

## Exam Review: Geometric Optics

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

physics	transparent	convex mirror	real image
optics	translucent	refraction	virtual image
wavelength	opaque	refractive index	magnification
amplitude	umbra	total internal reflection	SALT
frequency	penumbra	critical angle	angle of incidence
non-luminous	regular reflection	converging lens	angle of reflection
incandescent	diffuse reflection	diverging lens	angle of refraction
luminescent	concave mirror	optical centre	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  
c) 115 km/h to m/s  
d) 58 m/s to km/h

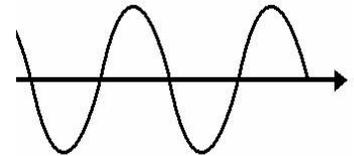
3. What is the speed of light in a vacuum? Convert this to km/h.

4. State each of the following Laws:

- a) the Law of Conservation of Energy  
b) the Law of Reflection  
c) Snell's Law  
d) the three Laws of Refraction

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

- 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?



6. a) What are the primary and secondary additive colours of light?  
b) What are the primary and secondary subtractive colours of light?

7. According to Subtractive Colour Theory, what colours of light are absorbed and reflected for an object to appear:

- a) red  
b) blue  
c) green

8. What are the three main ways that light can be produced by luminous objects? Give an example of each.

9. Explain what happens in an atom when light is produced by luminescence.

10. For fluorescent and incandescent light bulbs:

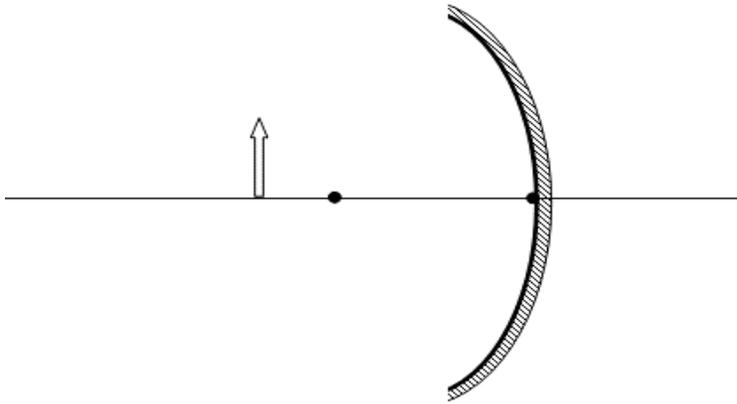
- a) describe how each type of bulb produces light (be specific)  
b) which type of bulb is more efficient?

11. What three things can happen to light when it hits the surface of an object?

12. What is a shadow? Explain how the following factors affect the characteristics of a shadow:

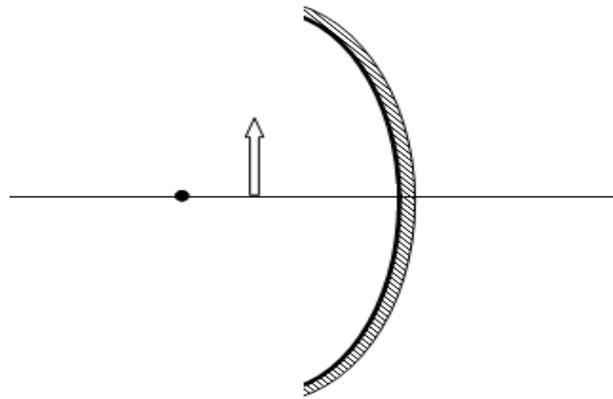
- a) the size of light source  
b) the size of the object  
c) the transparency of object  
d) the location of object

13. 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).

