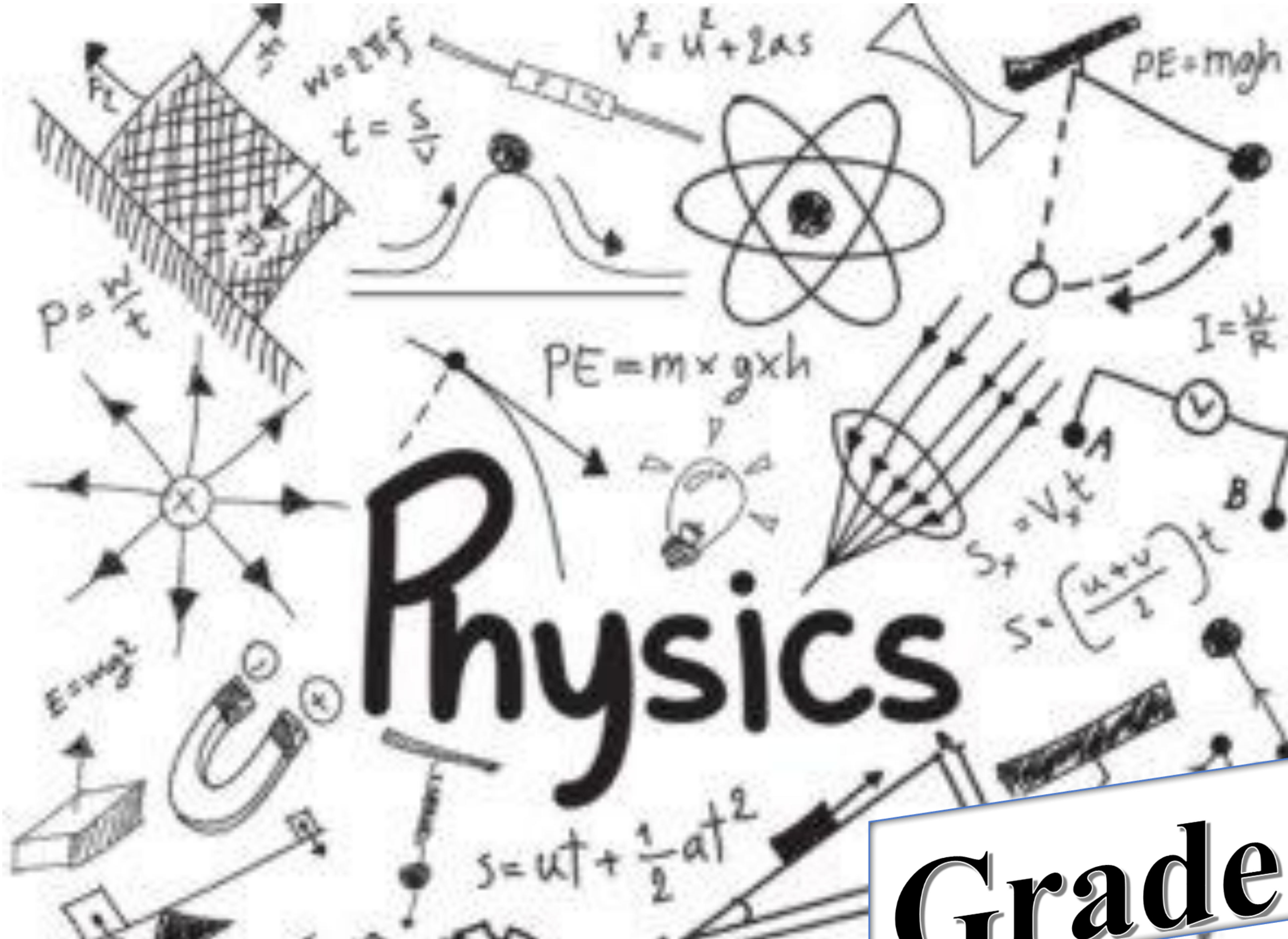
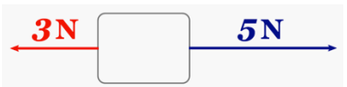
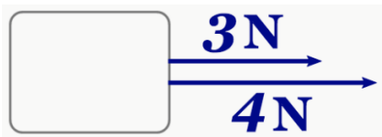
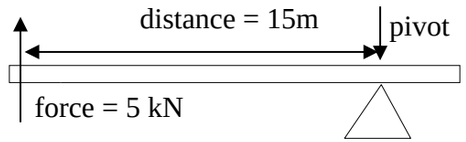
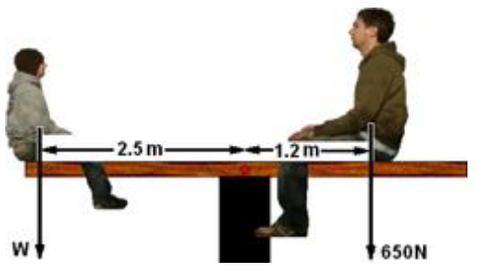


