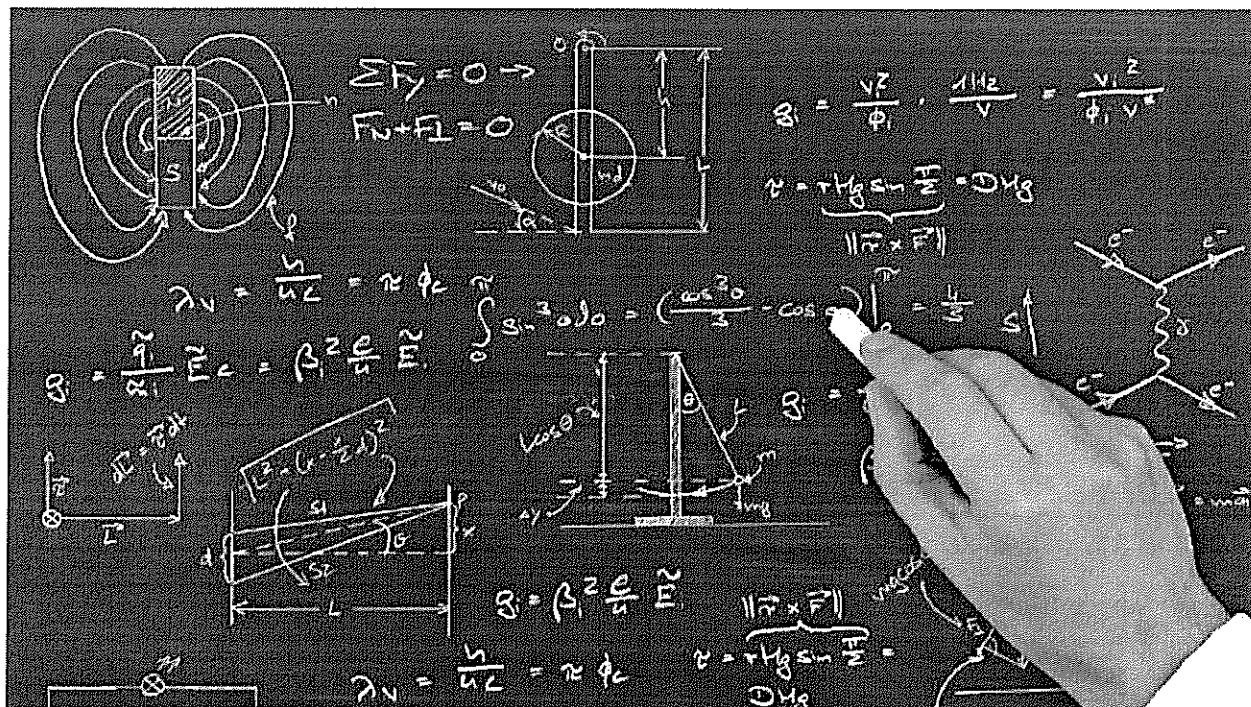


AP Physics C

SUMMER ASSIGNMENT 2019



Welcome to AP Physics C. At White Plains High School!

Both AP Physics C Mechanics and Electro-magnetism are college level courses that are sure to challenge you and capture your interest.

This summer assignment is designed to review all the prerequisite knowledge expected of you.

Of particular interest is the Chapter 3 assignment.

You are expected to have completed pre-calculus and know how to use the Power Rule to find the derivative and anti-derivative of a function. Apart from that, you should have seen before and been exposed to all the material addressed herein.

The summer assignment will be collected the first day of class.

Physics Introduction

You may print this out and write on it or work on your own paper.

Show all work.

1. How many liters is 458.9 mL?
2. How many milligrams are in 3.2 kg?
3. How many centimeters are in 5.43×10^4 nm?
4. How many milliseconds are in 96.2 Ms?
5. How many kiloliters are in 0.71×10^7 μ L?
6. How many meters are in 0.64 Gm?

Physics Chapter 2

You may print this out and write on it or work on your own paper.

Show all work.

1. Mary rollerblades 6 km in 4 hours. What is her speed in m/s?
2. Kengi rock climbs at 2.4 m/s. How long does it take him to climb 75 m?
3. A rock dropped off of a building accelerates at 10 m/s^2 (actually 9.8, but we will use 10). If the rock falls for 3.5 seconds, how far does it fall?
4. How fast is the rock in the problem above going after the 3.5 second fall if it started from rest? ($v_0 = 0 \text{ m/s}$)
5. A car decelerates from 30 m/s to 10 m/s in 4 seconds. What is the deceleration of the car?
6. For the car above, how far does it travel in the 4 seconds it slows down?

Physics Chapter 3

You may print this out and write on it or work on your own paper.

Show all work.

1. A ball's position is described by the $x = 8t - 14t^2$. What is the ball's velocity at 4 seconds given it started at 8 m/s?
2. An object moves such that $x = 6t + 2t^2$. What is the object's acceleration at 3 seconds?
3. A car has a velocity given by $v = 2t^3$. What is its acceleration at 4 seconds assuming that it started from rest?
4. The position of an orangutan is given by $x = -34t + 0.4t^3$. If the orangutan starts with an initial position of 2 m, what is the velocity and acceleration at 5 seconds?
5. A car has a velocity given by $v = 14t^2 + 0.5t^3$. What is the acceleration of the car at 4 seconds?
6. The horizontal path of an object is described by $x = 4 + 12t - 9t^3$. What is the velocity and acceleration of the object at 7 seconds?

