EXAMEN : baccalauréat Général – Série S –SVT ou S-SI	SESSION 2014
EPREUVE : Evaluation spécifique de Langue en section européenne	
PHYSIQUE – CHIMIE en langue ANGLAISE	
THEME : ondes et matière	Sujet n°10

The physics of noise cancelling headphones

Passive Noise Cancellation

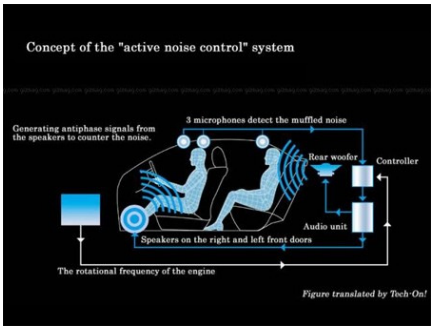
Passive noise cancellation consists of using an insulating material to muffle or dampen outside sounds. Construction workers often use passive noise cancellation headphones when operating loud machinery to protect their ears. This can also be exemplified by putting your pillow over your head to protect from noise bothering you at night. Passive noise cancellation decreases the amplitude of all waves. Music headphones often use over the ear cup designs to isolate the ears from outside noise.

Active Noise Cancellation

Active noise cancellation consists of using opposing frequencies to block out unwanted sounds. Outside waves are recorded with a microphone, inverted by electronics and projected with a speaker to eliminate background noise. In practice, waves are often very complicated and it is hard to get the wave in real time, so it is hard to create a perfect opposing wave.

Headphones are a good application for this because the ears are at single points in space, so it is easier to direct the opposing wave.

Other applications such as car interiors use active noise cancellation to muffle the sound of the car, wind, and tire noises. These applications are harder because there are different areas in the car, and the waves can interfere with other passengers. Cars still use active noise cancellation by using more speakers to detect noise from different points. High frequencies are difficult to process, but low frequencies are easier to block. This makes active noise cancellation well suited to the drone of plane engines and wind and tire sounds in cars.



From: http://ffden-2.phys.uaf.edu/212_spring2011.web.dir/michael_hirte/active_passive.htm

Questions:

1) Present and comment on this document.

2) Do not forget to focus on at least one physics topic as for example the interference phenomena.

3) What can you say about the impact of waves in our daily life ?