Grade 9

Term/ Month	Topic/Unit	Major concept	Specific Objectives	Teaching Strategies	Suggested Learning Activities & Assessment
September	Density	Density is the measurement of the compactness of an object. Density is a property that is determined by the ratio of a substance's mass to its volume. Mass is how much matter is inside of an object. Volume is how much space something takes up ***More dense*** the particles are spaced closer together in a particular material than in another material of the same size (volume). ***Less dense*** the particles are spaced further apart in a particular material than in another material of the same size (volume).	1. Define correctly the term mass. 2. Define correctly the term volume. 3. Define the term density correctly. 4. Explain what makes a material more/less dense on a molecular level. 5. Explain the effect of density when materials/substances interact with each other. 6. Calculate correctly the density of materials using the formula $\rho = \frac{m}{V}$.	Questioning Explanation Discussion Demonstration	Students will be engaged in a guided discussion on density as it relates to the amount of beans in the jar. Students will create a miniature hot-air balloon that floats using their knowledge of density, volume and mass. Students will design a replicable model showing density at work in the water cycle. Students will observe a video of an ice cube floating on water 1. The ratio of an object's mass to its _____ is called the density of the object. 2. State the formula for density in words and mathematical symbols. 3. A rock has a mass of 210 grams and occupies a volume of 70 cm3. What is its density?

October	Vector and Scalar Quantities	Students will understand the concept of a vector and be able to perform basic vector operations (addition, subtraction, scalar multiplication). Students will be able to draw vectors on the coordinate plane and graphically add, subtract, and multiply by a scalar. Force, Velocity, Acceleration, Momentum, Displacement and Weight are some examples of a vector quantity. Scalar quantity: Scalar quantity only have a magnitude (size). Vector quantity: Vector quantity have both magnitude and a direction. A force can be represented by a arrow as it is a vector. The direction in which the arrow head points represents the direction of the force. The length of the tail of the arrow represents the magnitude/size of the force.	1. Define the term force. 2. State the unit for force. 3. Define the term resultant force. 4. Apply the concept resultant force in scenarios found in the home and school. 5. Calculate resultant force for parallel force. 6. Calculate resultant force for perpendicular forces. 7. Represent a force using a vector. 8. Calculate resultant force using the parallelogram method		Getting from point a to point b: Vectors in the Classroom. In this activity, students should be able to design ways to obtain the speed of all the members of the group and decide how to use these values to determine who among them walks fastest. The students will use the improvised design for the measurement of the distance given by the teacher. They will also plot the data obtain, where in their position is at the y-axis while time is at the x-axis. 1. What is a force? 2. What is a resultant force? 3. Two soccer players kick a ball at the same instant. One strikes with a force of 65N west and the other 88 N east. Find the resultant force on the ball. 4. Two children pull a wagon by exerting forces of 15N and 18N at the same point. If the forces are parallel, what is the magnitude of the resultant force? 5.  6.  7. 

