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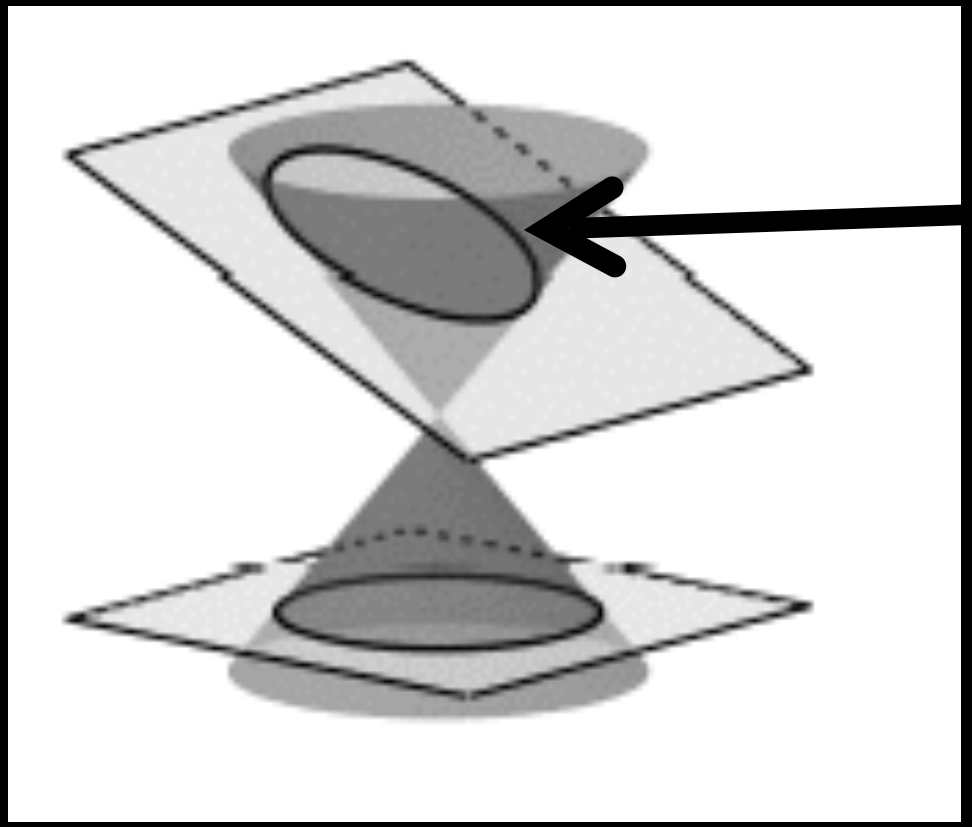
1. Circle
2. Ellipse
3. Hyperbola
4. Parabola



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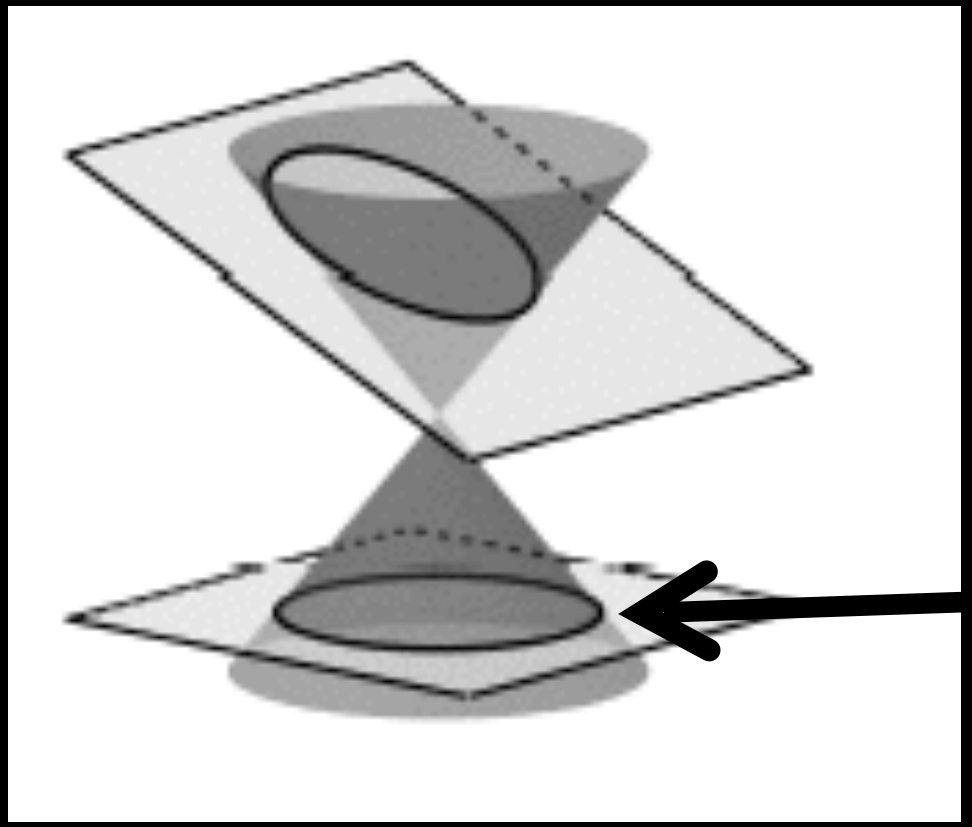

