clear commenting and variable naming. Link to the Mars rover design, for which they have a prototype on Earth and as they run code they run it on Earth first to check how it is going to behave in a Mars atmosphere.

### Report on the design, building, testing and evaluation of a device/explanation of a selected physics device, design or innovation

- Components of electrical circuits
- Calorimeter
- Two way switch
- Beam splitter
- Design a circuit to achieve a certain purpose eg switching on a light at a particular ambient light intensity
- Boomerangs
- Consult with U3/4 Systems Engineering teachers

### Application of Physics concepts to explain a model/theory/device/design/innovation

- Solar ovens

- Optical devices eg glasses
- Electrical device
- Analysis of safety feature on a car, such as adaptive cruise control
- Bullroarer: look at frequency and (possibly) Doppler Effect as it's swung around https://en.wikipedia.org/wiki/Bullroarer
- Boomerangs as Flight options or circular motion in Year 12
- Geiger Counter
- Transducers
- Calorimeter
- thermos

## Analysis and evaluation of primary and secondary data (plotting assumptions and conclusion)

- Data can be readily collected in all areas of study – can use phone as a sensor, get data from Luna Park activities
- Secondary data available for properties of radioactive materials (ANSTO, Farlabs

## report of an application of physics concepts to a real-world context and analysis, including calculations, of physics concepts applied to real-world contexts

After explicit teaching, get students to apply their knowledge to a range of unfamiliar situations

- Luna-park activity (motion).
- AC-DC in power transmission
- Double/triple rainbow
- Eye correction - e.g. causes of myopia
- Eclipses - why is the moon red?
- Why is the angular diameter of the moon the same as the angular diameter of the sun?
- Analyse the physics in a rock concert
- Test reaction time: Predict what you think your reaction time will be, then test with ruler drop experiment, then test with pedals (how quick can you move foot from accelerator to break in response to a stimulus). Another valuable and practical simulation is to look at two cars driving, and first car breaks, then how long until second car breaks, what is the difference in distance of first and second car. Vehicle safety is a good one for students to relate to (students at the age they are starting to look at buying their own car)
- Pose solutions to everyday problems such as:"How much ice do you need to keep the drinks cold for x hours for a party?"
- Explore link between burning off and climate change: https://indigenousknowledge.unimelb.edu.au/curriculum/resources/interdependence-in-the-environment
- Watch an action or sci-fi movie and discuss the physics behind why something wouldn't work.
- Write a sci-fi story that has realistic science (good sci-fi must always have good physics!)

Comment: Analysis is more desirable than simply reporting particularly when using calculations to support analysis.

### Comparison and evaluation of two solutions to a problem, two explanations of a physics phenomenon or concept, or two methods and/or findings from practical activities.

- different approaches to solving motion problems? (eg energy verses constant accel equations)
- Huygens vs Newton for refraction is far more interesting and has a lot more heft to it.
- Nuclear fission versus fusion
- Comparison of different models of fission reactor
- Compare LED versus incandescent light source
- Compare operation of an LED to a solar cell
- Compare evaporative and split-system cooling systems
- DC versus AC motor (U3 content)
- Do two different experiments to measure a physical quantity eg refractive index or heat capacity and compare.
- Compare models of DC circuits (see https://www.youtube.com/watch?v=bHIhgxav9LY Veratasium video on electric field model, note that don't have to compare all possible models)
- Suggestions for different methods of cooking and the amount of energy needed for different methods (eg slow cooker, oven, air fryer, etc. )

Comment:

- Focussing on problems might be easier than the explanation option.
- Each solution requires research, so challenge is managing the timing.
- Each of these is an assessment task that requires its own research, so the challenge is managing the time required.
- Could incorporate consideration of sources of bias.

### Media analysis/response

- Can find the article easily but it is not easy to assess students' understandings as the language used in the articles may be hard for students. especially for EAL students.
- Analyse contributions to online forums as media source
- Not directly connected to U3 and U4 tasks, so lower priority

### Infographic

- Communication method, not directly related to U3 and U4
- Use rubric to assess.
- Infographics can be a fun investigation task, takes some time to run in class but develops good communication skills for their poster.
- Topics suited to infographics: nuclear medicine, environmental topics.

## Assessment tasks and particular areas of study

### U1 AOS 1 Light and Heat

- Analysis and evaluation of generated primary and/or secondary data/critique of an experimental design, process or apparatus/ report of a laboratory activity
    - Determine specific heat capacity of different unknown metals, assessment could be a critique of experimental design
    - Determine refractive index of unknown material.

