

**Unit 9: Waves and Sound****Essential questions:**

- What is simple harmonic motion? Motion with a restoring force to bring something back through equilibrium. It occurs over and over in regular time intervals.
- What factors affect simple harmonic motion of a pendulum and a mass-spring system?  
For a pendulum: length, gravity... NOT the mass of the bob  
For a mass-spring system: k (the spring constant...how stiff the spring is), mass... NOT gravity
- What is a mechanical wave? Any wave requiring a medium for travel
- What distinguishes one mechanical wave from another? How the particles vibrate. For a transverse wave: particles vibrate perpendicular to wave motion(think doing 'the wave' in the football stadium...you stand up and down...wave moves left and right). For a longitudinal wave: particles vibrate parallel to wave motion (sound).
- How do the different characteristics used to measure waves relate to each other? Characteristics are speed ( $v$ ), frequency ( $f$ ), wavelength ( $\lambda$ ), amplitude ( $A$ ), and period ( $T$ ). Relationships:  $v = \lambda f$  and  $f = 1/T$  and  $T = 1/f$
- Why does the speed of a wave change passing from one medium to another? Because waves are a transmission of energy. That energy will travel differently in different materials. FREQUENCY NEVER CHANGES from medium to medium...so speed and wavelength change to compensate.
- What determines whether an incident wave pulse striking a boundary reflects inverted or not? It depends on the boundary. At FIXED boundaries, reflections are INVERTED. At FREE boundaries, reflections are UPRIGHT.
- How can the principle of superposition be used to describe wave interference in a variety of situations? If the waves are both on the same side of equilibrium will have constructive interference; if on opposite sides of equilibrium will have destructive interference.
- What are characteristics of a sound wave? Sound is longitudinal (like a slinky); sound needs a medium to travel, loudness is related to amplitude...or how much energy the sound wave has.
- Why does the speed of a sound wave change as it travels through different media or changes in the properties of the same media? Because waves are a transmission of energy. That energy will travel differently in different materials. FREQUENCY NEVER CHANGES from medium to medium...so speed and wavelength change to compensate.
- What is the Doppler Effect and how does it occur? A *perceptual* shift in frequency. It occurs when there is movement between the sound source and the observer. For example, a train moves toward you blowing its horn. While moving towards you, you will perceive a higher frequency that is really being emitted because the motion of the train causes the wave crests to be closer together when they arrive at your ear. The opposite is true when its moving away from you.

**Key vocabulary:** (I am giving you the shortest possible definitions here...easy to remember...mostly to jog your memory. If you need more than this...LOOK THEM UP online or in the textbook.)

Simple harmonic motion – motion repeated over and over in the same time interval due to a restoring force

Spring constant – stiffness of a spring ( $k$ )

Restoring force – for SHM brings back through equilibrium

Period – seconds per cycle/wave ( $T$ )

Frequency – waves per second ( $f$ )

Mechanical wave - requires a medium for transport (all waves are mechanical EXCEPT electromagnetic waves)

Transverse wave – particles vibrate perpendicular to wave motion (like a wave on a rope)

Longitudinal wave – particles vibrate parallel to wave motion (like a slinky)

constructive interference - waves meet and add up

destructive interference – waves meet and subtract

Doppler effect - shift in frequency because either the sound is moving or the observer is moving or both are moving

**Practice:**

- List 4 examples of systems which exhibit simple harmonic motion.
  - A child on a swing (is like a pendulum, right?)
  - A metronome (used to keep time for musicians)
  - A mass-spring system (like the shocks on your car)

# 2nd Semester Inquiry Review Answer Key

**Brendan G. Carr**



## 2nd Semester Inquiry Review Answer Key:

Reaching and Teaching Diverse Populations Mary Buckelew, Andrea Fishman, 2011 By engaging trainee teachers in activities that promote their understanding of diversity topics this book deepens their understanding of the interrelationship of the community the school classroom dynamics and cultures

Informed Learning Applications Kim L. Ranger, 2019-08-26 Informed Learning Applications is the latest volume of rigorous research in the Advances in Librarianship series Edited by experienced librarian Kim L Ranger the eight contributions to this volume describe various practices extending Christine Bruce s informed learning theory across a range of educational spaces

**The School Review**, 1919 **EJBRM Volume 9 Issue 2**, **The Balance Sheet**, 1950 **Beginning Qualitative Research** Pamela Maykut, Richard Morehouse, 2002-11-01 The authors have focused this book on the serious beginning qualitative researcher theoretically rigorous yet with an understandable perspective The book has three main features First it provides a strong theoretical base for the understanding of competing research paradigms Secondly it features a methods section consistent with the non linear nature of naturalistic inquiry yet it allows the beginner to see direction Thirdly the authors include examples of actual research studies conducted and completed in a single year

Manhattan Review: The GRE® Complete Guide Manhattan Review, 2013 Manhattan Review The GRE Complete Guide provides well researched and unparalleled material for students aiming for top scores in GRE The book covers topics in accordance with the revised test pattern and explains concepts strategies and tips supported by suitable definitions and examples It includes all sections of the GRE examination verbal reasoning quantitative reasoning and analytical writing assessment The verbal reasoning section explains basic grammar topics and nuances in writing and helps aspirants to build on vocabulary critical reasoning and reading comprehension along with analytical writing skills The quantitative reasoning section discusses concepts and methods of solving different types of problems The book also provides a formulae sheet concise set of notes useful for quick reference Well researched and validated strategies for solving different types of problems are included to help the test taker to attempt all sections of GRE confidently and successfully

*The Methodist Review Quarterly*, 1911 **5 Steps to a 5 AP Human Geography, 2012-2013 Edition** Carol Ann Gillespie, 2011-06-10 A Perfect Plan for the Perfect Score We want you to succeed on your AP exam That s why we ve created this 5 step plan to help you study more effectively use your preparation time wisely and get your best score This easy to follow guide offers you a complete review of your AP course strategies to give you the edge on test day and plenty of practice with AP style test questions You ll sharpen your subject knowledge strengthen your thinking skills and build your test taking confidence with Full length practice exams modeled on the real test All the terms and concepts you need to know to get your best score Your choice of three customized study schedules so you can pick the one that meets your needs The 5 Step Plan helps you get the most out of your study time Step 1 Set Up Your Study Program Step 2 Determine Your Readiness Step 3 Develop the Strategies Step 4 Review the Knowledge Step 5 Build Your Confidence

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