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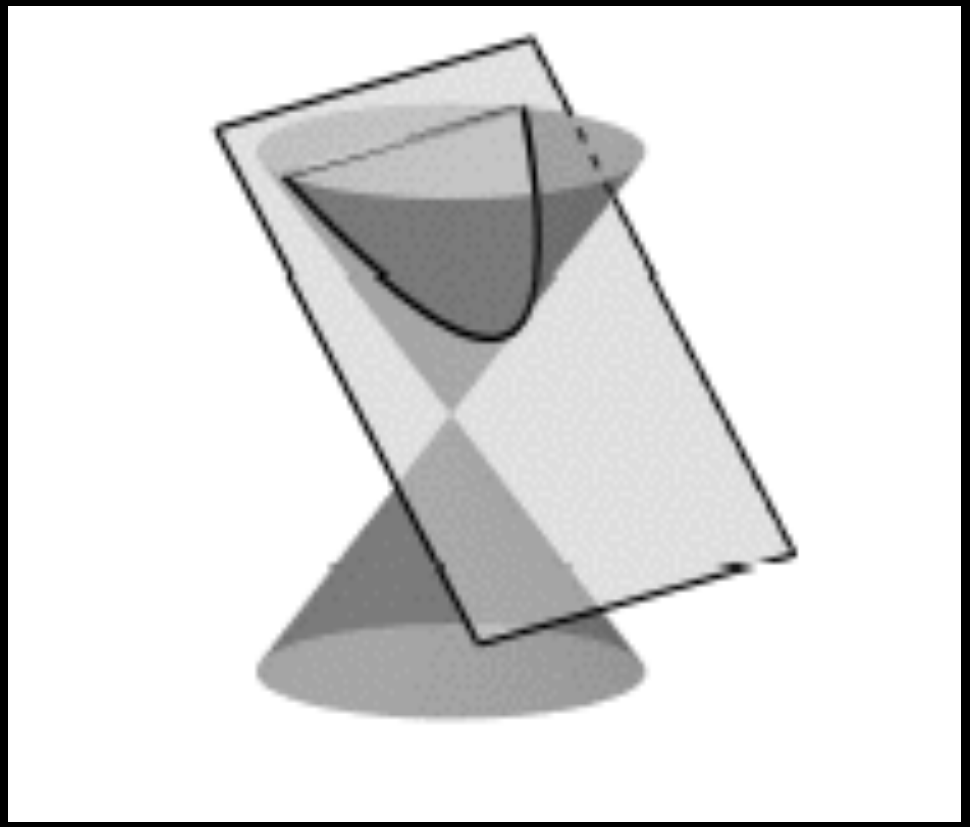

