May 29, 2019

Dear Future IB Physics Student,

WELCOME! We are excited to begin ramping up for another fun and challenging year of IB Physics.

To help get you warmed up for the course, we are assigning a short summer assignment. Our goal is that this review process will refresh your memory from Physics 1 so that we can dive right in when we get back in August. The assignment will be graded on completion, but use this as an opportunity to use your resources and re-familiarize yourself with concepts and equations.

Feel free to use the resources on Phyzcan (just google "phyzcan" to find it). The Physics 1 resources on Phyzcan should be sufficient and are more organized than the IB resources. You may work with classmates on this. Talking with them about problems and how to approach a problem will help you make deeper connections. In contrast, copying or asking them to read you the answer word for word, does not build connections in your brain in the same way that finding things yourself does, and we're looking to develop connections that will last. For that reason, you are not allowed to copy from classmates or ask them an answer word-for-word or anything similar. Instead, discuss the problem or approach generally and then go and write your answers separately.

Don't forget to RELAX this summer. If you have any questions, please email Mr. Canning at bcanning@seq.org. If he has access to email, he will usually respond within a few days. Please note that he will be traveling and may be slow to respond at times.

YOUR SUMMER ASSIGNMENT IS ON THE NEXT PAGES. **PLEASE ANSWER THE QUESTIONS ON A SEPARATE PIECE OF PAPER.**
IT WILL BE COLLECTED ON THE FIRST DAY OF SCHOOL.

REMEMBER, COPYING IS NOT ALLOWED.

Sincerely,

Mr. Canning

IB Physics Summer Assignment 2019-2020

This document and the answers can be found online at http://bit.ly/ibphys_summer

Motion

1) Differentiate between distance and displacement. Draw a picture to help you explain.
2) Differentiate speed and velocity. Draw a picture to help you explain.
3) Describe and draw one situation when the instantaneous speed might be different than the average speed.
4) Define acceleration a) formally, and b) in everyday language.
5) A cheetah can run a speed of 28 ms^{-1}. Calculate the time it takes to run 125 m.
6) Sketch the graph displacement (position) vs. time graph and the velocity vs. time graph of a car going forwards at 10. ms^{-1} for 20. seconds. Include proper title, labels, and scaling.
7) Calculate the acceleration of a car that can go from rest to 28 ms^{-1} in 10 s.
8) Calculate the instantaneous speed of an apple that falls from rest position and accelerates at 10 ms^{-2} for 1.5 seconds.
9) A car starts from rest (v_0 = 0 ms^{-1}) and then accelerates at a rate of 6 ms^{-2} for 10 s. Calculate the distance it travels in that time.
10) Ms. Stafford is going for a swim. She gently pushes off the wall with an initial velocity of 0.50 ms^{-1}. She then accelerates at a rate of 0.050 ms^{-2} until she is moving at a top speed of 1.1 ms^{-1}.
    a) Calculate the time it takes her to accelerate to her top speed.
    b) Using your answer from part (a), calculate the distance Ms. Stafford traveled while she was accelerating.
11) A baseball is thrown straight up into the air with a velocity of 15 ms^{-1}.
    a) Determine its velocity at the top of its path.
    b) Using your answer from (a), calculate the time it takes to reach to the top of its path.

Forces

1) State Newton's first law of motion. Draw a picture to illustrate it.
2) State Newton's second law of motion. Draw a picture to illustrate it.
3) State Newton's third law of motion. Draw a picture to illustrate it.
4) A 20 kg wagon is being pushed sideways with a 10 N force. Ignore friction.
    a) Calculate the weight.
    b) Determine the Normal force
    c) Draw a free body diagram of the wagon.
    d) Determine the net force on the wagon.
    e) Calculate the acceleration.

Work, Energy, and Power

1) Define the principle of conservation of energy. Draw a picture to illustrate it.
2) Define work (in physics) a) in regard to force, and b) in regard to energy. Draw a picture to illustrate it.
3) Define power a) in regard to energy, and b) in regard to work. Draw a picture to illustrate it.
4) Define kinetic energy. Draw a picture to illustrate it.
5) Define gravitational potential energy. Draw a picture to illustrate it.
6) Define elastic potential energy. Draw a picture to illustrate it.
7) Define efficiency. Draw a picture to illustrate it.
8) Kaepernick throws a 0.45 kg football 22 ms^{-1}. Calculate the KE of the football.
9) The walls of the snowboarding superpipe are 6.7 m (22 ft) high. US Snowboarder and X-games champion, Danny Davis has a mass of 72.6 kg. Calculate his GPE at the top of the superpipe.
10) How much work is done by a skier if she increases her kinetic energy from 500 J to 3600 J?
11) Alpine skier Julia Mancuso transfers 430,000 J of energy to the snow, converts 200,000 J to heat through air resistance and ends with 51,000 J KE. Assume that all the energy came from GPE.
    a) How much GPE did she start with?
    b) If Julia has a mass of 64 kg, what was the height of the mountain?

Momentum

1) Define momentum. Draw a picture to illustrate it.
2) State the principle of conservation of momentum. Draw a picture to illustrate it.
3) Define elastic collision. Draw a picture to illustrate it.
4) Define inelastic collision. Draw a picture to illustrate it.
5) Define impulse. Draw a picture to illustrate it.
6) A little boy throws a 3.8 kg bowling ball with a momentum of 19 N•s. Calculate the speed of the bowling ball.
7) Jeanne rolls a 7.0 kg bowling ball down the alley for the league championship. One pin is still standing, and Jeanne hits it head-on with a velocity of 9.0 ms^{-1}. The 2.0 kg pin acquires a forward velocity of 14.0 ms^{-1}. Calculate the new velocity of the bowling ball.

Begin Studying for EK0

Please start studying for your first EK. The link to the study guide is below. EK0 will involve matching the term to the definition, picture, & equation. EK0 will take place one week after our first day of school.

Fall EK Guide Short URL: http://bit.ly/EKguidefall

ANSWERS: Coming by July