

TSOKOS READING ACTIVITY

Section 4-1 (3 Points)

1. Essential Idea: A study of oscillations underpins many areas of physics with simple harmonic motion (SHM), a fundamental oscillation that appears in various natural phenomena.
2. Nature Of Science: Models: Oscillations play a great part in our lives, from the tides to the motion of the swinging pendulum that once governed our perception of time. General principles govern this area of physics, from water waves in the deep ocean or the oscillations of a car suspension system. This introduction to the topic reminds us that not all oscillations are isochronous. However, the simple harmonic oscillator is of great importance to physicists because all periodic oscillations can be described through the mathematics of simple harmonic motion.
3. International-Mindedness: Oscillations are used to define the time systems on which nations agree so that the world can be kept in synchronization. This impacts most areas of our lives including the provision of electricity, travel and location-determining devices and all microelectronics.
4. Theory Of Knowledge:
 - a. The harmonic oscillator is a paradigm for modelling where a simple equation is used to describe a complex phenomenon.
 - b. How do scientists know when a simple model is not detailed enough for their requirements?
5. Understandings:
 - a. Simple harmonic oscillations
 - b. Time period, frequency, amplitude, displacement and phase difference
 - c. Conditions for simple harmonic motion
6. Applications And Skills:
 - a. Qualitatively describing the energy changes taking place during one cycle of an oscillation
 - b. Sketching and interpreting graphs of simple harmonic motion examples
7. Guidance:
 - a. Graphs describing simple harmonic motion should include displacement– time, velocity–time, acceleration–time and acceleration–displacement
 - b. Students are expected to understand the significance of the negative sign in the relationship: $a \propto -x$
8. Data Booklet Reference:
 - a. $T = \frac{1}{f}$
9. Utilization:
 - a. Isochronous oscillations can be used to measure time

- b. Many systems can approximate simple harmonic motion: mass on a spring, fluid in U-tube, models of icebergs oscillating vertically in the ocean, and motion of a sphere rolling in a concave mirror
 - c. Simple harmonic motion is frequently found in the context of mechanics (see Physics topic 2)
10. Aims:
- a. Aim 6: experiments could include (but are not limited to): mass on a spring; simple pendulum; motion on a curved air track
 - b. Aim 7: IT skills can be used to model the simple harmonic motion defining equation; this gives valuable insight into the meaning of the equation itself
11. Read section 4-1, Pg. 146-152, in your textbook.
12. Choose one of the following activities and apply it to each of the terms listed in #13 below:
- a. Write a definition for each of the terms listed below.
 - b. Take notes on the section using the Cornell Notetaking system. You must cover all the terms and concepts listed below.
 - c. Develop a quiz of at least 10 questions covering the most important topics in the required reading. They 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. Humorous 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:
 - i. Use of Microsoft Equations to write equations.
 - ii. Use of the outline functions of MS Word to make sequentially numbered questions and sub-questions.
 - iii. Diagrams or shapes to accompany your quiz questions for clarification. Use of MS Shapes function or Insert Clipart is highly encouraged.
 - iv. Using underlining in conjunction with the tab functions to make fill-in-the blank questions.
 - v. Use of textboxes to create an area for name, date and period.
 - vi. Creating a boxed heading using the border function.
 - vii. Creating a logo of your own design (Devil Physics is already taken) with a picture or clipart and creative font.
 - viii. 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.
 - d. Draw a picture that adequately explains each term listed below to someone who is learning English as a second language.
 - e. Describe a situation for each term listed below in which you personally experienced the term in action.
 - f. Describe a scenario using all of the terms listed below.
 - g. Create a diagram showing how the terms listed below are related to each other.
 - h. Use the attached Frayer Model worksheets to explore the terms listed below.
 - i. Choreograph an interpretive dance explaining the terms listed below.
 - j. Create an entire meal using dishes that portray the characteristics of the terms below.

- k. Create and film an instructional video explaining the terms below. You may do this option in groups of up to 4 people. If you do this option, you will be provided extra time, but it must be turned in prior to the test day. If the video is well done, you may be awarded bonus points.

13. Terms:

- a. Oscillation
- b. Periodic
- c. Period
- d. Amplitude
- e. Restoring Force
- f. Simple Harmonic Motion (SHM)
- g. Displacement
- h. Frequency
- i. Phase Difference
- j. Energy In Simple Harmonic Motion
- k. Transformations
- l. Nature of Science: Oscillations

14. 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".

Definition

Characteristics

WORD

Examples

Non-examples

Definition

Characteristics

WORD

Examples

Non-examples

