Review: Midterm 1

Note: Midterm 1 is on Tuesday (04/27/2021), covering chapters: 14, 15, 16, & 31

Objective:

- Destroy this upcoming Midterm 1. Let's gooooo!!!!

  Okay but for real tho, let's try to nail down the following:

  - ☐ **Create** our own Formula Sheet
  - ☐ **Identify** the appropriate approach for a given problem
    (without the context of what specific chapter the problem is from)

Group Activity (student - student) [15mins]

In groups, try your best to complete the following activity.

Make your own Formula Sheet!

- Have one person create a **Google Slides file**
- As a group, write some relevant equations and/or note-worthy concepts!
- Here is an Example Formula Sheet, feel free to use this as reference.
- When you guys are done working, please send a **Share Link** to the Zoom chat so everyone can benefit! :)

Group Activity (student - student) [10mins]

In groups, try to solve the following problem and arrive at a possible solution.

Jet Engine

During takeoff, the sound intensity level of a jet engine is $140\,\mathrm{dB}$ at a distance of $30\,\mathrm{m}$. What is the sound intensity level at a distance of $1.0\,\mathrm{km}$?

Solution

$\beta = 110\,\mathrm{dB}$

Group Activity (student - student) [15mins]

In groups, try to solve the following problem and arrive at a possible solution.

Maximum Speed of Oscillator

A spring-block system involves a $300\,\mathrm{g}$ block oscillating in simple harmonic motion. At one point in time, the block's displacement is measured to be $3.0\,\mathrm{cm}$ and its speed $95.4\,\mathrm{cm/s}$. At another point in time, the block's displacement and speed are $6.0\,\mathrm{cm}$ and $71.4\,\mathrm{cm/s}$, respectively.

(a) Find the spring constant k

(b) Find the max speed v_{max}

Solution

(a) $k = 44.5\,\mathrm{N/m}$

(b) $v_{\mathrm{max}} = 1.02\,\mathrm{m/s}$

Group Activity (student - student) [5mins]

In groups, try to solve the following problem and arrive at a possible solution.

Microwave Radiation

a) Telephone signals are often transmitted over long distances by microwaves. What is the frequency of microwave radiation with a wavelength of $3.0\,\mathrm{cm}$?

b) Microwave signals are beamed between two mountaintops $50\,\mathrm{km}$ apart. How long does it take for a telephone signal to travel from one mountaintop to the other?

NOTE: Microwaves, like light, are electromagnetic (EM) waves; and all EM waves travel at . . .

Solution

(a) $f_{\text{microwave}} = 10\,\mathrm{GHz}$

(b) $t = 0.17\,\mathrm{ms}$