SAINT JOSEPH'S PREPARATORY SCHOOL
PHYSICS REVIEW PROBLEMS ..... T P FITZPATRICK
May 2016

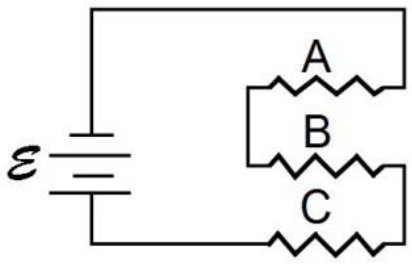
Name: _____ Period: _____

1. A thin converging lens has a focal length of 10.3 cm. If an object is placed 14.8 cm from the plane of the lens, what kind of image is formed? What is the orientation of the image? What is the location of the image? What is the magnification of the image?
2. A thin converging lens has a focal length of 6.3 cm. If an object is placed 12.6 cm from the plane of the lens, what kind of image is formed? What is the orientation of the image? What is the location of the image? What is the magnification of the image?
3. A spherical mirror whose radius of curvature is 3.0 cm is silvered on the inside. If an object is placed 5.4 cm from the mirror surface, What kind of image is formed? What is the orientation of the image? What is the focal length of the mirror? How far is the image from the surface of the mirror?
4. A thin converging lens has a focal length of 9.5 cm. If an object is placed 5.4 cm from the plane of the lens, what kind of image is formed? What is the orientation of the image? What is the location of the image? What is the magnification of the image?
5. A spherical mirror whose radius of curvature is 7.8 cm is silvered on the inside. If an object is placed 3.0 cm from the mirror surface, What kind of image is formed? What is the orientation of the image? What is the focal length of the mirror? What is the location of the image?
6. A thin converging lens has a focal length of 5.1 cm. If an object is placed 17.6 cm from the plane of the lens, what kind of image is formed? What is the orientation of the image? What is the location of the image? What is the magnification of the image?
7. A spherical mirror whose radius of curvature is 6.2 cm is silvered on the inside. If an object is placed 3.1 cm from the mirror surface, What kind of image is formed? What is the orientation of the image? What is the focal length of the mirror? How far is the image from the surface of the mirror?
8. A spherical mirror whose radius of curvature is 23.2 cm is silvered on the outside. If an object is placed 23.4 cm from the mirror surface, What kind of image is formed? What is the orientation of the image? What is the focal length of the mirror? What is the location of the image?
9. What are the units for index of refraction?
10. If the index of refraction of a particular kind of crystal is 1.9, What is the speed of light in the crystal? What is the critical angle for total internal reflection for this crystal?
11. A thin diverging lens has a focal length of -9.9 cm. If an object is placed 60.3 cm from the plane of the lens, what kind of image is formed? What is the orientation of the image? What is the location of the image? What is the magnification of the image?
12. Assume that the index of refraction of air is 1.00. A ray of light passes from air into a piece of transparent material whose index of refraction is 1.65. It enters the material at an angle of 9.5° from the normal. What is the angle of refraction? What is the speed of light in the material?

13. Which of these statements about refraction are true?
    - The speed of light is greater in water than it is in air.
    - The speed of light is greater in a medium with a greater index of refraction.
    - A ray of light passing into a medium with a greater index of refraction will be refracted c
    - Light has its greatest speed in a vacuum.
    - Angles of incidence and refraction should be measured from a normal line.
14. A particular diffraction grating has 525 lines per mm.
15. A blue laser is shown through the diffraction grating at a screen 1.00 m from the diffraction grating. The wavelength of the laser is 465 nm. What is the distance between lines on the diffraction grating? How far is the third dot from the zeroeth dot?

Assume that the index of refraction of air is 1.00.

