Liceo Parroquial San Antonio
English Department
March - April 2020
12th Grade Mat

Handout2 – 12th grade Mat – Unit 1: Applied physics

General Objective	1. Demonstrate comprehension of written texts related to applied physics
Specific objectives	1.1. Reflect about the way in which the student himself/herself reads 1.2. Identify reading strategies to increase and facilitate comprehension 1.3. Apply reading strategies in a text related to the scientific method 1.4. Expand students' vocabulary through the use of their vocabulary log
Contents	Reading strategies – Skimming and Scanning Newton's laws
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- **General instructions**

  a) This first unit's objective is to develop and improve your reading comprehension skills so that you can move forward to the next unit.
  b) If you have any doubts, write a mail to your corresponding teacher.
  c) Use https://www.wordreference.com/; https://dictionary.cambridge.org/dictionary/english/; https://www.oxfordlearnersdictionaries.com/us/ to solve vocabulary doubts.
  d) **Avoid** using **Google translator** for **complete** sentences. **REMEMBER** that **YOU** are the one who **should do** that mental process.
  e) Do your best and take care 😊

I. REVIEW → NEWTON'S 1ST LAW

Instructions → Draw 1 of the 2 extra examples of Newton's 1st law (Handout 1). Explain it graphically as the image in handout 1 ("Everyday applications")

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II. READING STRATEGIES – SKIMMING AND SCANNING

Instructions → In this part, there are 2 reading comprehension strategies.
READ through each one of them.
LOOK UP every word you don't know. **AVOID TRANSLATING THE WHOLE TEXT.**

SCANNING

Aim → Speed
Read quickly

DO NOT START BY READING the whole text

Focus → Specific details/ Detailed info

HOW

For you to scan a text you have to:
1. **Read** what you're asked to do or to **answer**
2. Underline/highlight **key** words in the **question**
3. **Go** to the **text** and **scan** it to **find** the **key** words (or **synonyms**) you selected in the **questions**
4. That's **where** you probably will **find** the info to **answer**

EXAMPLES

This technique is to **quickly** solve a reading task, it **prevents** you from reading everything and makes you **focus** on the **info** you need. However, you use it every day.
-When you look for a **friend's number** on your contacts list
-When you look for **your name** on a long list
-When you want to find a specific number or data on a long text

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SKIMMING

Focus → General info/ Main ideas

HAVE to READ the **whole** text or part of the text to get the info you need

Aim → Selection of info. Details vs Main idea

HOW

For you to skim a text you have to:
1. **Read** what you're asked to do or to **answer. (whole text vs. paragraph)**
2. **If** → **Main idea** of the whole text: Read the **title**. **Look** at the images. Read **1st** and **last** sentence of **each paragraph**. Read **last paragraph** completely
3. **If** → **Main idea** of a paragraph: Read heading (if). Read **all** the paragraph, pay special attention to the **1st line** (1st line = **topic sentence**, which contains **most of** the info that the paragraph will be about). **Cross out** details. Underline key info.
4. **Write** a main idea as follows:
COMPLETE SENTECE →
SUBJECT + VERB + COMPLEMENT

EXAMPLES

You also skim different sources of info in your daily life.
-When you tell someone what a **book** was **about**.
-When you **tell** a friend an **episode** of a series both watch
-When you **watch** a match and give your opinion of the **match itself**.
In each case, you **do not tell every little thing** that happened, just the **most important** info

Tips for skimming

Details usually **are**: specific numbers, examples, data, rephrasing, explanations, etc. They change depending on the context.
Main ideas can be **clearly** stated or **inferred**. If they are clearly stated, they usually are at the beginning and at the end of the paragraph
Avoid starting a main idea by writing "the text is about", "the author says", "the text says". **MAIN IDEA = TOPIC + CENTRAL POINT**
Do not worry if it's difficult for you at first. In handout 3, we will cover this content in a more detailed way.

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SCANNING

➔ **Example**.

Question → What was the role of Galileo Newton's laws of motion?

1**There are **2 key words highlighted** in the question. They both **determine** the **info** I have to **look** for in the **text****
2** **After** selecting the key words in the question, I **go** to the **text** and look for them or for synonyms**

Newton published his laws of motion in 1687, in his seminal work "Philosophiæ Naturalis Principia Mathematica" (Mathematical Principles of Natural Philosophy) in which he formalized the description of how massive bodies move under the influence of external forces. Newton expanded upon the earlier work of Galileo Galilei, who developed the first accurate laws of motion for masses, according to Greg Bothun, a physics professor at the University of Oregon. Galileo's experiments showed that all bodies accelerate at the same rate regardless of size or mass. Newton also critiqued and expanded on the work of Rene Descartes, who also published a set of laws of nature in 1644, two years after Newton was born. Descartes' laws are very similar to Newton's first law of motion.

