

## Guided Module on Astrophysics

This completed activity sheet demonstrates the use of research, writing, and learning skills in analysing concepts associated with the topic of Newton's law of universal gravitation

**Subject / Course:** Physics / SPH4U

**Grade Level:** Grade 12

**Topic:** Determining the Mass of Saturn's Satellite, Daphnis

### Specific Curriculum Expectations Met:

- A1.8 synthesize, analyse, interpret, and evaluate qualitative and quantitative data; solve problems involving quantitative data; determine whether the evidence supports or refutes the initial prediction or hypothesis and whether it is consistent with scientific theory; identify sources of bias and/or error; and suggest improvements to the inquiry to reduce the likelihood of error
- A1.9 analyse the information gathered from research sources for logic, accuracy, reliability, adequacy, and bias
- A1.10 draw conclusions based on inquiry results and research findings, and justify their conclusions with reference to scientific knowledge
- D2.2 analyse, and solve problems relating to, Newton's law of universal gravitation and circular motion (e.g., with respect to satellite orbits, black holes, dark matter) [AI]

### Required Resources:

- Data projector
- Guided module
- One copy of the Journal *Determining the Mass of Saturn's Satellite, Daphnis* per student
- One copy of the student assignment that accompanies the article per student
- Instructor solutions

### Content and Teaching Strategy of Lesson:

- **Overview:** Introduce concept of Journal Articles to students
- **Teaching Strategies:**
  1. Guide students through the "How to Effectively Use a Journal Article" PowerPoint Presentation – provide students with an opportunity to practice paraphrasing
  2. Walk students through the Guide to University Learning to facilitate effective reading strategies
  3. Students read the article *Determining the Mass of Saturn's Satellite, Daphnis* and respond to questions in handout
- **Consolidation:** Students review answers with each other and instructor; share paraphrasing strategies; connect content in research article with scientific investigation skills and their current understanding of Newton's law of universal gravitation

**Title of article analysed:** Bauer, A. & Thomas, P. (2010). *Determining the mass of Saturn's satellite, Daphnis*. *Journal of Undergraduate Research in Physics*, 23, August 27<sup>th</sup>.

The goal of this exercise is to highlight and demonstrate the transition in Research, Writing and Learning Skills that a student might encounter during the transition from high school to post-secondary education.

*We have provided all the necessary links to the activity on this site. This activity is to be used in conjunction with the downloadable [student template](#)*

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### **Step 1. Getting the Article**

- a) Go to the website for the Journal of [Undergraduate Research in Physics](#)
- b) Select above article

### **Step 2. Reading the article**

- a) Reading material, highlighting and taking good notes are important skills required in post-secondary education. In order to get an idea of what is required of your students, take them through our [Guide to University Learning activities](#) .

### **Step 3. Filling out the student template**

- a) Plagiarism concerns are highlighted in this exercise. In order to address this concern, take your students through the [Paraphrasing exercise](#).

For a complete solution of this module please email: [learning@uoguelph.ca](mailto:learning@uoguelph.ca)