

Name _____ Test Date _____ Period _____

Physics - Semester exam Review - Fall 2009

Review due date is the same as the test date. This counts as two daily grades.

List the three fundamental dimensions and SI units of each for the metric system:

- a. _____
 - b. _____
 - c. _____
- (Do you remember the units for mass in the imperial system? _____)

A derived SI unit will consist of _____
_____.

Example Problem:

Which of the following is not a derived SI unit? **a)** m/s; **b)** N-m; **c)** meter; **d)** $\text{kg}\cdot\text{m}/\text{s}^2$

What is the difference between displacement and distance traveled? _____

How many significant figures should be used when measuring with laboratory equipment?

Example Problems:

a) The triple beam balanced is calibrated to the gram. You can estimate the measurement to the nearest _____ of a gram.

b) If you have a one meter measure, you can accurately estimate the measurement to the nearest **a)** 1/1000 meter; **b)** 1/100 meter; **c)** 1/10 meter; or **d)** 1 meter

Know which zeros are significant and which zeros are not significant in a number.

What are the two components of speed (think of the units)? _____

What is the difference between speed and velocity? _____

State the formulas for average velocity.

- a. _____
- b. _____

Example problem: A car moves a distance of 25 meters in 5 seconds. Calculate the average velocity. _____

What is acceleration? _____

State the formula for acceleration. _____

Example Problems:

- a) A car accelerates from rest to a final velocity of 30 m/s in 10 seconds. Calculate the car's acceleration. _____
- b) A car accelerates from rest at a rate of 4 m/s^2 . Calculate the final velocity after an elapsed time of 5 seconds. _____

The two components of any vector quantity are:

- a. _____
- b. _____

What is the difference between a vector quantity and a scalar quantity? _____

What is the objective of resolving a vector? _____

Straight-line vectors can be combined by _____.

Example Problems:

- a) A force of 10 N pulls to the right of an object and a force of 5 N pulls to the left of the object. What is the total force in what direction acting on the object?

- b) A plane flies at 900 km/h NE into a wind blowing 25 km/h SW. What is the velocity of the plane? _____

Define equilibrium - _____

When a system is in a state of equilibrium, then all the vector quantities will equal _____.

Example Problem:

A force of 22 N is pulling an object North. What is the equilibrant vector? _____

What is the difference between mass and weight? _____

What is the formula for calculating weight? _____

Example Problem: You have a mass of 45 kg on Earth. What is your weight? _____
(Note: g on Earth is always _____)

State Newton's first law of motion. _____

State Newton's second law of motion. _____

State Newton's third law of motion. _____

Which of the above laws can be defined with an equation? _____

What is the equation? _____

The units for force is _____.

Example Problems:

a) A car with a mass of 1250 kg is accelerated at a rate of 3.5 m/s². Calculate the force. ____

b) A box of 125 kg has a force of 80 N applied. What is the acceleration? _____

Two-dimensional motion

What shape describes the path of two-dimensional motion? _____

Which motion is constant in two-dimensional motion? (circle one) **horizontal / vertical**

Which motion is constantly changing in two-dimensional motion? (circle one) **horizontal / vertical**

Which motion is affected by the force of gravity? (circle one) **horizontal / vertical**

Which motion is **not** affected by the force of gravity? (circle one) **horizontal / vertical**

List Horizontal Motion Equations	List Vertical Motion Equations

Example Problems:

a) An object is dropped from a height of 2.5 meters. Calculate the time it takes to fall that distance **and** the velocity of the object after it fell 2.5 meters. _____

b) A water balloon is launched straight up with a velocity of 32 m/s. What is the height the balloon will reach? _____

c) A ball has a horizontal velocity of 3 m/s as it rolls off of a table that is 1.2 meters high. Calculate the time it takes to hit the floor **and** how far from the table it hits the floor. _____

Define Energy. _____

State the respective formulas for potential energy and kinetic energy.

a. _____

b. _____

The unit's for energy is the _____ and the base SI units included are _____.

What is the difference between potential energy and kinetic energy? _____

Example Problem: Determine which has the greatest KE: a 5 gram bullet with a velocity of 4200 m/s or a 2000 kg car with a velocity of 95 km/h. (Hint: Do dimensional analysis first.) _____

State the law for conservation of energy. _____

Example Problem:

A 500 kg object is at a height of 1.5 meters above a tabletop. At the instant the object is dropped, calculate the KE and the PE of the object. _____

At the instant the object makes contact with the tabletop, what is the KE and PE of the object. _____

Example Problem:

A 4000 kg truck with a PE of 1.962×10^6 joules is sitting at the top of a hill. How high is the hill? _____

What is elastic energy? _____

Write the formula and state the units for elastic energy. _____

Example Problems:

a) A spring has a relaxed length of 0.15 m. A k of 5 N•m is applied to the spring and the length increases to 0.5 m. Calculate the PE_{elastic} of the spring. _____

b) A spring in a click pen has a length of 3cm. A k of 0.1 N•m is applied to the spring to extend the ink cartridge and the spring length is compressed to 1.5 cm. How much energy is stored in the spring? _____

Define Work. _____

State the formula and units for work. _____

Describe a situation when a force is applied to an object but no work is done. _____

Example Problems:

a) You apply a force of 375 N to a car and it moves a distance of 100 meters (Ugh!). Calculate the work you did. _____

b) A table has a mass of 25 kg and you lift it 1.5 meters. How much work did you do? _____

When work is calculated the direction of the vector for the force applied to the object must always be (circle one) **parallel** / **perpendicular** to the direction of motion of the object.

State the formula to solve for work when the applied force is at some angle to the object. _____

Example Problem:

A sled is pulled a distance of 500 meter by a force of 124 N by a rope that makes an angle of 35° with the surface. Calculate the amount of work done on the sled. _____

Work is never 100% efficient. What force in the opposite direction hinders the applied force? _____

What can be done to minimize this opposing force? _____

In some situations this opposing force needs to be increased. State an example _____

Define Power _____

One joule of work done in one second of time represents how much power? _____

List the formula for power. _____

Example Problems:

a) A person with a mass of 60 kg runs up stairs for a total vertical distance of 4 m in 4.2 seconds. Calculate the work done and power produced. _____

(Hint: What is the force that the person is working against? _____)

b) A person applies a force of 75 N to a 150 kg box for 8 seconds and the distance the box is displaced is 1 meter. Calculate the work done and the power produced to move the box. _____

c) How much horsepower was generated? _____

Define Momentum. _____

List the formula for momentum. _____

What effects the change of momentum for any fixed mass? _____

Example Problems:

a) A bullet has a velocity of 1750 m/s and a mass of 5 grams. Calculate the momentum. ____

b) A car and a train travel at the same velocity. Which one has the larger momentum and why? _____