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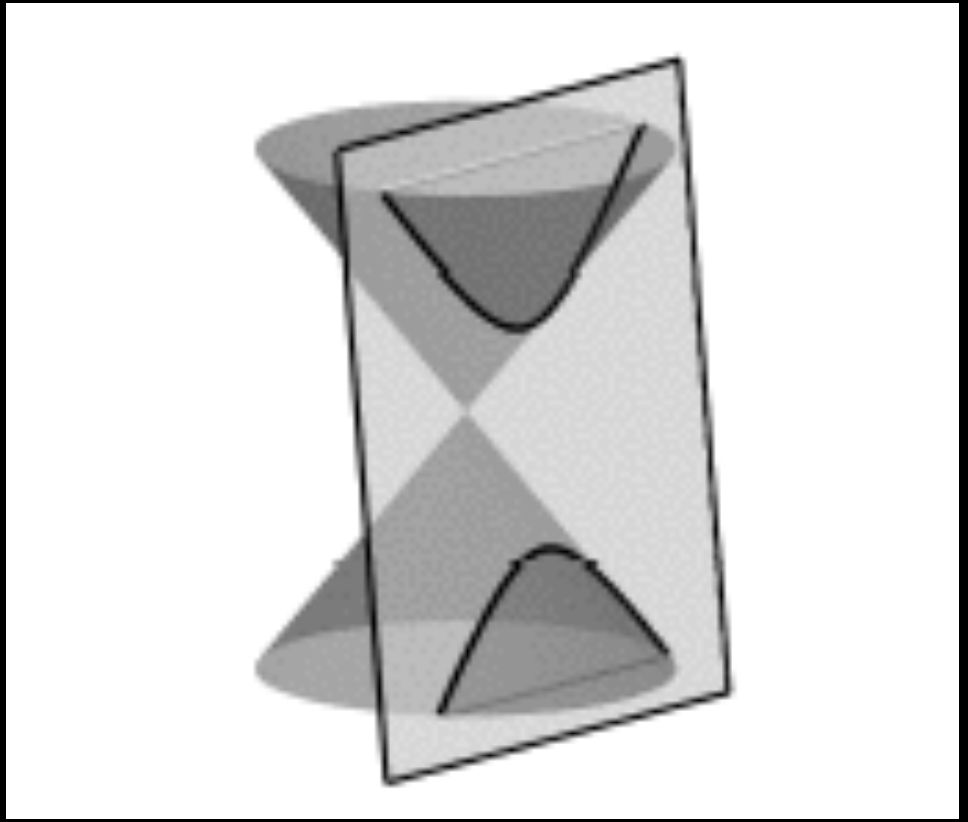


What happens to the pressure of an ideal gas (which is kept in an enclosed container), when its temperature is doubled, while keeping its volume constant?

1. Pressure is reduced by half
2. Pressure remains constant
3. Pressure is doubled

“Every graduate of basic education shall be an empowered individual who has learned, through a program rooted on sound educational principles and geared towards excellence, the foundations for learning throughout life, the competence to engage in work and be productive, the ability to coexist in fruitful harmony with local and global communities, the capability to engage in creative and critical thinking, and the capacity and willingness to transform others and oneself.”

Section 2, Republic Act 10533
Enhanced Basic Education Act of 2013

BIOLOGY

The Cell
- Cell Theory
- Structure and Functions
- Cell Types
- Cell Modifications
- Transport Mechanisms

Biological Molecules
- Carbohydrates and Lipids
- Amino Acids and Proteins
- Enzymes

Energy Transformations
- Photosynthesis
- Cellular Respiration
- The Role of ATP

Genetics

Evolution

Biodiversity

Systematics

Plant and Animal Organ Systems

CHEMISTRY

Matter and its properties
Atoms, Molecules, and Ions
Stoichiometry
Gases

Electronic Structure of Atoms
Electronic Structure and Periodicity
Chemical Bonding
Organic compounds

Intermolecular Forces
Liquids and Solids
Physical Properties of Solutions
Thermochemistry
Chemical Kinetics

Chemical Thermodynamics
Chemical Equilibrium
Acid-Base Equilibria and Salt Equilibria
Electrochemistry

PHYSICS

Units and Measurement
Vectors
Kinematics
Newton's Laws of Motion
Work, Energy, and Energy Conservation
Momentum, Impulse, and Collisions
Rotational equilibrium and rotational dynamics
Mechanical Waves and Sound
Fluid Mechanics
Laws of Thermodynamics

Electrostatics
Current, Resistance, and Electromotive Force
Direct-Current Circuits
Integration of Electrostatic, Magnetostatics, and Electric Circuits Concepts
Light and Optics
Relativity