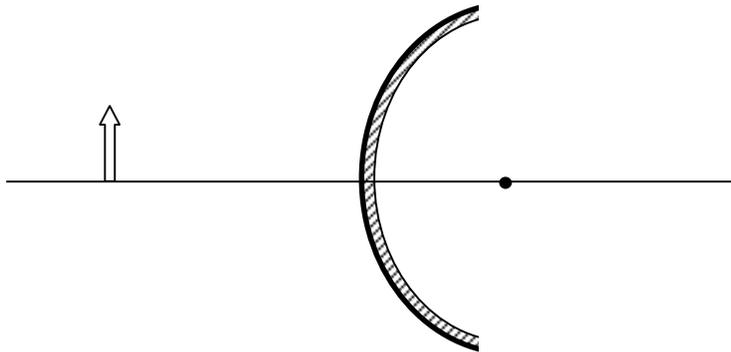


S:	_____
A:	_____
L:	_____
T:	_____

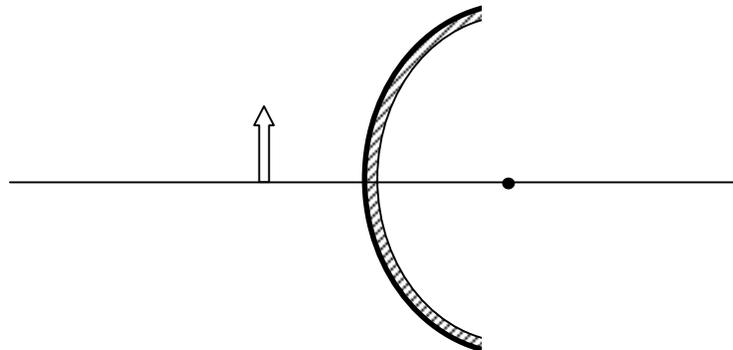
S:	_____
A:	_____
L:	_____
T:	_____



S:	_____
A:	_____
L:	_____
T:	_____



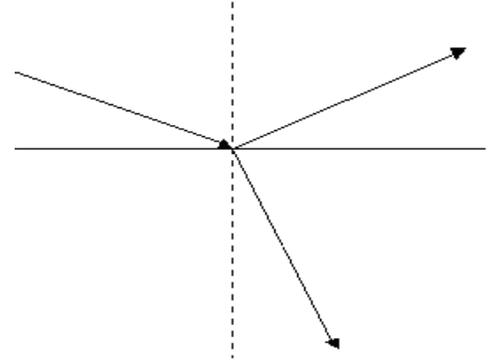
S:	_____
A:	_____
L:	_____
T:	_____



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

15. On the diagram to the right:

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



16. Explain what happens during total internal reflection.

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

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

Substance	Refractive Index
Air	1.0003
Water (liquid)	1.333
Alcohol	1.361
Corn oil	1.47
Pyrex glass	1.47
Plexiglass	1.49
Crown glass	1.523
Flint glass	1.61
Cubic Zirconium	2.16
Diamond	2.429

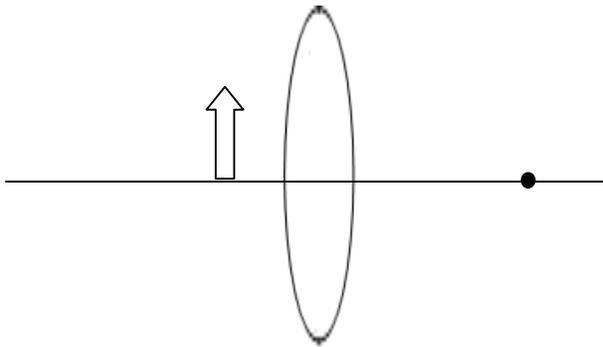
18. Light travels from air into plexiglass, hitting the surface at an angle of  $36^\circ$ . What is the angle of refraction? Show a full, organized solution.

19. Light travels from alcohol into a cubic zirconium. If the angle of refraction is  $27^\circ$ , what was the angle of incidence?

20. Compare near-sightedness and far-sightedness:

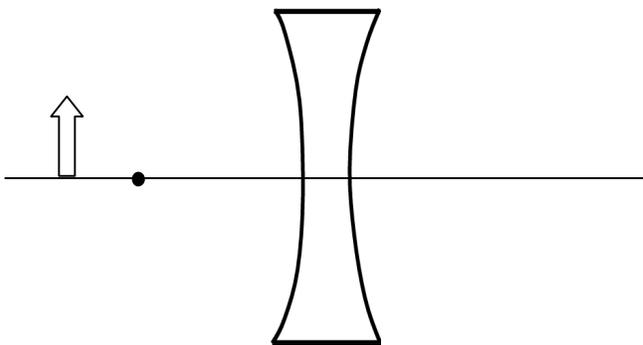
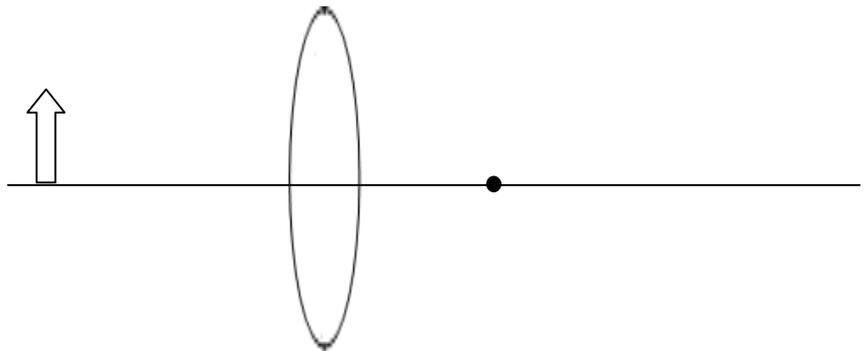
	Medical name for this condition	What is wrong in the eye? (2 possibilities)	What type of lens is used to correct it and why?
near-sightedness			
far-sightedness			

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



S:	_____
A:	_____
L:	_____
T:	_____

S:	_____
A:	_____
L:	_____
T:	_____



S:	_____
A:	_____
L:	_____
T:	_____

S:	_____
A:	_____
L:	_____
T:	_____

