

Exam Review: Geometric Optics

1. Know the meaning of the following terms and be able to apply or recognize them:

transparent	magnification	converging lens
convex mirror	amplitude	angle of reflection
real image	umbra	incandescent
optics	total internal reflection	diffuse reflection
translucent	frequency	diverging lens
refraction	penumbra	angle of refraction
virtual image	critical angle	luminescent
wavelength	angle of incidence	concave mirror
opaque	non-luminous	optical centre
refractive index	regular reflection	normal

2. Use the conversion factor method to convert between the following units. You must know the conversion factors and show all work.

- a) 360 nm to m
- b) 5.35 m to nm

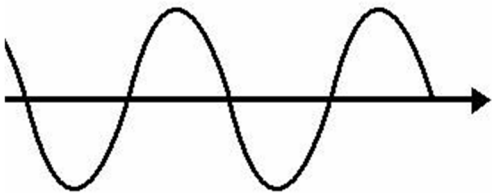
3. What is the speed of light in a vacuum?

4. State each of the following Laws:

- a) Snell’s Law
- b) the Law of Reflection

5. Be able to label the trough, crest, rest position, wavelength and amplitude on a diagram of a wave.

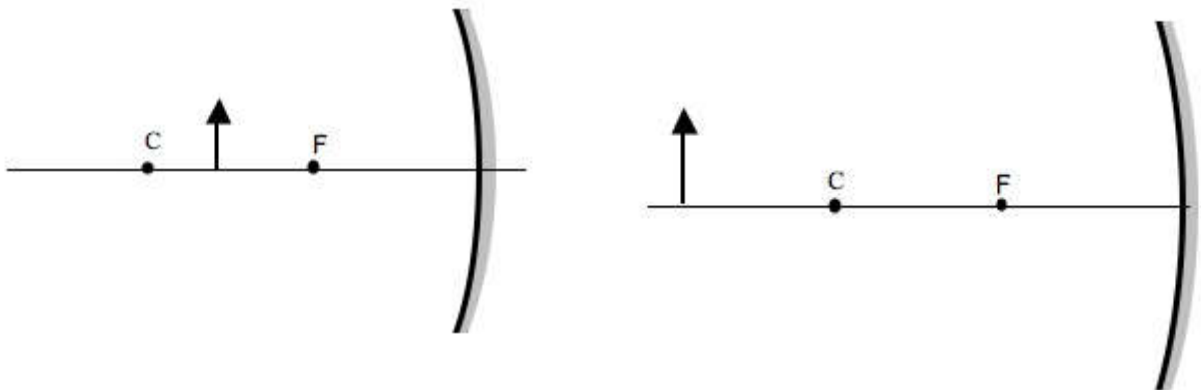
6. a) What is the importance/significance of the wavelength of light?
- b) What is the importance/significance of the amplitude of light?
- c) What is the importance/significance of the frequency of light?



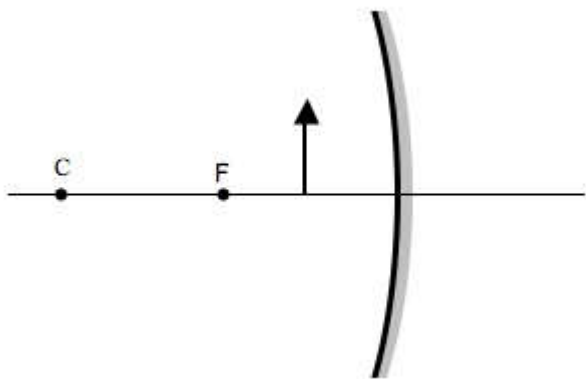
7. Fill in the following chart for the different sources of light:

Type of Light Source	How It Works	Example
Incandescence		
Bioluminescence		
Chemiluminescence		
Fluorescence		
Phosphorescence		
Triboluminescence		
Electric discharge		

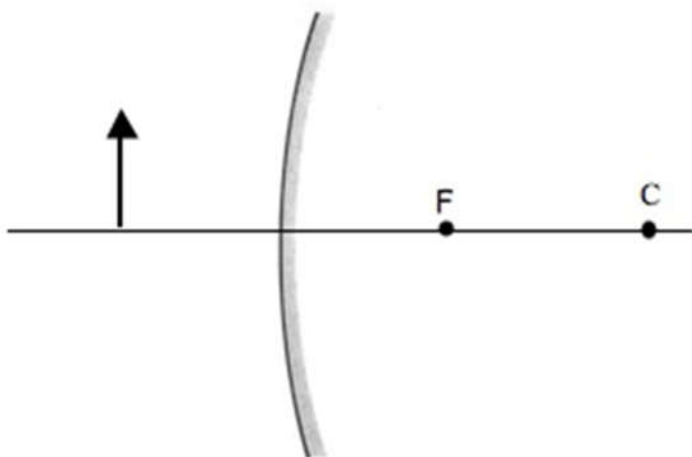
8. Draw the images of the objects as they are reflected by the curved mirrors. Describe their SALT characteristics. Include a calculation of the magnification (include the formula).



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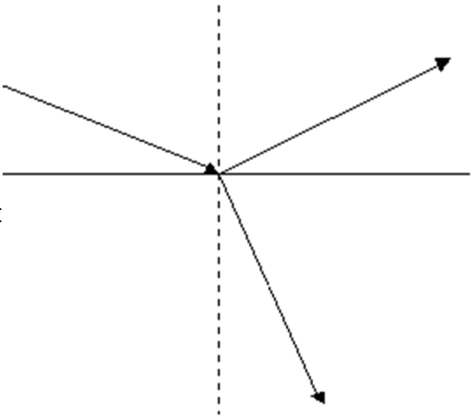


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9. Describe two uses of concave mirrors. Describe two uses of convex mirrors.

