

**Topic 1 - What is Light?**

1. Radiation is the type of energy transfer which does not require ...
  - A matter
  - B heat
  - C waves
  - D light
  
2. Light-producing technologies, such as incandescent and florescent lights, are examples of ...
  - A bioluminescence
  - B natural light source
  - C artificial light source
  - D chemical luminescence
  
3. The absorption of radiant energy, on a dark surface, depends on the light's ...
  - A form
  - B intensity
  - C direction
  - D temperature
  
4. Ultraviolet light energy is absorbed by chemical particles giving visible light energy. This transformation describes ...
  - A incandescence
  - B phosphorescence
  - C bioluminescence
  - D florescence
  
5. Why is the disposal of florescent light tubes a challenge?
  - A because they could cut someone, if they were broken
  - B because the materials they are made of are not biodegradable
  - C because the materials they are made of are toxic
  - D because they cannot be recycled

**Topic 2 - Reflection**

6. Reflection is the process in which light strikes a surface and bounces off that surface. The reflected ray will bounce back directly to the light source if it is lined up with the ...
  - A incident ray
  - B reflected ray
  - C normal line
  - D reflecting surface

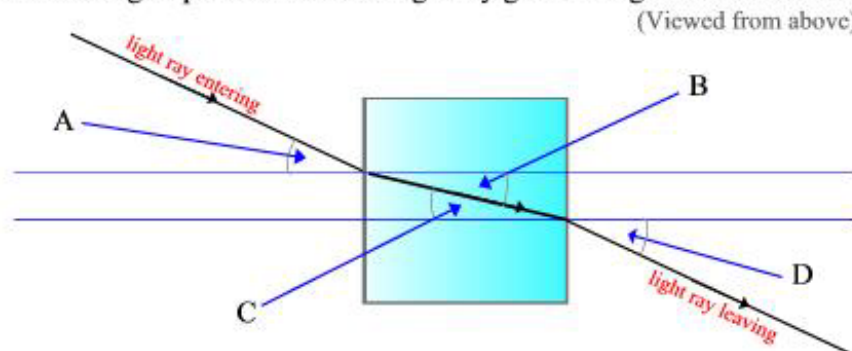
7. To discover the laws of reflection it is necessary to use a ...
- A ray box
  - B plane mirror
  - C reflecting surface
  - D normal line
8. In stating the law of reflection, that *the angle of incidence equals the angle of reflection* it is necessary to understand that this is a law because ...
- A a scientist has stated it
  - B this relationship happens most of the time
  - C this relationship always happens
  - D science is always accurate and precise
9. When you attempt to focus an image on a screen, using a concave mirror, but cannot, yet, you can see an image when are looking into the same concave mirror, the image is called a ...
- A convex distortion
  - B concave image
  - C virtual image
  - D reflected distortion
10. Pool players use the law of reflection to improve their game. When the cue ball bounces off the cushion on the side and hits the target ball, the action is called a ...
- A bank shot
  - B cushion shot
  - C angled shot
  - D image shot

### Topic 3 - Refraction

11. Refraction is the bending of light when it travels from one medium to another. What direction does the light bend when it travels from a medium of greater density to one of lesser density?
- A along the normal
  - B along the perpendicular
  - C towards the normal
  - D away from the normal
12. When light is refracted, the angle of incidence increases and the angle of refraction ...
- A depends on the intensity of the light
  - B increases, depending on the material
  - C decreases, but only by one half
  - D increases by double

13. Mirages cause an illusion of a watery surface. This illusion is actually ...
- A water drops reflecting the light
  - B water drops refracting the light
  - C the sky refracted by warm air
  - D the sky reflected by warm air
14. When light strikes a surface and is absorbed, the light ...
- A changes into another form of energy
  - B bounces off in many different directions
  - C travels through it in a different direction
  - D happens only when it is a smooth shiny surface
15. During refraction, when the angle of incidence is doubled, the angle of refraction is ...
- A also doubled
  - B not necessarily doubled
  - C decreased by the same amount
  - D decreased by about half

