

# Science 8 LIGHT & OPTICS REVIEW

Name: Key

This completed review package will be a great strategy to finish and study from.

Describe and give examples of natural and artificial light (p.179-183)

Natural Light	Artificial Light
Sun	Incandescent Sources (Light Bulbs)
Fire	Fluorescent Sources (Tubes)
Lanterns	Phosphorescent Sources
Candles	(Computer Screens)
Oil Lamps	Chemiluminescent Sources
Bioluminescent Sources (Jellyfish, Fireflies)	(Glow Sticks)

2. What are the steps you need to do to calculate the Cost of Lighting?

Convert Watts to Kilowatts ( $\div 1000$ )

$\text{KW} \times \text{hours} \times \text{cost}$

3. If you turn on a 60 Watt Incandescent Light bulb for 36 hours, knowing that the electrical company charges \$0.07 per kW/h, how much will it cost you? (show your work)

$$60\text{W} \div 1000 = 0.060 \text{ KW}$$

$$\begin{aligned} \text{cost of electricity} &= \text{KW} \times \text{hours} \times \text{cost} \\ &= (0.060 \times 36) \times (0.07) \\ &= 0.0576 \\ &= \$0.06 \end{aligned}$$

4. What if you had 22 light bulbs of 60 Watts turned on for 36 hours, knowing that the electrical company charges \$0.07 per kW/h, how much will it cost you? \$1.32

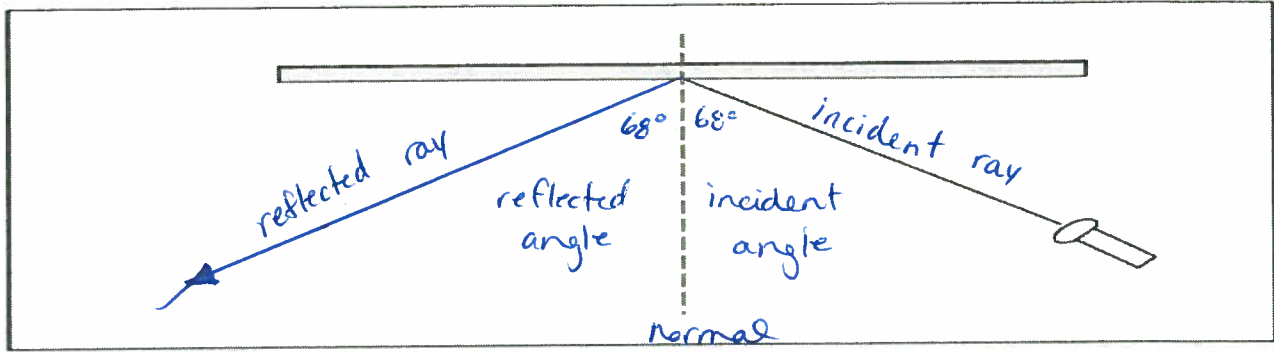
5. What are the three types of surfaces light can encounter? How does each affect light?

transparent - ~~some~~ all light will pass through.

translucent - some light passes through while some is blocked

opaque - blocks all light

6. Complete, and LABEL this Ray Diagram



7. What are the basic principles of light (p.177-178)?

Light is a form of energy.  
 When light is absorbed by a surface, it can be transformed.  
 The brightness/intensity of light indicates how much energy a surface will receive.

8. Describe the difference between concave and convex lenses?

Concave lenses cause the light to diverge.  
 Convex lenses cause the light to converge.

Concave	Convex
- Thinner : flatter in the middle	- Thicker in the middle
- light diverges (spreads out)	- causes light to converge
- image appears stretched.	(come together)
	- image may be inverted

9. State the Law of Reflection

The angle of reflection is equal to the angle of incidence.

