# SUMMATIVE EVALUATION REVIEW

## Introduction

1. State the 3 S.I. base units – name, symbol, and the quantity each measures.
2. Fill in the following chart on metric prefixes.

|  |  |  |
| --- | --- | --- |
| Prefix Name | Symbol | Multiplier |
|  |  | 109 |
| mega |  |  |
|  | k |  |
|  |  | 10-2 |
|  | m |  |
| micro |  |  |
|  | n |  |

1. What is the expression for calculating a measurement error as a percentage?
2. Indicate the labels, which should appear on every graph of data plotted and explain how to calculate the slope of a straight-line graph.

## Unit #1 - Kinematics

1. Differentiate between mechanics, kinematics and dynamics.
2. Explain how Physics defines when an object is considered to be in motion.
3. How does a vector differ from a scalar?
4. Distinguish between distance, position and displacement.
5. Define speed in terms of distance and time. State the equation. Explain the difference between constant, average and instantaneous speeds.
6. Define velocity in terms of both position and displacement and time. Differentiate between constant, average and instantaneous velocity.
7. How does speed differ from velocity?
8. A person goes for a walk due North and takes 0.20 h to walk 0.30 km. Then the person rests for 10 minutes. Next the person walks 25 minutes due west for 500 m. Calculate the person’s average speed and average velocity.
9. What is uniform motion and non-uniform motion?
10. What physically is the slope of a position-time graph?
11. On the graph below, indicate a region of
	1. uniform velocity
	2. changing velocity
	3. stopped motion
	4. returning towards starting position.



1. From the graph below, calculate the
	1. average velocity for the whole trip
	2. average speed for the whole trip.
	3. average velocity during the first 3.0 seconds
	4. calculate the instantaneous velocity 6.5 seconds after the trip began.
	5. state what position has been reached at 7.0 seconds after the trip began.
	6. indicate what time(s) the traveler will be 3.0 m [N] of the starting position.



1. Define acceleration in terms of time and velocity. State the equation. Describe the difference between constant, average and instantaneous acceleration.
2. A car moving at 50 km/h requires 6.0 seconds to reach 80 km/h when merging into the expressway traffic. Calculate the acceleration of the car.
3. What, physically, is the slope of a velocity-time graph?
4. Write a formula for displacement in terms of velocity and time when velocity is uniform and 2 formulas when acceleration is uniform.
5. Calculate the displacement of the car during 6.0 seconds in question #14.
6. Physically, what does the area beneath a velocity-time graph represent?
7. What is the acceleration due to gravity on earth? What symbol is this given? How does acceleration due to gravity depend upon the mass of a falling object, height of the object above the earth, shape of the object, surface texture of the object, presence of air?
8. What is the value of the acceleration of a plane, which is accelerating at 3.5g?
9. Resolve the vector 36 m/s [N60°W] into its horizontal and vertical components.
10. If the current in a river is 2 m/s and a kayaker can paddle 5 m/s directly across stream, how fast will they appear to be going from an observer on shore?
11. Ms. Mac hits a golf ball with a speed of 45 m/s at an angle of 10° above the ground.
	1. How long is the ball in the air?
	2. How high will the ball reach?
	3. How far does the ball travel down the course?

**Unit #2 - Dynamics**

1. Define force. What are its units? What instrument measures it? List four kinds of forces and give one example of each.
2. Draw the free body diagram of four teenage mutant ninja turtles pulling on a pizza where M is pulling with a force of 30 N [E], D is pulling at 15 N [N], L is pulling at 25 N [S] and R is pulling at 40 N [W]. Determine the resultant force on the pizza, the net force and the unbalanced force.
3. What is gravitational field intensity: symbol, value, units? How does it depend on height, latitude, and celestial body? Relate gravitational field intensity and acceleration due to gravity.
4. Write an equation for force due to gravity. What direction is this force?
5. Write an equation for calculating weight. Explain the difference between mass and weight. What are the units for each?
6. If an alien had a weight of 1500 N on Jupiter (gravitational field intensity of Jupiter = 26 N/kg), what would this alien weigh on Earth?
7. Write an equation relating normal force and the force of friction. List 2 types of friction. What direction is the frictional force?
8. Sketch a motorboat, mass 175 kg, accelerating forward at 2.0 m/s2. The coefficient of friction with the water is 0.05. Calculate and show all the forces acting on the boat. Draw a free body diagram, labeling every force and the net (unbalanced) force.
9. State Newton’s First Law. Give 2 everyday examples of it.
10. State Newton’s Second Law.
11. State Newton’s Third Law. Explain how jumping depends on this law.
12. What is the acceleration of a 1200 kg car, which applies 9000 N of force backwards against the asphalt?

