TSOKOS READING ACTIVITY
Section 9-5

1. Essential Idea: The Doppler effect describes the phenomenon of wavelength/frequency shift when relative motion occurs.

2. Nature Of Science:

   a. Technology: Although originally based on physical observations of the pitch of fast moving sources of sound, the Doppler effect has an important role in many different areas such as evidence for the expansion of the universe and generating images used in weather reports and in medicine.

3. International-Mindedness: Radar usage is affected by the Doppler effect and must be considered for applications using this technology

4. Theory Of Knowledge: How important is sense perception in explaining scientific ideas such as the Doppler effect?

5. Understandings: The Doppler effect for sound waves and light waves

6. Applications And Skills:

   a. Sketching and interpreting the Doppler effect when there is relative motion between source and observer

   b. Describing situations where the Doppler effect can be utilized

   c. Solving problems involving the change in frequency or wavelength observed due to the Doppler effect to determine the velocity of the source/observer

7. Guidance:

   a. For electromagnetic waves, the approximate equation should be used for all calculations

   b. Situations to be discussed should include the use of Doppler effect in radars and in medical physics, and its significance for the red-shift in the light spectra of receding galaxies

8. Data Booklet Reference:

   a. Moving source: $f' = f\left(\dfrac{v}{v \pm u_s}\right)$

   b. Moving observer: $f' = f\left(\dfrac{v \pm u_s}{v}\right)$

   c. $\dfrac{\Delta f}{f} = \dfrac{\Delta \lambda}{\lambda} \approx \dfrac{v}{c}$

9. Utilization: Astronomy relies on the analysis of the Doppler effect when dealing with fast moving objects (see *Physics* option *D*)

10. Aims:

    a. Aim 2: the Doppler effect needs to be considered in various applications of technology that utilize wave theory

    b.   Aim 6: spectral data and images of receding galaxies are available from professional astronomical observatories for analysis

    c.   Aim 7: computer simulations of the Doppler effect allow students to visualize complex and mostly unobservable situations

11. Read section 4-5, pg. 381-388, in your textbook.

12. Develop a quiz of at least 10 questions covering the most important concepts in the required reading. Provide a separate answer sheet with (you guessed it) the answers to your questions. The questions can be multiple choice, true/false, short answer, fill-in-the blank, essay, or any combination of the previous. Creative or thought-provoking questions are encouraged. Humerous questions are also encouraged, BUT are accepted only IN ADDITION TO the 10 serious ones. Secondary skills I would also like you to work on include:

    a.   Use of Microsoft Equations to write equations.

    b.   Use of the outline functions of MS Word to make sequentially numbered questions and sub-questions.

    c.   Diagrams or shapes to accompany your quiz questions for clarification. Use of MS Shapes function or Insert Clipart is highly encouraged.

    d.   Using underlining in conjunction with the tab functions to make fill-in-the blank questions.

    e.   Use of textboxes to create an area for name, date and period.

    f.   Creating a boxed heading using the border function.

    g.   Creating a logo of your own design (Devil Physics is already taken) with a picture or clipart and creative font.

    h.   Items a-g above are not required for your grade, but offer an excellent opportunity to improve your computer skills for use in future assignments/projects/activities.

13. This assignment may be typed or neatly printed. Drawings may be freehand, but try to make use of the 'Shapes' or 'Insert Clipart" functions of MS Word. If you submit this assignment electronically, the filename must be in the following format, "LastnameFirstinitialPerXReadActX-X". **You *do not* need include a copy of these instructions with the assignment you hand in.**