3** You can see that I **circle** the name **Galileo** and I **underline** a piece of **information** next to his name**

4** Now that I've **found** the **key** words I selected first, I **read** that piece of info and **see** if it serves as a **possible** answer

5** In this case, **there's** my answer since Galileo determined laws of motion before Newton and his work was the basis of Newton's.

6** I **write** the **answer** to the question
Question: What was the role of Galileo Newton's laws of motion?
Answer: Galileo's work was the basis of Newton's laws as he firstly determined how objects accelerate.

SKIMMING

→ **Example**.

Question → What is the main idea of paragraph N°1?

1**There are **2 key words highlighted** in the question. They both **determine** that I need to **skim** the paragraph. I'm not being asked for specific info so I can't use the scanning technique**
2** After that, I **read** the corresponding paragraph

Newton's First Law of Motion describes the behavior of a massive body at rest or in uniform linear motion, i.e., not accelerating or rotating. The First Law states, "A body at rest will remain at rest, and a body in motion will remain in motion unless it is acted upon by an external force." This simply means that things cannot start, stop or change direction all by themselves. It requires some force to be exerted or acted on them from the outside to cause such a change. While this concept seems simple and obvious to us today, in Newton's time it was truly revolutionary

3** Read the **1st sentence**: *"Newton's First Law of Motion describes the behavior of a massive body at rest or in uniform linear motion, i.e., not accelerating or rotating"* By reading this 1st sentence I can get the **TOPIC** of the paragraph: Newton's 1st Law of Motion.
4** I need to **continue reading** the paragraph and start **crossing out details** and **highlighting KEY** info

Newton's First Law of Motion describes the behavior of a massive body at rest or in uniform linear motion, i.e., not accelerating or rotating. The First Law states, "A body at rest will remain at rest, and a body in motion will remain in motion unless it is acted upon by an external force." ~~This simply means that things cannot start, stop or change direction all by themselves. It requires some force to be exerted or acted on them from the outside to cause such a change. While this concept seems simple and obvious to us today, in Newton's time it was truly revolutionary~~

5** The paragraph should look like the one above. The **highlighted** words are **key** words: "Newton's 1st law of motion" is the **topic** and the others are the **words that define the law** (behaviour, massive body, motion, at rest, in motion, external force). The **crossed out sentences** are **rephrasing** ("this simply means" indicates a re explanation) and **personal** irrelevant **opinion** ("it was truly revolutionary" is the author's opinion and the paragraph is not about how revolutionary Newton was).
6** Now I have everything I need to write my main idea. If I have **doubts** about it, I **ask** myself "**What** does the **author** want me to **know** about the **topic**? What is the author **teaching** me?" In this case, the author wants to state what the 1st law is about, so the info I selected is correct.
7** Finally, I **write** the main idea. **MAIN IDEA = TOPIC + CENTRAL POINT**. Remember to **avoid** starting with "the author says, the text says, the main idea is, paragraph 1 is about" **You start with the topic = Newton's first law of motion.**
Newton's First Law of Motion states that a body will continue at rest or in motion until an external force is exerted upon it. (Main idea of that paragraph)

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III. READING COMPREHENSION EXERCISE

Instructions: Answer the question of the following text applying the scanning and skimming strategies (and the ones from Handout1).

I. Vocabulary exercise → Use context to get the meaning of and define the following words

a) Bottleneck: _____
b) Lacks of: _____
c) Compelled: _____
d) Equillibrium:_____
e) Pertain:_____

II. Classify the words above into the following categories. MIND THE CONTEXT

Nouns	Adjectives	Verbs

III. Answer the following questions by using skimming and scanning.

1. What is the importance of Newton's laws?
2. According to the first Newton's law, what is the only way in which an object can accelerate?
3. Explain the main idea of paragraph 8
4. Explain the relation between acceleration, force, and mass of an object.
5. What is a Newton?

