CLASS NOTES TO UNIT: SATELLITES AND SMARTPHONES (Video lesson + Class + Portfolio assignments)

In this unit we are going to:
-Hold a content-based simulated class (so as to deal with technical English in the most possible practical way, in context, and without stopping at linguistic issues), based on satellites and smartphones, divided into: previous questionnaire (1), lecture (2) and discussion (3).
-Write a forum sequence of experts (4).

Parts 1-3 will be dealt with in the video lesson and in class, including exercises a and b. Part 4 must be done after the class and included in the students' portfolio

1. Questionnaire/ Exercise a: answer the following questions according to your own knowledge, without searching for further information. Read the introductory paragraph first:

PS location apps on a smartphone can be very handy when mapping a travel route or finding nearby events. But how does your smartphone know where you are? Wilton L. Virgo explains how the answer lies 12,000 miles over your head, in an orbiting satellite that keeps time to the beat of an atomic clock powered by quantum mechanics.

1. How fast does light travel?
- A 6.626x10-34 J*s
- B 9,192,631,770 Hz
- C 299,792,458 m/s
- D 70 mi/hr

2. What kind of signals do GPS satellites transmit to our smartphones?
- A Laser
- B Radio
- C Electrical
- D Sonic

3. GPS atomic clocks operate on which quantum mechanical mechanism?
- A Transitions between quantized energy levels
- B Cosmic ray detection
- C Superconductivity
- D Detection of a Higgs boson

4. Which of the following equations were discussed as important for smartphone location?
- A Work = Force * Distance
- B Voltage = Current * Resistance
- C Force = Mass * Acceleration
- D Distance = Speed * Time

5. About how far away are the orbiting GPS satellites?

- ○ **A** 11 miles
- ○ **B** 324,000 miles
- ○ **C** 12,000 miles
- ○ **D** 500 miles

6. How do scientists build atomic clocks in a laboratory?

7. Why are the elements cesium and rubidium used in many atomic clocks?

8. How can we count the fast ticking of an atomic clock?

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2. Lecture / <mark>Exercise b:</mark> let's watch the video; then, go back to the questionnaire and modify any answers if necessary, using a different colour:

https://ed.ted.com/lessons/how-does-your-smartphone-know-your-location-wilton-l-virgo#watch

In class, we will talk about numbers, measuring units, mathematical calculations and formulas etc. as they appear in the video.

3. Discussion: in class, we will discuss the following topic related with the previous exercises:

> **Many GPS applications are used for mapping and directions. What other uses for GPS can you think of?**

4. Written assignment for your portfolio: in class, we will read the following discussion sequence in a forum, based on the question formulated in exercise 3:

Participant 1
In the movie "Interstellar", GPS is used to locate and control tractors on the family farm, but I found out that this is already being done today, in real life. I'd like to learn more on what this "precision agriculture" is all about.

Participant 2
Cars such as Google's (without a human driver) need to interact with the other vehicles. Thanks to GPS, each car 'knows' where the other cars are. They constantly interact. Thanks to GPS and automatic driving, traffic jams may be reduced by 30 %.

Participant 3
This is incorrect. Self-driving cars will need not only location awareness of themselves (partially provided by GPS) they will need instantaneous collision awareness provided by other sensors.

Participant 4
This is correct. They will need more sensors then ever but I think Participant 2's answer is based on a statistic story and it will be like this in the next 20 years. But really guys, I can`t imagine sitting in the car and doing nothing. ;-) Maybe on the highway but not in the city traffic.

Now, think of another possible question about the same topic for a similar forum, and introduce at least 4 entries from 4 possible participants. These must give different points of view about the issue discussed whenever

possible. You can try to find inspiration in the forum questions available, but do not copy/paste any ideas or entries. Approx. length: between 120-150 words.