## Unit #3 - Work, Energy and Power

1. Define work. What unit measures it? State an equation for calculating work. What three criteria must be satisfied to use this equation?
2. Define energy. Relate energy to work. What unit measures energy? List 8 types of energy and give and example of each.
3. Define the following and write the symbols used to describe them
	1. Alpha particle
	2. Beta particle
	3. Gamma ray
4. Write the standard atomic notation for the three isotopes of hydrogen.
5. For the following nuclei, determine the daughter element
	1. $$ undergoing alpha decay
	2. $$ undergoing alpha decay
	3. $$ undergoing beta decay
	4. $$ undergoing beta decay
	5. $$ undergoing gamma decay
6. Describe how a CANDU reactor works. List the benefits of nuclear energy and the drawbacks.
7. Calculate the work done while a person exerts 80 N of force against a filing cabinet while moving it 5.0 m up a ramp. How much energy was required?
8. State the Law of Conservation of Energy.
9. Define gravitational potential energy. State the equation used to calculate it. What is the usual reference for measuring it?
10. Define kinetic energy. State the equation used to calculate it.
11. Relate the total energy of an object to its kinetic and gravitational potential energies.
12. A 350 g ball is 4.5 m above the ground and moving at 22 m/s vertically upwards.
	1. Calculate its kinetic energy, its gravitational potential energy relative to the ground and its total energy.
	2. Calculate its kinetic energy, its gravitational potential energy, and total energy at the instant it just hits the ground.
13. Define power. What units measure it? Write an equation for calculating power. Relate kilowatt-hour to joules. Do you pay for power or energy?
14. Determine the power of a weightlifter, who lifts 50 kg vertically 2.0 m upwards in 0.75 s.
15. Calculate the cost of running a 300 watt computer for 30 minutes if the charge is 12¢/kWh.

## Unit #4 - Waves and Sound

1. An electric drill rotates at 2500 rpm. Calculate its frequency in hertz and the number of rotations, which would occur in 3.0 s.
2. Define cycle. Define frequency and period and relate them by an equation.
3. Fifteen flashes of the cursor on the computer screen take 3.0 s. Calculate the number of flashes, which would occur if the computer was left on for 24 hours.
4. Differentiate longitudinal and transverse motion.
5. Draw a labeled diagram of a transverse wave with a wavelength of 10 cm and amplitude of 3.0 cm.
6. At what speed do waves travel across a lake if they have a frequency of 30 Hz and a wavelength of 2.0 cm?
7. Draw a standing wave pattern which has 5 nodes, given a wave with λ = 10 cm. How many antinodes are there? What are the conditions necessary to produce such a pattern?
8. Determine the speed of sound in air at 20˚C. Is the speed faster or slower at 40˚C? Is the speed the same in water? What is the speed of sound in a vacuum?
9. A lightning flash is seen 8.0 s before the sound of the thunder is heard. How far away did the lightning strike if the temperature is 20˚C?
10. What is the speed of a supersonic jet flying at Mach 1.3, if the speed of sound is 1225 km/h?
11. Calculate the frequency of a sound wave if a tuning fork vibrates 500 times in 2.0 seconds.
12. Calculate the speed of a sound wave with a frequency of 384 Hz and a wavelength of 90.0 cm.
13. A ship sends a sound signal towards a cliff and the echo is heard 10.0 seconds later. If the air temperature is 10˚C, how far is the ship from the cliff?
14. Label the parts of the ear and state the function of each part. What frequencies are infrasonic, ultrasonic and audible to a normal human ear?
15. Give three examples of common sounds of different intensities on the decibel scale. How many B is 80 dB? Express this in S.I. units.
16. A 1.0 m long string vibrates with a frequency of 200 Hz. If it is held at is midpoint, with what frequency will it vibrate? For this 1.0 m string, what is the value of its fundamental frequency, its first overtone, it’s third harmonic frequency? Where would you hold the string to achieve this?
17. Determine the frequency of the sound at 20˚C with the longest wavelength that a pipe closed at one end will resonate with if the pipe is 40 cm long. Repeat for the pipe open at both ends. Sketch a diagram to explain each situation. What is the next higher resonant frequency in each case? If a sound of greater intensity is used in the above problem, how will the frequency change?
18. Describe the change in frequency and intensity of the sound heard as you walk across an area in which two speakers set slightly apart are emitting the same frequency sound in phase. What causes this effect?