Physics 2012 Senior Final Exam Review

Concepts to be addressed…

Optics, Light, & Reflection
light properties, ray diagrams, shadows, images in mirrors

Vibrations, Waves, & Sound
wave properties, sound properties, frequency, period, etc

Periodic Motion & Simple Harmonic Motion
period of a pendulum/mass & spring system, frequency, period, etc

Energy
coaster problems, conservation of energy, work, power

What you should do...

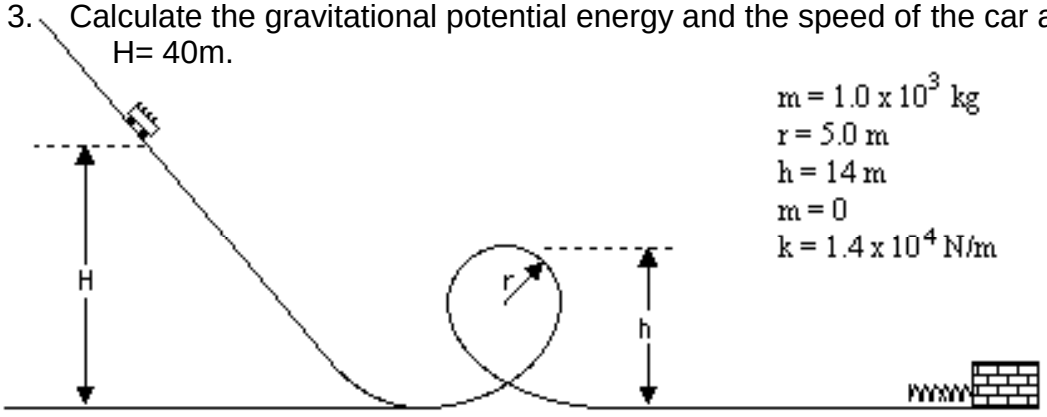
Go back through your notes
Review definitions of important terms
Go through old worksheets and problems
Try these problems below
See Mr. Woods if you need extra help
Pace yourself! Don't cram the night before! It won't work on a test like this!

REVIEW PROBLEMS

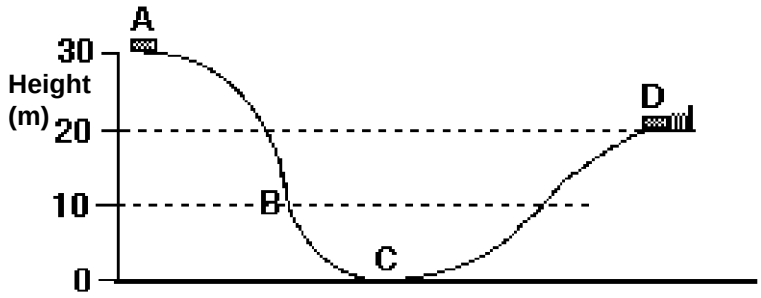
1. What is work? Define qualitatively and quantitatively.

2. A 1000 kg car is traveling at a constant speed of 30 m/s. How much energy is dissipated as the car comes to rest?

3. Calculate the gravitational potential energy and the speed of the car at the top of the loop.
H= 40m.



4. A car at rest has **60,000 J** of Potential Energy at point **A**. It moves down a ***frictionless*** track and comes to a stop as it compresses a huge spring at point **D**. *Consider the car, spring and the earth to be in the system.



a. How fast is the car moving at point **C?** Show work.

b. What is the gravitational potential energy at point D?

c. What is the elastic potential energy at point D?

d. How far does the spring (k=8888 N/m) at point D compress?

5. What mass on a spring with a spring constant of 100 N/m will oscillate with a period of 2.0 s?

6. A 0.50 kg mass oscillates in simple harmonic motion on a spring with a spring constant of 200 N/m.
   a. What is the period of the oscillation?

   b. What is the frequency of the oscillation?

7. The simple pendulum in a tall clock is 0.75 m long.
   c. What is the period of the oscillation?

   d. What is the frequency of the oscillation?

8. A student reading his physics book on a lake dock notices that the distance between two incoming wave crests is about 0.75 m, and he then measures the time of arrival between the crests to be 1.6 s. What is the approximate speed of the waves?

9. Light waves travel in a vacuum at a speed of $3x10^8$ m/s. The frequency of visible light is about $5x10^{14}$ Hz. What is the approximate wavelength of light?

10. Which of the following electromagnetic waves travels fastest in a vacuum?
    a. green light
    b. infrared light
    c. gamma rays
    d. they all have the same speed

11. Find the frequencies of electromagnetic waves with wavelengths of
    a. 3.0 cm

    b. 650 nm

    c. 1.2 fm

12. A meteorologist in a TV station is using radar to determine the distance to a cloud. He notices that a time of 0.24 ms elapses between the sending and the return of a radar pulse. How far away is the cloud?

13. The angle of incidence is the angle between
    a. the incident ray and the reflecting surface
    b. the incident ray and the normal to the surface
    c. the incident ray and the reflected ray
    d. the reflected ray and the normal to the surface

14. The angle of incidence of a light ray on a mirrored surface is 35°. What is the angle between the incident and reflected rays?