16. Label the angles produced when a light ray goes through a refraction tank.



**A** is the angle of \_\_\_\_\_

**B** is the angle of \_\_\_\_\_

**C** is the angle of \_\_\_\_\_

**D** is the angle of \_\_\_\_\_

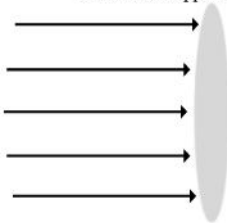
#### Topic 4 - Lenses and Vision

17. When light passing through a lens, the light is bent, causing the rays of light to diverge. The type of lens is a ...
- A convex lens
  - B concave lens
  - C optic lens
  - D diamond prism lens

18. When light rays pass through a convex lens the image that is formed is ...
- A diverted
  - B converted
  - C inverted
  - D implied
19. The lens of the human eye is a convex lens. That means that when it takes in light from an object, it refracts the light rays, by focusing them on the retina. If the eye is too long, the image will form in front of the retina. This condition is called ...
- A retina dysfunction
  - B optical illusion
  - C near-sightedness
  - D far-sightedness
20. When comparing the eye and the camera, certain parts perform the same function. The retina of the eye is similar to the part of the camera called the ...
- A film
  - B shutter
  - C diaphragm
  - D focusing ring
21. The aperture of a camera controls the amount of light coming into the camera, so that a clear image can be formed. This aperture-opening device is similar to the pupil of the eye. It is called the ...
- A iris
  - B shutter
  - C diaphragm
  - D optic nerve
22. When light passes through a lens it is refracted. Complete the following illustration and sentences as directed.

**Activity 1** (3 points)

Draw what happens to the light rays going through this lens.

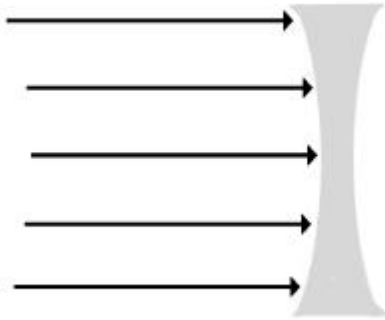


What type of lens is it? It is a \_\_\_\_\_ lens.

What happens to the light rays? They are \_\_\_\_\_ .

**Activity 2 (3 Points)**

Draw what happens to the light rays going through this lens.



What type of lens is it? It is a \_\_\_\_\_ lens.

What happens to the light rays? They are \_\_\_\_\_

**Topic 5 - Extending Human Vision**

23. Telescopes use different types of mirrors to collect the rays of light. The type of telescope that uses a concave mirror to collect the rays of light from distant objects is the ...
- A reflecting telescope
  - B refracting telescope
  - C prism telescope
  - D magnifying telescope
24. Magnifying glasses are used to make object look bigger than they usually are. New developments and discoveries have been able to make magnifying instruments (known as microscopes) much stronger. When Anton van Leeuwenhoek was able to see bacteria, for the first time, the magnification he needed was about ...
- A 200X
  - B 280X
  - C 1800X
  - D 2000X
25. In order to have the greatest magnification possible in a reflecting telescope, it is necessary to have a ...
- A very large concave mirror
  - B very thick objective lens
  - C very strong plane mirror
  - D great distance between the object and the image

26. A binocular uses prisms to redirect light from distant objects. These prisms act like ...
- A concave lenses
  - B convex lenses
  - C plane mirrors
  - D refracting mirrors
27. Microscopes have limits in terms of their magnification because of the types of lenses that are used. To magnify objects by different amounts, scientists would use this part of the compound microscope.
- A objective lens
  - B eyepiece lens
  - C condenser lens
  - D adjustment lens

### Topic 6 – The Source of Colors

28. White light - when passed through a prism - will be broken up into all the visible colors of the spectrum. What will happen if all these colors are then passed through a second prism?
- A nothing
  - B no light can be seen
  - C white light will reform
  - D the colors of the spectrum will reverse
29. Sunlight produces the seven colors of the spectrum in a pattern called the solar spectrum. To remember the pattern this memory aid is used ...
- A RYOBGIV
  - B ROYGBIV
  - C VIBOGRY
  - D GROVIBY
30. When the primary colors of light - red, green, and blue - are added together, this color is produced.
- A yellow
  - B magenta
  - C cyan
  - D white
31. Rods and cones are two types of light detecting nerve cells in the retina of the eye. Which of the following statements is correct?
- A Rods are cylindrical and detect color
  - B Cones are shaped like teardrops and detect color
  - C Rods are shaped like teardrops and detect the presence of light
  - D Cones are cylindrical and detect the presence of light