- Assessment based on portfolio of practical activities
- Linking thermodynamics and light - explain the property of the building that causes objects to catch on fire. https://www.bbc.com/news/magazine-23944679
- Compare energy efficiency and contribution to enhanced greenhouse effect of electric, petrol and/or hydrogen vehicles (including comparison of CO2 emissions taking into account battery production)
- Short test

## U1 AOS 2 Nuclear

- Report of selected phenomenon/application of physics concepts to real-world context (presentation, video)
- Comparison of two energy generation techniques eg types of fission reactors or fission versus fusion
- Pamphlet on radiation types, infographic, oral presentation,
- media analysis (apply theory of radioactivity to real-life scenarios: nature of radiation in every day life, examples of radioactive poisoning)
- Build a model reactor (turbines, coolant, water, etc.) and annotate what is going to be in the reactor to make it function.
- Nuclear debates can be interesting - opportunity for literature review.

## U1 AOS 3 Electricity

- Problem solving involving physics concepts and/or skills – characterizing and identifying unknown device hidden in a match box
- Assessment based on portfolio of practical activities and short test
- Report on laboratory activity with collection and analysis of primary data.
- Practical skills test - draw the circuit (checked before wiring). Then wire it up, take some readings, do some calculations, present the data. Small groups of students spread out across the lab benches, other students are working on practice questions. Get a set amount of time to set-up the circuit, take readings and pack-up. Forces students to all try and demonstrate physical skills. Could expand this out to other topics too!

## U2 AOS 1 Motion

- Report of a laboratory activity, single scaffolded prac preparing for extended investigation
- Reflective annotations on collection of small pracs as assessment (60%) and test (40%)

## U2 AOS 2 Options

- prac/presentation/test. Choice will depend on how much flexibility students have been given in selection of topic.

## U2 AOS 3 Extended Investigation

- poster as a report on extended investigation related to U2 AOS
- 600 word posters will be tough for all students to demonstrate ALL that knowledge in 600 words. Consider doing this as formative assessment tasks throughout the year. Assessing log books alongside will be vital here to gain a strong result.
- Consider hosting a 'poster night' where parents and other students ask about their posters (outside of hours – time-in-lieu is a big deal now - plus students are focused on exam

preparation at this time of year. Have a 'public choice' vote as a method of feedback. Consider running these good intention activities in junior secondary year levels (backwards by design), or invite junior years into the classroom for a 1 period poster session (invite STEM club students, who are likely to ask good questions).

- Consider starting earlier, when students are fresher

## Tests

- Can be difficult to develop test skills without using tests, so many teachers will still use tests as a formative assessment.
- Practice of 'exam style' questions and an approach in an exam is still a vital skill for us to develop in our students, such as pacing and evaluating what circumstances are considered in a question (frictionless, vacuum etc.). Other skills to practice include responding in the appropriate way, such as cycles per second, specific units, manipulating data to suit the response.

## Other comments

- Rubric for comparison and evaluation of two solutions would be helpful.
- Need to resolve expectations around handling uncertainties in measurement. New study design expects students to be able to include on graphs, but, in seeming contradiction, not to determine quantitatively.
- How to stick within the 50 minutes conditions - some flexibility with this, maybe they produce some research in the 50 minute conditions then create an infographic later. Or they do research beforehand and bring their notes in to complete a report in 50 minutes.
- The 50 minute condition is more to reduce the burden on students to produce tasks in large chunks of exam conditions, not that you are restricted to assessing 50 minutes worth of a task. Some work can be done before or after to consolidate this assessment task.
- In Google Classroom you can use an authentication checker which will check the authenticity of student submissions.
- Options task being presented to junior secondary year levels. Need to design a prac/demo/activity to deliver within these year levels to build interest in science.
- During EPI tasks, students struggle to have success during Unit 3/4, so practicing this in Unit 1/2 would be beneficial. Builds like catapults and parachutes would work well, but others are likely to be too complex given the time. Equity concerns regarding parental involvement with building using welding etc.
- Unit 2 motion lends itself to being split into multiple assessments - could include test or data analysis type questions to check for understanding. Assessment tasks that analyse data should give a good indication of ability because they use formulae, compared to written reports or creating an activity.
- Unit 1 AoS 1 also lends itself to being split as it's recommended to be a 7-8 week block.
- Consider how formative assessment and checkpoints can be used as evidence towards the "Satisfactory" grade - pre-work engaged with, homework tasks, logbooks, exam-style questions - so that students don't just focus on SAC/CAT style tasks. Create a checklist that shows "what does success look like?" (very John Hattie), that outlines what students must do to meet an "S" grade - certain percentage on assessments, percentage of questions and prac reports completed. Depends on what you see as important to the class.