Precalculus

- Analytic Geometry
  - Conic Sections (Circles, Parabolas, Ellipses, Hyperbolas)
  - Systems of Nonlinear Equations
- Mathematical Induction
  - Sequences and Series
  - Sigma Notation
  - Proving Identities and Inequalities
  - The Binomial Theorem
- Trigonometry
  - Angles in a Unit Circle
  - Circular Functions
  - Graphs of Circular Functions
  - Trigonometric Identities (Fundamental, Sum/Difference, Double and Half Angles, Inverse Functions)
  - Polar Coordinate System

SAYSAY (MEANING)

Why is this important?

- facilitate an understanding of the value of the lessons, for each learner to fully engage in the content on both the cognitive and affective levels.

HUSAY (MASTERY)

How will I deeply understand this?

- aim for deep understanding of the subject matter where learners are led to analyze and synthesize knowledge.

SARILI (OWNERSHIP)

What can I do with this?

- learners take ownership of their learning, developing independence and self-direction

3.1. Key Concepts, Equations, and Problem Solving Strategies

Concept	Discussion
Position, distance, and displacement in 2- and 3-dimensions	• The position vector $\vec{r}$ of a particle with reference to the origin of an x-y-z reference frame is $\vec{r} = x\hat{\imath} + y\hat{\jmath} + z\hat{k}$. • If it is known that the particle is located on a plane, e.g. the x-y plane, the position vector can be written more simply as $\vec{r} = x\hat{\imath} + y\hat{\jmath}$.
Speed, average velocity, and instantaneous velocity in 2- and 3-dimensions	• The average speed of a particle in a time interval, is defined as distance traveled along the path, divided by the time elapsed. • The average velocity of a particle in a time interval is just its net displacement per unit time: $\vec{v}_{av} \equiv \frac{\vec{r_2} - \vec{r_1}}{t_2 - t_1} = \frac{\Delta\vec{r}}{\Delta t}$ • The instantaneous velocity, or velocity, of a particle is the instantaneous rate of change of the position: $\vec{v} = \lim_{\Delta t \to 0} \frac{\Delta\vec{r}}{\Delta t} = \frac{d\vec{r}}{dt}$ • The instantaneous velocity vector is tangent to the path at each point