November-December	Mass, Weight & Centre of Gravity	Identify the state of equilibrium of an object. Locate the centre of gravity of an object	1. state what centre of gravity is after viewing PowerPoint and class discussion 2. determine the centre of gravity for regular after viewing PowerPoint and observing a demonstration 3. justify how centre of gravity affects stability after viewing Power Point, an illustration and a class discussion 4. identify which objects will be stable or unstable after viewing Power Point 5. determine how to achieve more stability in an object, giving examples after an experiment *6.* determine the centre of gravity for irregular objects after viewing PowerPoint and observing a demonstration *7.* draw and label the nitrogen cycle after viewing PowerPoint	Questioning Explanation Discussion Illustration Experiment	Various shaped thick card hung from corners. Tipping of different shaped blocks Balance objects with stable, unstable and neutral equilibrium 1. What is the centre of gravity? 2. How do you determine the centre of gravity? 3. What is the line of symmetry? 4. How does centre of gravity affects stability?

January	Moments	Identify moment at play in the environment. Using the principle of moment to calculate an unknown force or distance. **Equilibrium** An object at equilibrium has no net influences to cause it to move, either in translation (linear motion) or rotation **Net forces** The net force acting upon the object is equal to 0. Upward force + Downward force + Reaction force = 0 **Net Moment** The net moment equal 0. The sum of the Clockwise moment = Sum of Anti-Clockwise moment Calculate the moment of a force using the formula Moment = Force × Distance. Calculate the moment of a body in equilibrium using the formula Sum of Anti-Clockwise moment = Sum of Clockwise moment.	1. Define the moment of a force. 2. Identify situations in which principle of moments is applied 3. State conditions necessary for a body to be in equilibrium. 4. Calculate unknown variables of object in a state of equilibrium using the equation Sum of Anti-Clockwise moment = Sum of Clockwise moment	Questioning Explanation Discussion Illustration Experiment	Opening door at different distances from hinge, simple see-saw, spanners with different length handles, different size crow-bars etc Students and teacher will discuss the use of a spanner/adjustable, after which a discussion will ensue on the difference made in the turning force when the length is varied. **Worked examples** **1.** calculate the moment about the pivot  answer moment = force * perpendicular distance. = 5N*15m = 15Nm 2. If the system is in equilibrium, what is the weight of the child  Answer Sum of the total clockwise moments = Sum of the total anticlockwise moments 650N * 1.2m = W * 2.5m W= 312N

February	Energy	Identify types of energy in the environ. Calculate the energy used in a given scenario.	1. Define correctly the term Energy. 2. State the law of conservation of energy. 3. List the types of Energy. 4. Differentiate between the Potential and Kinetic energy. 5. Give four (4) sources of each type of Energy. 6. Compute the amount of energy used in various scenarios. 7. Show a willingness to identify types of energy	Questioning Explanation Discussion Illustration Experiment	In three short demonstrations, students learn about some of the forms of energy commonly found around us. Watch this activity on YouTube Fan (Answer: Uses electrical energy; produces kinetic energy.) Battery (Answer: Stores chemical energy.) Banana (Answer: A source of chemical energy.) Guitar (Answer: Uses chemical energy from a person [energy from the food they eat]; produces sound energy.) Candle (Answer: Uses chemical energy; produces light and thermal energy.) Waterfall (Answer: The water has potential energy at the top of the falls and kinetic energy at the bottom of the falls.) Research the source of your local utility company's electricity. Is it coal, natural gas, hydro, nuclear, wind or some combination? A ball thrown vertically upward leaves the hand with a certain speed and a corresponding amount of kinetic energy. This kinetic energy is completely converted to gravitational potential energy as the ball rises and comes to a stop at its highest point. Then as the ball falls back to earth, its potential energy is gradually changed back again to kinetic energy. Since the ball returns to the level from which it started with the same speed with which it