16. A ray of light passes from a piece of transparent material whose index of refraction is 1.25 into the air. The ray of light reaches the surface of the glass at an angle of 50° from the normal. What is the speed of light in the material? What is the angle of refraction of the ray?
17. A particular diffraction grating has 280 lines per mm.
18. A green laser is shown through the diffraction grating at a screen 1.00 m from the diffraction grating. The distance between the zeroeth dot and the first dot is 0.14 m. What is the distance between lines on the diffraction grating? What is the wavelength of the laser's light?
19. If the speed of light in a particular kind of glass is 2.19108 m/s, What is the index of refraction of the glass? What is the critical angle for total internal reflection for this glass?
20. If the voltage across a 4.5 mF capacitor is 75 V. What charge is on the capacitor? What resistance combined with the capacitor would produce a 5.00 s time constant?
21. Based on the circuit shown, fill in the table with the missing values.



	V	*I*	*R*	*P*
A			50.0Ω	
B			75.0Ω	
C			125.0Ω	
T	50.0V			
??				

22. Based on the circuit shown, fill in the table with the missing values.

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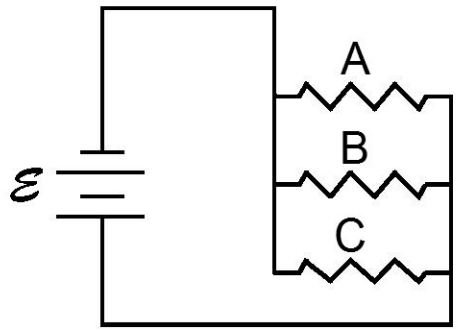
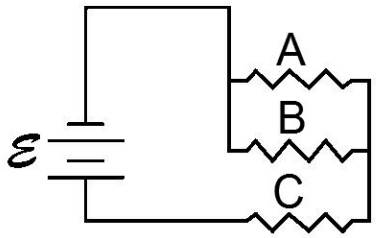


	V	*I*	*R*	*P*
A			360.0Ω	
B			180.0Ω	
C			240.0Ω	
T	40.0V			
??				

23. Based on the circuit shown, fill in the table with the missing values.



	V	*I*	*R*	*P*
A			105.0 Ω	
B			140.0 Ω	
C			55.0 Ω	
T	100.0 V			
??				

24. What charge would cause a +2.5 μC charge to experience an attractive force of 2.25 N when placed 15.0 cm away?

25. What is the electric field at a point associated with a +2.55 C charge 36.0 m North of it?

26. If 320 V is applied across a heating element (resistor) resulting in 4.0 A of current, what is the resistance of the heater? What is the rate in watts that heat is produced by the heater?

27. Two resistors are connected in series to a 12.0 V power source. If one of the resistors has a resistance of 24.0 Ω and a voltage across it of 3.00 V, what is the resistance of the second resistor? What is the current in the circuit?

28. A proton moves at right angles to a magnetic field of 1.75 T in a circular path of radius 0.455 m. What is the speed of the proton?

29. A current of 15.0 A is passed through a horizontal wire 40.0 m long at a place where the downward component of the earth's magnetic field is 5.50×10^{-5} T. What magnitude force will be exerted on the wire by this component of the Earth's magnetic field?

30. A 2500 kg demolition ball swings on a cable 17.0 m long. What is the period of swing?

31. A 4.00 kg mass is hung from a spring whose constant is 145 N/m. When the system undergoes simple harmonic motion, what is the period of vibration? If the mass is replaced by one whose mass is 1.00 kg, what will the period become?

32. A 1.25 kg mass is hung from a spring and is observed to undergo 25.0 vibrations in exactly 21.0 s. What is the spring constant?

33. The sound of an explosion is heard 7.25 s after the explosion is seen. If the temperature of the air is 21.0° C, How far from the observer did the explosion take place?

34. What power is generated by a point sized speaker which radiates sound spherically if the intensity level is 135 dB at a distance of 5.6 m from the speaker?

35. Two cars are approaching each other. Each car has a speed of 12.5 m/s relative to the ground. What frequency is heard by the second car if the first car sounds a horn at 256 Hz? The temperature of the air is 10.0° C.