

Name _____ # _____

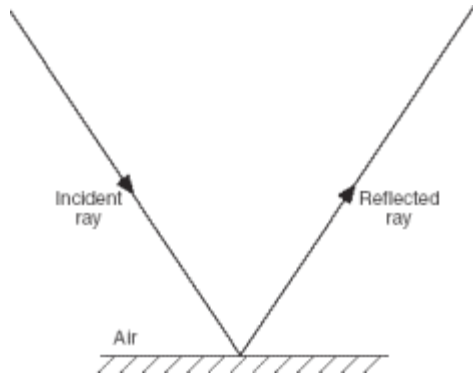
Section _____

St. Mary's Physics

Date _____

Extended Response Homework

Base your answers to questions 1 through 4 on the information and diagram below. The diagram below is provided for practice purposes only. Be sure your final answer appears on your answer paper. A ray of monochromatic light of frequency 5.00×10^{14} hertz is incident on a mirror and reflected, as shown.



1. Using a protractor and ruler, construct and label the normal to the mirror at the point of incidence on the diagram on your answer paper. [1]
2. Using a protractor, measure the angle of incidence to the nearest degree and record the value on your answer paper. [1]
3. Determine the wavelength of the ray of light. [Show all calculations, including the equation and substitution with units.] [2]

4. What is the color of the ray of light? [1]

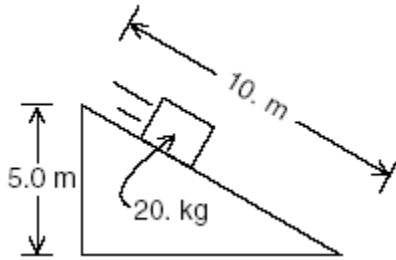
Base your answers to questions 5 through 6 on the information below. A 0.12-meter-long electromagnetic (radar) wave is emitted by a weather station and reflected from a nearby thunderstorm.

5. Determine the frequency of the radar wave. [Show all calculations, including the equation and substitution with units.] [2]

6. Using one or more complete sentences, define the Doppler effect. [1]

Extended Response Homework p. 2

A 20.-kg block is placed at the top of a 10.-meter-long inclined plane. The block starts from rest and slides without friction down the length of the incline.



7. Determine the gravitational potential energy of the block at the top of the incline. [Show all calculations, including the equation and substitution with units.] [2]

8. Determine the kinetic energy of the block just as it reaches the bottom of the incline. [1]

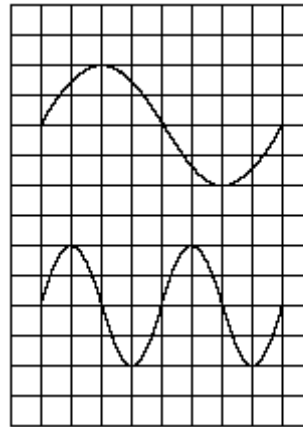
A mercury atom makes a direct transition from energy level e to energy level b.

9. Determine the energy, in electronvolts, given off in the transition. [1]

10. What is the energy of the emitted photon in joules? [1]

11. Determine the frequency of the radiation corresponding to the emitted photon. [Show all calculations, including the equation and substitution with units.] [2]

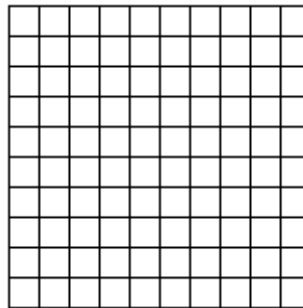
12. Explain what would happen if a 4.50-electronvolt photon were incident on a mercury atom in the ground state. [1]



Base your answers to questions 13 through 15 on the information and wave diagrams below. Two waves, A and B, pass through the same medium at the same time.

A

13. On the grid below, sketch the wave pattern produced when the two waves interfere. The grid below is provided for practice purposes only. [3]

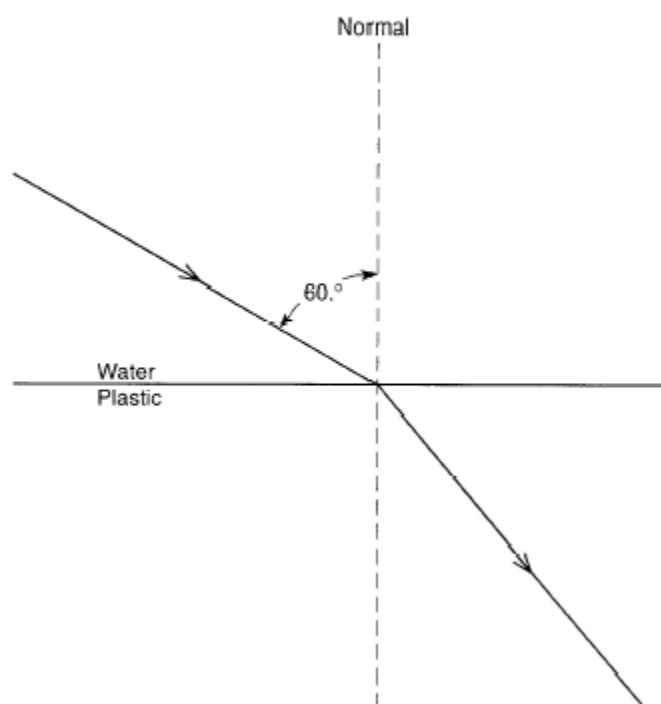


14. Name a wave characteristic that is the same for both wave A and wave B. [1]

15. Name a wave characteristic that is different for wave A and wave B. [1]

Extended Response Homework p. 3

Base your answers to questions 16 and 17 on the information and diagram below which shows a light ray in water incident at an angle of 60.0° on a boundary with plastic.



16. Using a protractor, measure the angle of refraction to the nearest degree. Record the value below.

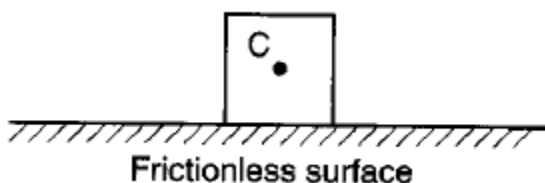
17. Determine the absolute index of refraction for the plastic.

Base your answers to questions **18** and **19** on the information below.

A 5.0-kilogram block weighing 49 newtons sits on a frictionless, horizontal surface. A horizontal force of 20. newtons toward the right is applied to the block. [Neglect air resistance.]

18. On the diagram on your answer paper, draw a vector to represent each of the three forces acting on the block.

Use a ruler and a scale of 1.0 centimeter = 10. newtons. Begin each vector at point C and label its magnitude in newtons. The diagram below is to be used for practice purposes only. Be sure your final answer appears on your answer paper.



19. Calculate the magnitude of the acceleration of the block. [Show all calculations, including the equation and substitution with units.]