32. The condition in some people's eyes that is responsible for color blindness is if ...
- A Cones cannot detect light
  - B Rods detect only some colors
  - C Cones detect only some colors
  - D Rods cannot detect light

### Topic 7 - The Wave Model of Light

33. Wavelengths can be determined by measuring ...
- A the height of a crest
  - B the depth of a trough
  - C the distance between two crests
  - D the difference in height between a crest and a trough
34. The rate at which an object is moving up to the top of a crest and down to the bottom of a trough is called ...
- A amplitude
  - B frequency
  - C hertz
  - D rest position
35. When light passes through a small opening, the waves spread out. How far they spread out depends on this ...
- A amplitude
  - B frequency
  - C wavelength
  - D one complete trough
36. At sunset, the colors we are able to see are reds and oranges. This is made possible because when light hits the atmosphere, this happens.
- A blue and violet are absorbed by dust particles
  - B red and violet are refracted through the atmosphere
  - C blue and orange are reflected back into space
  - D red and orange pass around the particles
37. A laser demonstrates the difference between incoherent light and coherent light. The laser, which is used for many purposes gives off coherent light, which are ...
- A waves with multiple frequencies
  - B waves with only one frequency
  - C waves with variable wavelengths
  - D waves with a variable amplitude

## Topic 8 - Beyond Light

38. The difference between water waves and light waves is that these vibrate ...
- A the different colors of light
  - B electrical and magnetic fields
  - C wavelengths and frequencies
  - D particles in the magnetic spectrum
39. The frequency of different colors of light waves is often given in scientific notation. The frequency of orange light is 500,000,000,000,000 Hz. This can be represented, using scientific notation, as ...
- A  $5.0 \times 10^{14}$
  - B  $5.0 \times 10^{13}$
  - C  $500.0 \times 10^{12}$
  - D  $5000.0 \times 10^{11}$
40. Infrared radiation is heat radiation. This type of radiation can have a useful application. They are used in ...
- A computers to keep the chips warm
  - B restaurants to keep food warm
  - C refrigerators to trap the heat
  - D microwaves to cook the food
41. There are many different types of radio waves. A transmitting station can send these types of signals to an orbiting satellite, which will amplify them and send them back to a receiving station on the Earth. The type of signal used in satellite communications is ...
- A AM Radio
  - B FM Radio
  - C Microwave
  - D Shortwave
42. A special blocking agent - **sunscreen** - is added to the lotion we use to avoid sunburn. This blocking agent reflects the UV rays and can help prevent cancerous growths on the skin. The strength of this blocking agent is determined by the ...
- A SDF
  - B SPF
  - C SVF
  - D SBF



## Light and Optical Systems Unit Test

### Answer Key

Topics	Questions				
	1.	2.	3.	4.	5.
<b>Topic 1 - What is Light?</b>	<b>A</b>	<b>C</b>	<b>B</b>	<b>D</b>	<b>C</b>
	6.	7.	8.	9.	10.
<b>Topic 2 – Reflection</b>	<b>C</b>	<b>B</b>	<b>C</b>	<b>C</b>	<b>A</b>
	11.	12.	13.	14.	15.
<b>Topic 3 - Refraction</b>	<b>D</b>	<b>B</b>	<b>C</b>	<b>A</b>	<b>B</b>
Question 16.					
A - Incidence B – Refraction C – Incidence D - Refraction					
	17.	18.	19.	20.	21.
<b>Topic 4 - Lenses &amp; Vision</b>	<b>B</b>	<b>C</b>	<b>C</b>	<b>A</b>	<b>C</b>
Question 22.					
Activity 1 – double convex , converging Activity 2 – double concave , diverging					
	23.	24.	25.	26.	27.
<b>Topic 5 - Extending Human Vision</b>	<b>A</b>	<b>B</b>	<b>D</b>	<b>C</b>	<b>A</b>
	28.	29.	30.	31.	32.
<b>Topic 6 – The Source of Color</b>	<b>C</b>	<b>B</b>	<b>D</b>	<b>B</b>	<b>C</b>
	33.	34.	35.	36.	37.
<b>Topic 7 - The Wave Model of Light</b>	<b>C</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>B</b>
	38.	39.	40.	41.	42.
<b>Topic 8 - Beyond Light</b>	<b>B</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>B</b>