					left the hand, it has exactly as much kinetic energy at the end of its flight as it had at the beginning. Although its energy changed from kinetic to potential and back to kinetic again, none of its initial energy was lost. Take a rubber band and stretch it.
March	Graphs of Motion	Teacher will be engage students in a guided discussion on liner graph using a power point. ***Linear Graph*** The word Linear simply means straight, so if you have a linear graph it is a straight line graph. Linear relationships are used in everyday life. These relationships can be expressed in many different ways. Linear graphs are one way of expressing these relationships, when graphed they give a straight line. Linear graphs can be sketched or plotted. ***Relationship between Quantities*** Mass-Volume – Density Distance-Time – Velocity Velocity-Time – Acceleration Force-Area – Pressure ***Inversely Proportional***	1. Define the term linear graph. 2. Determine the relationship between two quantities of the graph. 3. Differentiate between directly and inversely proportional. 4. List at least five (5) items on a finished graph. 5. Give the criteria for the items of graph. 6. Make a suitable scale for a given graph. 7. Plot the co-ordinates of a graph, given a table. 8. Produce a best-fit-line 9. Calculate the gradient/slope of the graph. 10. Read and interpret a graph	Questioning Explanation Discussion Illustration Experiment	Students will be able to describe an object's displacement, velocity, and acceleration based on one given graph of motion. Students will be able to create an approximate graph of motion upon observing an object in motion. Students will develop a deeper understanding of slope as a rate of change and that a velocity vs. time graph is the graph can be developed by graphing the slope at each given point in a position vs. time graph. Graph plotting activities Graphing Practice Problem #1: **Ethylene is a plant hormone that causes fruit to mature. The data above concerns the amount of time it takes for fruit to mature from the time of the first application of ethylene by spraying a field of trees.** **Amount of ethylene in ml/m^2** | **Wine sap Apples:**

		A relationship between two variables in which the product is a constant. When one variable increases the other decreases in proportion so that the product is unchanged. ***Directly proportional*** ***A***s one amount increases, another amount increases at the same rate. The symbol for "directly proportional" is ∝.			<table><tr><th></th><th>Days to Maturity</th></tr><tr><td>10</td><td>14</td></tr><tr><td>15</td><td>12</td></tr><tr><td>20</td><td>11</td></tr><tr><td>25</td><td>10</td></tr><tr><td>30</td><td>8</td></tr><tr><td>35</td><td>8</td></tr></table> **A. Make a line graph of the data.** **B. What is the dependent variable?** **C. What is the independent variable?**
April	Laws of Motion	Student will be able to understand that mass x velocity equals momentum. Student will be able to understand the impacts of collisions and their results. Student will be able to determine the vector of an incident.	1. differentiate between the terms distance and displacement. 2. differentiate between the terms speed and velocity. 3. apply the formula $v = {}^{s}/_{t}$ to determine an unknown variable. 4. define the term acceleration. 5. apply the formula $a = {}^{\Delta v}/_{\Delta t}$ to determine an unknown variable.		Students will draw from a bag of different size marbles and string and let them try to see what kinds of angles are made when you hit two marbles together. Have them observe if the angle changes when the marbles are the same compared to when the marbles are different. Discuss the observations with the class. One person stands still. The other person skates into him. At the point when they would collide, they push off from each other.

			6. explain the term uniform acceleration. 7. apply the correct equation of uniformly accelerated motion to determine change of speed, acceleration and /or distance. 8. explain Newton's first law of motion. 9. define the term inertia. 10. explain Newton's second law of motion. 11. apply Newton's laws of motion to explain how everyday moving machines work and move.		
May	Heat	To understand the difference between heat and temperature To understand how the Celsius scale is derived	1. Describe the caloric theory of heat. 2. Describe the kinetic theory of heat. 3. Provide at least two conditions which the caloric theory cannot explain. 4. Define the term temperature. 5. Convert between Kelvin and degree Celsius. 6. Differentiate between heat and temperature.	Questioning Explanation Discussion Illustration Experiment	Mixed equal volumes of hot and cold water, what happened to the temperature? How did the temperature rise of the cool water and temperature drop of the hot water compare? Was the result what you expected? What does this tell you about energy transfer in this activity? Buckets: 2 buckets, one cold and one hot- water. Students will dip a hand in each bucket. Wait and dip into the other bucket.

			7. Explain the concept thermometric property. 8. Identify and explain the fix points of the Celsius scale. 9. Identity at least two types of thermometer and its thermometric property. 10. Identify at least three differences between the clinical thermometer and the laboratory thermometer. 11. State the different states of matter. 12. Differentiate between the different states of matter.		