AP Physics C - Chapter 4

You may print this out and write on it or work on your own paper.

Show all work.

1. An evil clown applies an evil force of 70 N to a 40 N watermelon during an evil performance at an evil circus. What is the resulting acceleration of the watermelon?
2. Two hockey players arrive and hit the puck, 0.4 kg, at the same instant. One applies a force of 65 N and the other hits with a force of 38 N at a right angle to the first player. What is the resulting acceleration of the puck?
3. Two forces act on a 0.75 kg box of chocolates. One of the forces is known to be 4 N and the resulting acceleration is 12 m/s/s. What is the largest magnitude that the second force can be?
4. The acceleration due to gravity on the moon is $1/6^{\text{th}}$ that on Earth. What force would be required to cause a 80 kg astronaut to accelerate at 5 m/s/s on the moon?
5. A 250 kg raft experiences a westward force of 80 N from paddling the oars and a 60 N force northwest from the current. What is the resulting magnitude and direction of the resulting acceleration?
6. A student rocking out to music at home runs down their hardwood floored hall and slides to a stop in their socks, ala *Risky Business*. If the student has a mass of 60 kg and has an initial speed of 7 m/s and stops in 2.6 m, what is the average force of friction acting on them?

AP Physics C - Chapter 5

You may print this out and write on it or work on your own paper.

Show all work.

1. A horizontal force of 120 N is applied to a 22 kg monkey across an 8 m level surface. If the monkey accelerates at 3.5 m/s/s, then what is the work done by the force of friction as it acts to retard the motion of the monkey?
2. Physics Phil pushes a 65 N crate of watermelon up a ramp 16 m in length and inclined at 15 degrees. What is the change of potential energy in the crate as it moves from the bottom of the ramp to the top?
3. A simple pendulum constructed in the front of a physics classroom is 3 m long and has a bowling ball as a bob with a mass of 12 kg. If the support string is initially 25 degrees from vertical and released with an initial speed of 2 m/s, what is the maximum angle it will swing to on the other side?
4. Captain Hooke has a Hooke's law spring hanging from his hook. If the spring is stretched 17 cm and has 84 J stored in it at this point, what is the spring constant for Hooke's Hooke's law spring upon his hook? (I know you're as hooked on physics as I am).
5. Tico pushes a wheelbarrow filled with peat, weighing 280 N, to the top of 40 m long street inclined at 15 degrees. Unfortunately, after leaving the wheelbarrow at the top of the hill, a strong breeze causes the wheelbarrow to slide back down the hill, during which a 57 N friction force acts on it. What is the kinetic energy of the wheelbarrow at the bottom of the hill?
6. A skydiver (55 kg) with a broken foot jumps out of an airplane at a height of 850 m above the ground. If he lands with a speed of 3.5 m/s, what is the energy that friction removed?

AP Physics C - Chapter 6 momentum

You may print this out and write on it or work on your own paper.

Show all work.

1. A 2 kg turtle dives horizontal off his 1 kg raft floating in his tank. If the turtle leaves the raft going 0.2 m/s relative to the ground, what speed does the raft move in the opposite direction?
2. If in the above problem, the turtle is in contact with the raft during the “dive” for 0.2 seconds, what is the force acting on the raft? What is the force acting on the turtle?
3. A tennis star (75 kg) returns a tennis ball (0.7 kg) out at a speed of 34 m/s that was originally moving at her at 19 m/s. What is the change in momentum of the racket? What was the impulse delivered to the ball?
4. An astronaut (86 kg) on a space walk (outside of the shuttle) throws Space Cat (4.8 kg) at a speed of 25 m/s, relative to the shuttle, at an angle of 40 degrees above horizontal away from himself. What is the speed of the astronaut after launching our feline superhero?
5. A student slides a 5 kg watermelon to the left at a speed of 14 m/s along a frictionless table while his teacher slides the student’s 0.3 kg calculator at the watermelon from the other direction at a speed of 24 m/s. The calculator penetrates the watermelon and becomes lodged in the center. What speed do the watermelon and calculator now move?
6. A positive impulse of 16 N-s is applied to 1.3 kg toy car. What is the speed of the car if it was initially moving at 5 m/s in the positive direction?

Planet Holloway - Websheet 7.1

AP Physics C - Chapter 7

You may print this out and write on it or work on your own paper.

Show all work.

Assume Planet Holloway is different for each problem below. ($g_{\text{earth}} = 10 \text{ m/s/s}$)

1. An object of mass 1.2 kg is transported to Planet Holloway where its weight is measured to be 18 N. What is the freefall acceleration on Planet Holloway?
2. Planet Holloway has twice the radius of Earth, but the same density. What is the gravitational acceleration at the surface of Planet Holloway?
3. If Planet Holloway has a gravitational acceleration of 5 m/s/s at the surface, what would the weight of a 50 kg astronaut be if they were 6 radii away from the center of Planet Holloway?
4. If Planet Holloway has 0.2 times the mass of Earth and its radius is 0.7 that of Earth, what is the gravitational acceleration at the surface of Planet Holloway. ($g = 10 \text{ m/s/s}$)?
5. What is the mass of a penguin that has a weight of 420 N on Planet Holloway, given that Planet Holloway has 1.5 times the mass of Earth and is 40 percent the radius of Earth?
6. A head of broccoli (0.8 kg) is dropped on the surface of Planet Holloway. The acceleration is observed to be 4 m/s/s. If Planet Holloway has half the mass of Earth, what is its radius? ($r_e = 6.4 \times 10^6 \text{ m}$)