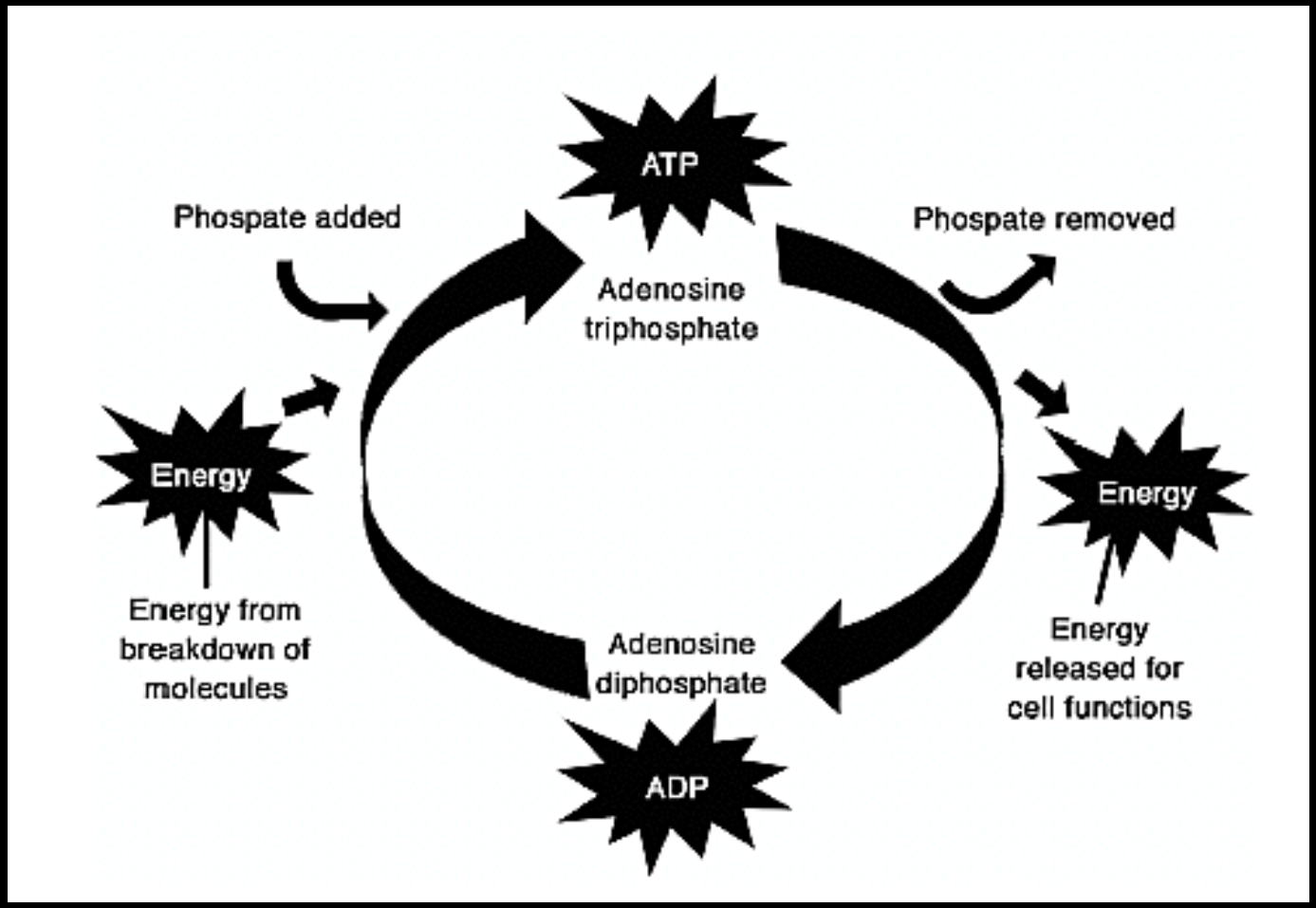
When solving problems in this chapter, remember that:

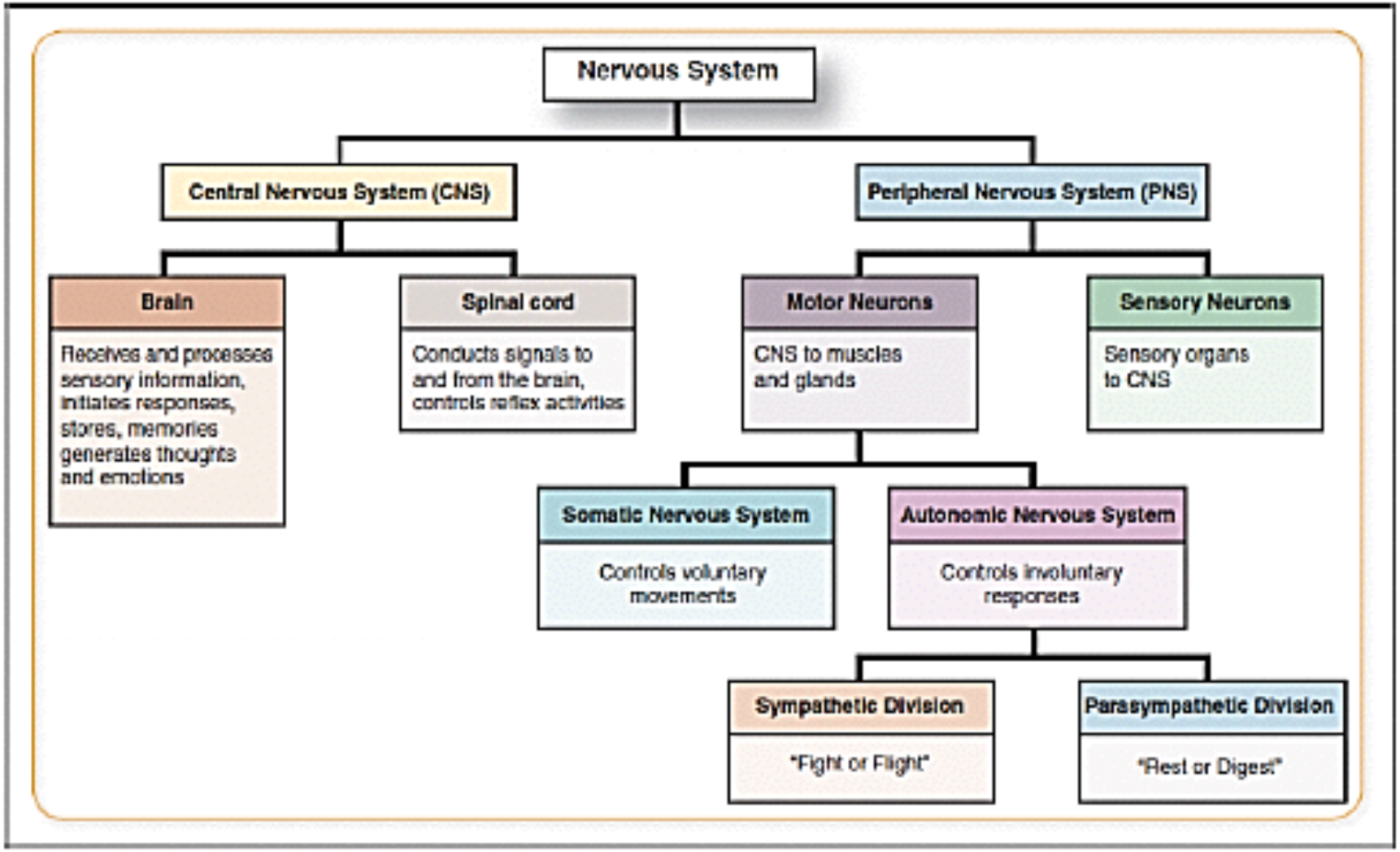
1. It is often a good strategy to first identify the physical principles involved before doing the mathematics.
2. It is often a good strategy to postpone numerical substitutions because tracking down algebraic mistakes is easier than tracking down numerical mistakes
3. Displacement, position, and distance are different.
4. Velocity and speed are different
5. When a projectile is at its maximum height the vertical component of its velocity is zero.
6. It is possible for an object to be accelerating even though it is moving at a constant speed (e.g. uniform circular motion).
7. The direction of the total acceleration of an object moving along a circular path is towards the center of the circle only for uniform circular motion.