15. A plane mirror
    a. has a greater image distance than object distance
    b. produces a virtual, upright, unmagnified image
    c. changes the vertical orientation of an object
    d. reverses an object's top and bottom

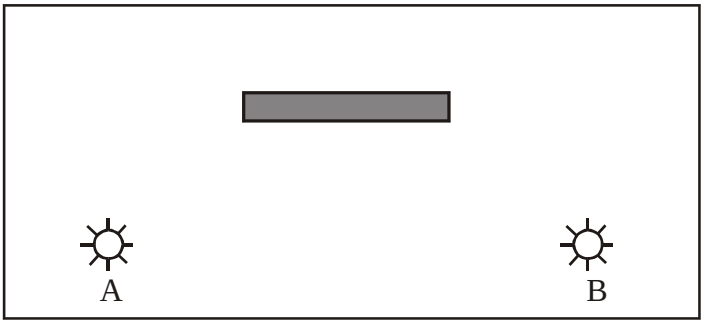
16. A plane mirror
    a. produces both real and virtual images
    b. always produces a virtual image
    c. always produces a real images
    d. produces an image by diffuse reflection

17. Why do some emergency vehicles have AMBULANCE printed on the front?

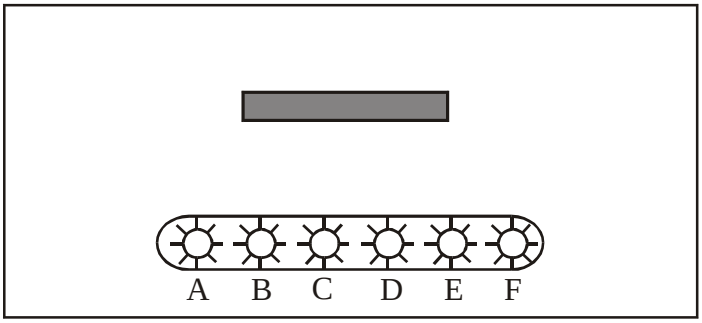
18. A person stands 2.0 m away from the reflecting surface of a plane mirror.
    a. What is the distance between the person and his or her image?

    b. What are the image characteristics?

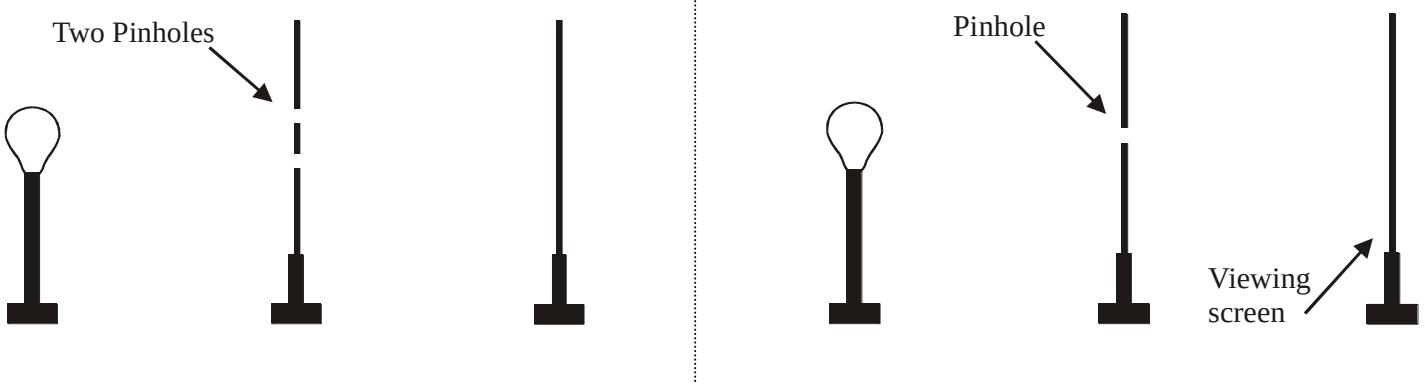
19. Draw a number of rays from each source and shade in the shadow region that results when the two bulbs are more widely separated. Indicate the total and partial shadow regions.



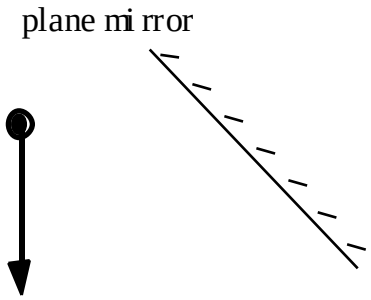
20. An extended light source, like a fluorescent bulb, can be thought of as a series of point sources. Draw a number of rays from each source and determine the appearance of the shadow region.



21. Draw two rays from the top and two rays from the bottom of the bulb that travel through each pinhole and reach the screen. Compare the two diagrams (similarities and differences).



22. A top view of a mirror and an arrow is shown below.
    a. Locate and sketch the image of the arrow.
    b. Position an observer's eye where the whole image could be seen.
    c. Draw a ray diagram that shows how light from both ends of the arrow reach the observer.



23. A ray of light incident upon a mirror is shown. Using a protractor:
    a. draw and label the normal,
    b. draw and label the reflected ray,
    c. label the incident angle and its measure in degrees,
    d. label the reflected angle and its measure in degrees.