10. On the diagram to the right:

- a) label the normal, incident ray, refracted ray, reflected ray, angle of reflection and angle of refraction
- b) measure the angles of incidence, reflection and refraction
- c) does the second medium have a higher or lower refractive index than the first medium?
- d) how does the speed of the reflected ray compare with the incident ray?
- e) how does the speed of the refracted ray compare with the incident ray?
- f) What two laws does this diagram portray?



11. Explain what happens during total internal reflection.

- a) what conditions must be met for it to occur?
- b) explain how optical fibres transmit light by total internal reflection
- c) what are two applications (uses) of optical fibres?

12. Calculate the speed of light in corn oil. Show your work.

13. Light travels from air into plexiglass, hitting the surface at an angle of 36o. What is the angle of refraction? Show a full, organized solution.

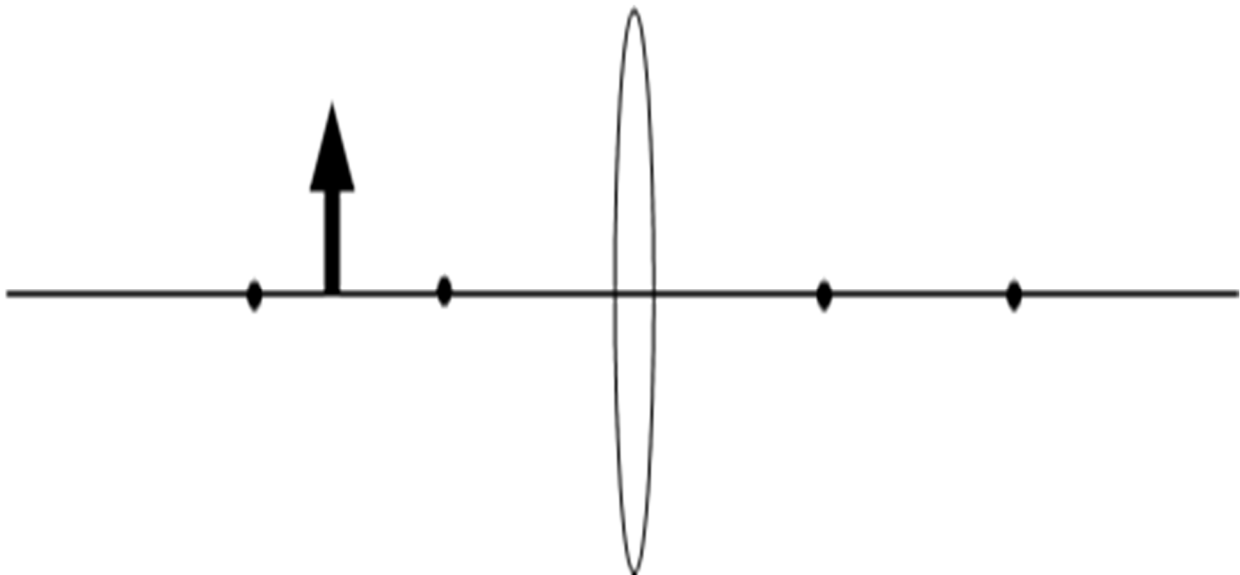
Absolute Indices of Refraction ($f = 5.09 \times 10^{14}$ Hz)	
Air	1.00
Corn oil	1.47
Diamond	2.42
Ethyl alcohol	1.36
Glass, crown	1.52
Glass, flint	1.66
Glycerol	1.47
Lucite	1.50
Quartz, fused	1.46
Sodium chloride	1.54
Water	1.33
Zircon	1.92

14. Light travels from alcohol into a cubic zirconium. If the angle of refraction is 27°, what was the angle of incidence?

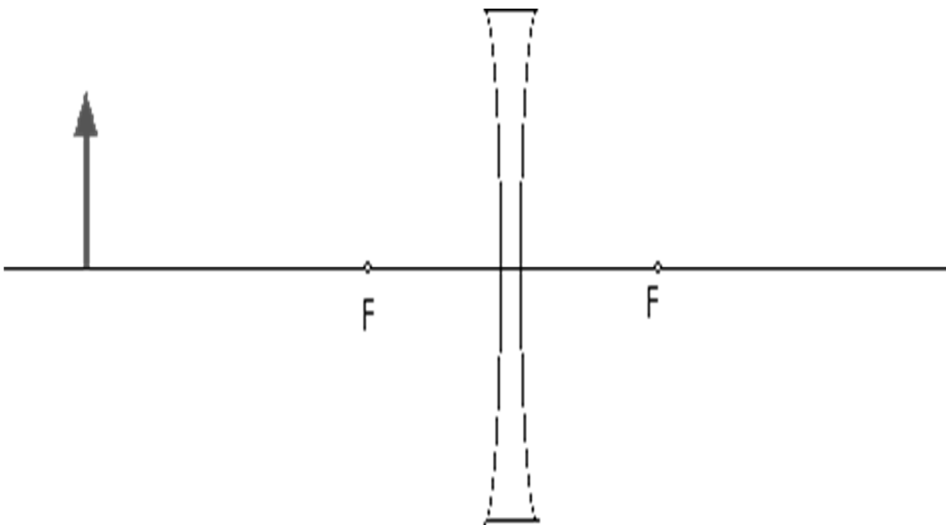
15. Compare near-sightedness and far-sightedness:

	What is wrong in the eye?	What type of lens is used to correct it and why?
Near-sighted		
Far-sighted		

16. Draw the images of the objects created by the lenses below. Describe their SALT characteristics. Include a calculation of the magnification (include the formula).



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