Compare the cell to a big city. Ask the learners what the requirements of the city would be in order for it to function. Relate these requirements to the parts of the cell. Relate the learners' responses to the functions of the different parts of a cell.

Sample responses:

- The city will need power. What generates power for the city? Relate this to the function of the mitochondria and the chloroplast.
- The city generates waste. How does it minimize its waste? How does the city handle its garbage? Relate this to the function of the lysosome.
- The city requires raw materials to process into food, clothing, and housing materials. Where are these raw materials processed? Relate this to the functions of the Golgi Apparatus.

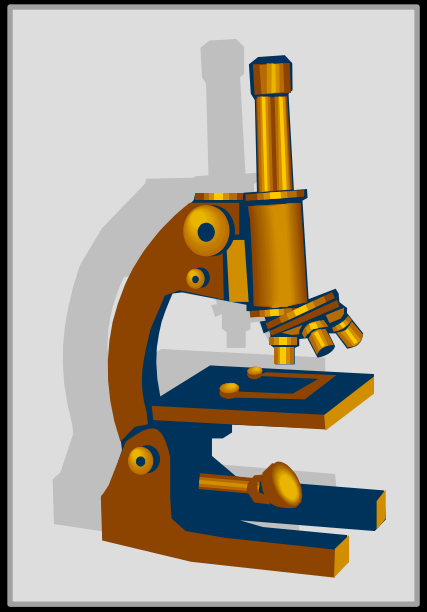

ATP
Phospate added
Phospate removed
Adenosine
triphosphate
Energy
Energy
Energy from
breakdown of
molecules
Adenosine
diphosphate
Energy
released for
cell functions
ADP


Nervous System
Central Nervous System (CNS)
Peripheral Nervous System (PNS)
Brain
Receives and processes sensory information, initiates responses, stores, memories generates thoughts and emotions
Spinal cord
Conducts signals to and from the brain, controls reflex activities
Motor Neurons
CNS to muscles and glands
Sensory Neurons
Sensory organs to CNS
Somatic Nervous System
Controls voluntary movements
Autonomic Nervous System
Controls involuntary responses
Sympathetic Division
"Fight or Flight"
Parasympathetic Division
"Rest or Digest"

Compare animal cells from plant cells. For the animal cells, scrape cheek cells using a toothpick. Ask the learners to place the scrapings on a microscope slide and add a drop of water to the scrapings. Tease the scrapings into a thin layer and cover with a slip. Examine under HPO. Instruct the learners to draw the cells on their workbooks and to label the cell parts that they were able to observe under the microscope.