10. What technologies use reflection? Perhaps in your everyday life. Car reflectors, Vehicle mirrors, Dental Mirrors.

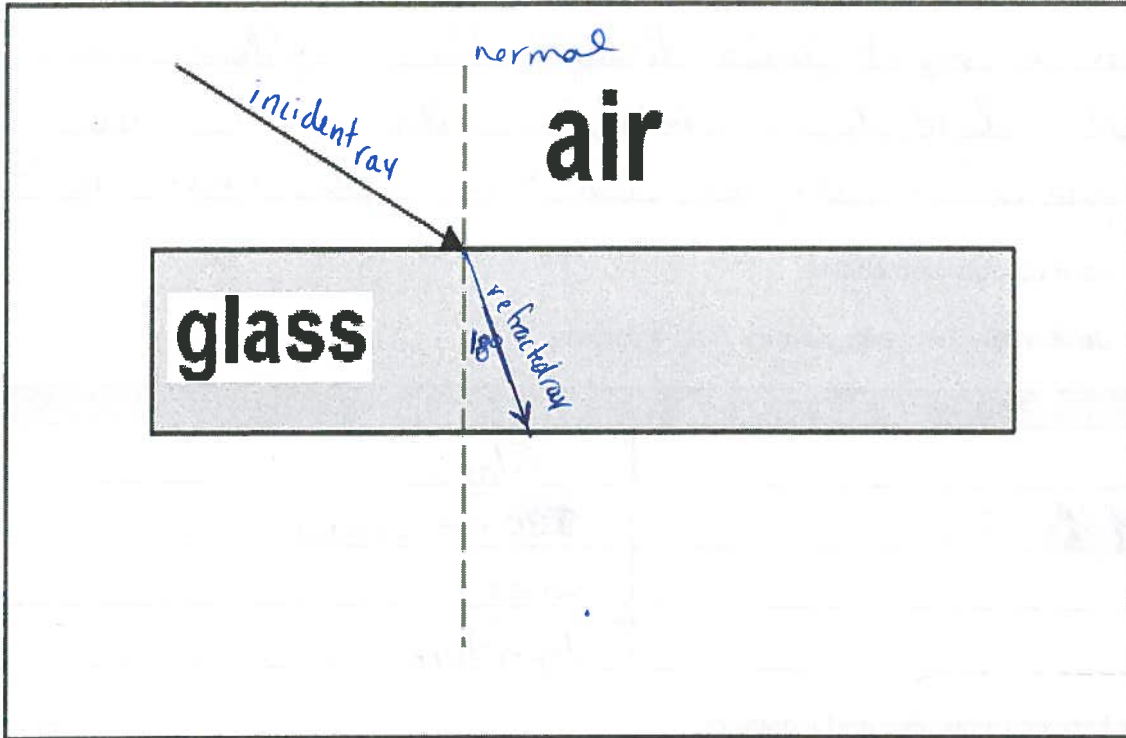
11. What is fiber optics (p. 248)

Transmitting optical waves from one end of the fibre to another in order to transfer communication information.

12. What is **Refraction**? How does it relate to the 'normal line'?

Refraction is when light bends. When light travels into a denser medium it will bend toward the normal. When it exits a denser medium it will bend away from the normal.

13. Complete, and LABEL this **Refraction Diagram** (knowing that glass refracts light at 18 degrees)

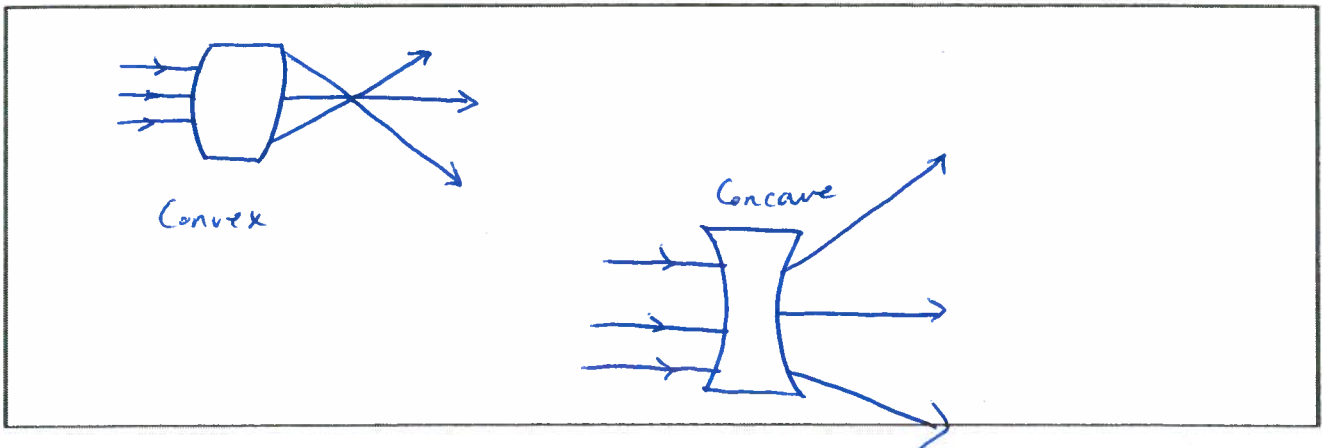


14. Why do you see mirages? What causes a road to have those 'glass puddles' in the distance?

The light is refracting in different temperatures of air when you see mirages and "glass puddles".

15. What happens to light when it passes through a lens? The lens refracts the light.

16. Draw what happens when light passes through a Double Convex Lens. **THEN,** Draw what happens when light passes through a Double Concave Lens





17. An example of a double Concave Lens in real life is... eyeglasses.

18. Two examples of a double Convex Lens in real life are... telescopes, microscopes

19. How does your eye form an image? (walk me through the steps of light to your brain)

Light from an object passes through the cornea/lens which refracts the light to a point on the retina. The retina passes a signal via the optic nerve to the brain.

20. Complete these comparison charts.

Identify the similarities between your eye and a camera.

<u>Eye</u>	<u>Camera</u>
Retina	Film
<del>Retina</del> Iris	<del>Diaphragm</del> Diaphragm
Lens	Lens
Pupil	Aperture.