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Newton's Laws of Motion

1. Newton's Laws of motion form the foundation to all concepts of what we call 'Newtonian mechanics', or the rules that govern the motion of particles and bodies in our macroscopic world. However, very often they are poorly understood, or the real implication of these laws are incorrectly interpreted. The philosophies behind Newton's Laws and their proper interpretation constitute many of the fundamental pillars in classical physics with far reaching consequences. More often than not, his three laws of motion are introduced in high-school level physic classes without elaborating on or explaining some of the underlying concepts and assumptions. This eventually becomes a severe **bottleneck** in understanding more advanced concepts in physics like energy, relativistic mechanics and quantum mechanics. Very often those **lacks of** understanding are shoved under the carpet.
2. In this article I would thus like to start from the very beginning - the statements of the three laws - and would try to elucidate the fundamental concepts behind the laws of motion in as simple words as possible. We will do so by taking ourselves back to the time of Isaac Newton, and will start with contemporary understandings about the classical world. We will see how Newton's laws, for the first time, shone light on some of the most haunting concepts in physics, but were able to do so only with some questions left open. We will thus use those to motivate the development of concepts that are part of some of the more recent advancements in physics, including the fundamental forces, relativistic mechanics and theory of electromagnetism.
3. **Newton's First Law of motion:** Everybody continues to be in its state of rest or of uniform motion in a straight line unless and untill **compelled** by some external imposed force.
4. **Newton's Second Law of motion:** The rate of change of momentum of a body is directly proportional to the force acting on the body and the change takes place in the direction in which the force acts.
5. **Newton's Third Law of motion:** To every action there is an opposite and equal reaction.
6. Hence, having revised the statements of the Laws, insight into their contents is going to be taken. First of all, it is to be understood that Newton's first two laws are more of definitions than 'laws' of nature. And hence they can never be proved wrong or can never change unless we change the definitions. If you define the name of an apple to be 'apple', and everybody accepts it, how can it ever go wrong unless some fine morning everybody changes mind and prefers calling it something else? However, if you postulate that the diameter of an apple is always less than 10cm, then it is highly possible that an apple is found by some means which violates the postulate. So that's the difference between a definition and a postulate. In one sense it is right to call a definition by the name 'Law', since a definition will never ever change.

The Second Law - measure of Force and the concept of Inertial Mass:

7. Newton's first law of motion predicts the behavior of objects for which all existing forces are balanced. The first law - sometimes referred to as the law of inertia - states that if the forces acting upon an object are balanced, then the acceleration of that object will be 0 m/s/s. Objects at **equilibrium** (the condition in which all forces balance) will not accelerate. According to Newton, an object will only accelerate if there is a net or unbalanced force acting upon it. The presence of an unbalanced force will accelerate an object - changing its speed, its direction, or both its speed and direction.
8. Newton's second law of motion **pertains** to the behavior of objects for which all existing forces are not balanced. The second law states that the acceleration of an object is dependent upon two variables - the net force acting upon the object and the mass of the object. The acceleration of an object depends directly upon the net force acting upon the object, and inversely upon the mass of the object. As the force acting upon an object is increased, the acceleration of the object is increased. As the mass of an object is increased, the acceleration of the object is decreased.

9. Newton's second law of motion can be formally stated as follows:
   The acceleration of an object as produced by a net force is directly proportional to the magnitude of the net force, in the same direction as the net force, and inversely proportional to the mass of the object.
   This verbal statement can be expressed in equation form as follows:

$$\mathbf{a = F_{net} / m}$$

The above equation is often rearranged to a more familiar form as shown below. The net force is equated to the product of the mass times the acceleration.

$$\mathbf{F_{net} = m \bullet a}$$

10. In this entire discussion, the emphasis has been on the *net force*. The acceleration is directly proportional to the *net force*; the *net force* equals mass times acceleration; the acceleration in the same direction as the *net force*; an acceleration is produced by a *net force*, the NET FORCE. It is important to remember this distinction. It is the net force that is related to acceleration. The net force is the vector sum of all the forces. If all the individual forces acting upon an object are known, then the net force can be determined.
11. Consistent with the above equation, a unit of force is equal to a unit of mass times a unit of acceleration. By substituting standard metric units for force, mass, and acceleration into the above equation, the following unit equivalency can be written.

$$\mathbf{1\ Newton = 1\ kg \bullet m/s^2}$$

The definition of the standard metric unit of force is stated by the above equation. One Newton is defined as the amount of force required to give a 1-kg mass an acceleration of 1 m/s/s.