For the plant cells, instruct the learners to obtain a Hydrilla leaf and place it on a microscope slide. Examine under LPO. Ask the learners to draw the cells on their workbooks and to label the cell parts that they were able to observe under the microscope.

Science Process Skills



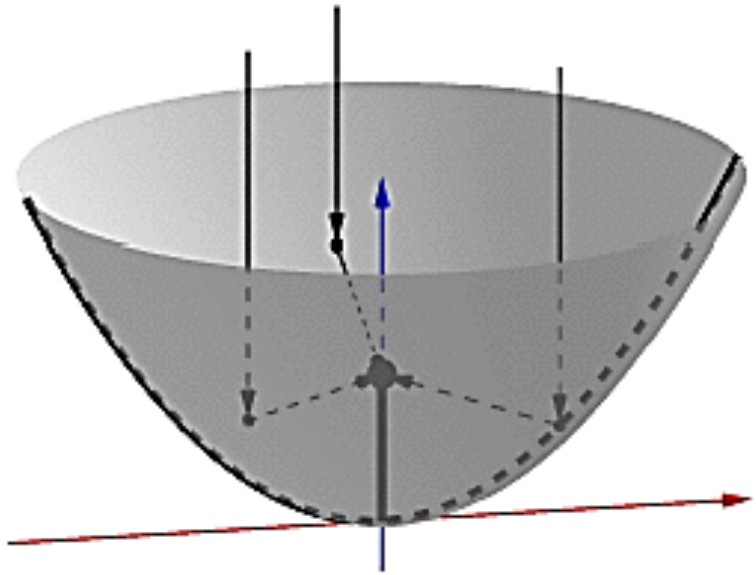
6. Multi-concept/ Bridging/ Rich-Context/ Challenge Problems

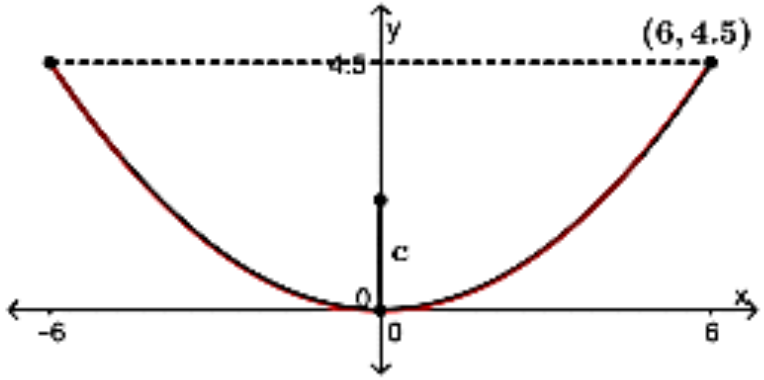
Example 8: You are an astronaut and you are at the surface of a moon that has no atmosphere. One of your tasks is to determine the gravitational acceleration, g_M, at the moon's surface. To accomplish this you were given a projectile launcher that can launch a metal ball at a constant initial speed v_0, a horizontal platform with adjustable height, a tape measure that can measure lengths with centimeter accuracy, and a timer that can measure time to an accuracy of hundedths of a second. However, you forgot the value of v_0. You therefore set out to estimate the moon's gravitational acceleration and the initial speed by performing a series of measurements and analyzing the data.