Differences between your eye and a camera

<u>Eye</u>	<u>Camera</u>
Filled with humour (fluid)	"Filled" with mechanical parts
Acts instinctively	Requires human input.
Optic nerve "takes" image to the brain.	Film/Card must be processed to view.

21. What is Far-Sightedness? How does it become corrected?

You cannot see near objects very well. The correction is a convex lens.

22. What is your Blind Spot?

The point where the optic nerve enters the retina. It does not have any light-sensing cells.

23. Describe the difference between a reflecting and a refraction telescope?

Reflecting- light is collected and focussed by a convex lens.  
 Refracting- " " " " " " " " " " Mirror.

24. How are prisms used in binoculars?

They serve as plane mirrors. Light is reflected back and forth, inside the tube, off the prisms.

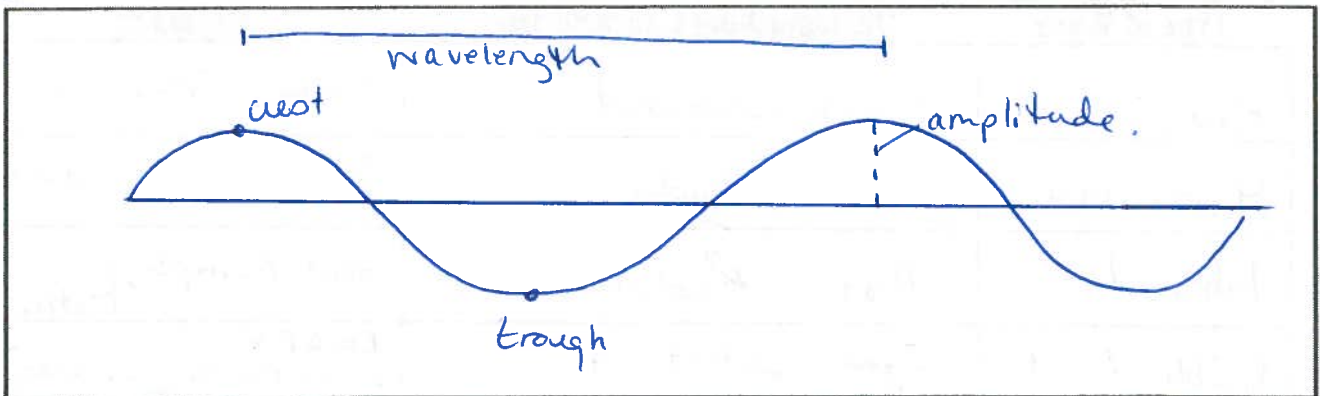
25. List 5 other things that use Plane Mirrors to reflect light/images.

Bathroom mirrors, Disco balls,

26. How is wavelengths determined?

The distance from:  
 crest to crest, trough to trough, rest point to 2<sup>nd</sup> rest point.

27. Draw a wavelength model of light and label the crest, trough, wavelength and amplitude.



28. Complete the following wavelength calculations:

Number of Wavelengths	Time (seconds)	Frequency (Hz)
a) 400 waves	2 seconds	200 Hz
b) 800 waves	8 seconds	100 Hz
c) 2000 waves	8 seconds	250 Hz

29. Why do scientists refer to the "wave model", rather than just saying that light travels in waves?

Scientists refer to a wave model because it can act as a wave at times and as a ray at other times.

30. How is a sunset made? (p. 244)

Sunlight passes through many particles; the blues/violet waves are reflected away b/c of their shorter wavelength leaving the red/oranges to be visible.

31. What is the difference between Coherent and Incoherent waves? What technologies use them?

Coherent is light with many different frequencies and wavelengths (Sunlight). Incoherent is a single wavelength and frequency (Lasers)

32. What is the order of Visible Light colors from slowest to fastest frequency?

Red, Orange, Yellow, Green, Blue, Indigo, Violet.

33. What is the electromagnetic spectrum?

Radio, Infrared, Visible Light, Ultra-violet, X-Ray, Gamma

34. Please complete the following chart going from Slowest to Fastest Frequency in the EM Spectrum

Type of Wave	Distinguishing Characteristic	Examples
Radio	Longest Wavelength	Radar, Television
Microwaves	Shortest Radio	Microwave ovens
Infrared	Heat Radiation	Heat lamps, Motion Sensors
Visible Light	Eyes Detect it	ROYGBIV Light Bulbs, Candles,
Ultraviolet	Causes Tanning / Harmful to Eyes / Skin	Tanning Beds. Nail Sealers.
X-Ray	Passes through tissue (skin/muscle)	Medical Imaging.
Gamma Rays	Shortest wavelength	Radiation Therapy

Well, you've done it!

It will be for summative AND formative marks.

I would highly encourage you to make sure it is completed correctly and that you understand all concepts on this review package to achieve your best on the **Unit 3 Exam. Thursday Oct 30th**