A. *You dropped the metal ball from a height 150 ± 0.5 cm and recorded the amount of time needed for the ball to reach the ground as $0.98 + 0.005$s. Use the data to estimate the gravitational acceleration at the surface of this moon and its uncertainty*

B. *To determine the initial speed, v_0, imparted by the launcher to the metal ball. You launched the projectile horizontally from various heights and measured the range. The data you obtained is summarized in the table below. Use the data, together with the estimate for the gravitational acceleration in Part A to estimate v_0 and its uncertainty.*

Example 1.2.6. A satellite dish has a shape called a paraboloid, where each cross-section is a parabola. Since radio signals (parallel to the axis) will bounce off the surface of the dish to the focus, the receiver should be placed at the focus. How far should the receiver be from the vertex, if the dish is 12 ft across, and 4.5 ft deep at the vertex?





Learning Competency	Assessment Tool	Exemplary	Satisfactory	Developing	Beginnning
The learners shall be able to: 1. describe the structure and function of major and subcellular organelles (STEM_BIO11/12-Ia-c-2)	Learner participation (during lecture)	Learner was able to answer all the question/s without referring to his/ her notes	Learner was able to answer the main question without referring to his/her notes but was not able to answer follow-up question/s	Learner was able to answer the questions but he/she referred to his/her notes	(1) Learner was not able to answer the question/s (2) Learner read notes of his/her classmate
	Assignment	Learner submitted an assignment beyond the requirements	Learner submitted a comprehensive and well-written assignment	Learner submitted a well written report but some responses lack details	(1) Learner did not submit an assignment (2) Learner submitted a partially-finished assignment
The learners shall be able to: 2. describe the structural components of the cell membrane (STEM_BIO11/12-Ig-h-11)	Learner participation (during practice)	Learner was able to concisely answer all the questions	Learner was able to answer the main question without referring to his/her notes but was not able to answer follow-up question/s	Learner was able to answer the questions but he/she referred to his/her notes	(1) Learner was not able to answer the question/s (2) Learner read notes of his/her classmate
	Laboratory (Examination of Animal and Plant Cells)	Learner submitted drawings that were beyond the requirements	Learner submitted drawings that fulfilled the requirements (complete and detailed)	Learner submitted drawings that were incomplete	(1) Learner was not able to submit drawings (2) Learner's drawings were haphazardly done
The learners shall be able to: 3. relate the structure and composition of the cell membrane to its function (STEM_BIO11/12-Ig-h12)	Examination	Learner obtained 90% to 100% correct answers in the examination	Learner obtained 70% to 89.99% correct answers in the examination	Learner obtained 50% to 69.99% correct answers in the examination	Learner obtained less that 50% correct answers in the examination
	Research Assignment	Learner submitted a research assignment beyond the requirements	Learner submitted a comprehensive and well-written research assignment	Learner submitted a well written report but some responses lack details	(1) Learner did not submit an assignment (2) Learner submitted a partially-finished assignment

CAMPAIGN and DEBATE RUBRIC

CAMPAIGN	
NAME OF BODY SYSTEM	**POINTS**
Written clearly, spelled correctly, easy to see	3
Missing one criterion	2
Missing two criteria	1
Absent	0
LIFE SIZE REPRESENTATION	
Correct size, colored, neatly drawn	12
Missing one criterion	8
Missing two criteria	4
Absent	0
DESCRIPTION OF BODY SYSTEM FUNCTION	
Accurate, clearly stated, easy to understand	6
Missing one criterion	4
Missing two criteria	2
Absent	0
PLACEMENT AND LABELLING OF ORGANS AND PARTS	
All organs and parts are accurately placed and labeled	4
Either not labeled or placed correctly	3
Not all organs and parts accounted for	2
Absent	0

CAMPAIGN	
DESCRIPTION OF ORGAN OR PART FUNCTION	
Accurate, clearly stated, easy to understand	6
Missing one criterion	4
Missing two criteria	2
Not all organs and parts accounted for	1
Absent	0
CONCLUSION	
Clearly stated, easy to understand, evidence to back it up	9
Missing one criterion	6
Missing two criteria	3
Absent	0

DEBATE	
REVIEW	**POINTS**
Clearly stated, easy to understand	2
Missing one criterion	1
Absent	0
REBUTTAL	
Effectively refutes points made in all other campaigns	15
All other campaigns are refuted, but not all points	10
All other campaigns are not refuted	5
Absent	0
CLOSING ARGUMENT	
Clearly stated, easy to understand, evidence to back it up	3
Missing one criterion	2
Missing two criteria	1
Absent	0

Capstone Research Project