

#1

What are the 7 different categories of the electromagnetic spectrum? List them from least to most energetic.

Name:

#3

Rank the following electromagnetic waves from least to most energetic: microwaves, x-rays, green light, red light, violet light, radio waves, ultraviolet light, gamma rays

Name:

#2

Gamma rays can cause cancer, but they can also be helpful. List at least 3 ways gamma rays are helpful to humans.

Name:

#4

In your opinion, which type of electromagnetic wave is most useful to humans? Explain in detail.

Name:

#5

How is infrared light used by humans? List at least 3 ways.

Name:

#7

List the 7 distinct colors that Isaac Newton identified in the visible spectrum from least to most energetic.

Name:

#6

Ultraviolet rays can cause cancer, but they can also be helpful. List at least 2 ways UV rays are helpful to humans.

Name:

#8

What is the advantage to placing telescopes in space as opposed to on Earth's surface?

Name:

#9

Incandescence is the production of light from \_\_\_\_\_. Two examples of incandescence are:

Name:

#11

How do objects "glow in the dark"?

Name:

#10

Electric discharge creates light when \_\_\_\_\_ passes through a \_\_\_\_\_. Two examples of light from electric discharge are:

Name:

#12

What is the main difference between light from phosphorescence and light from fluorescence?

Name:

#13

Explain how a glow stick creates light.  
What type of light production is this?

Name:

#15

Give 5 examples of organisms that  
produce light through bioluminescence.  
Why would these organisms create light?

Name:

#14

Define "triboluminescence" in your own  
words.

Name:

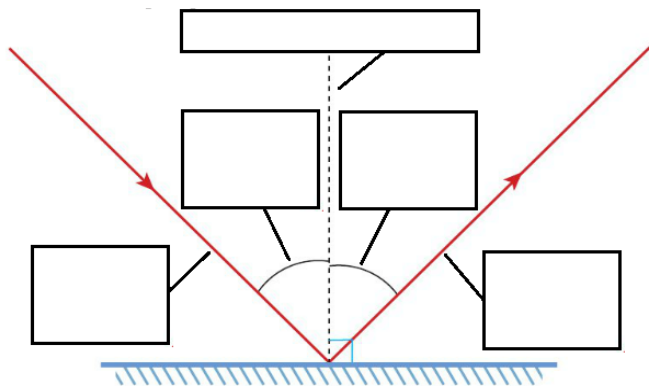
#16

How do light-emitting diodes (LEDs)  
work? Explain in your own words.

Name:

#17

Label the 5 parts of this diagram.



Name:

#19

If the angle of incidence is  $37^\circ$ ; the angle of reflection is \_\_\_\_\_.

If the angle of reflection is  $15^\circ$ ; the angle of incidence is \_\_\_\_\_.

If the angle between the normal and incident ray is  $28^\circ$ ; the angle of reflection is \_\_\_\_\_.

If the angle between the mirror and the incident ray is  $50^\circ$ ; the angle of reflection is \_\_\_\_\_.

Name:

#18

State the two Laws of Reflection.

Name:

#20

If you were to go for a hike along a still lake, would you see specular or diffuse reflection. Explain.

Name:

#21 Use the Laws of Reflection to draw the mirror image of the object.

EYE



Name:

#23 Use the Laws of Reflection to draw the mirror image of the object.

WOW



Name:

#22 Use the Laws of Reflection to draw the mirror image of the object.

SCIENCE



Name:

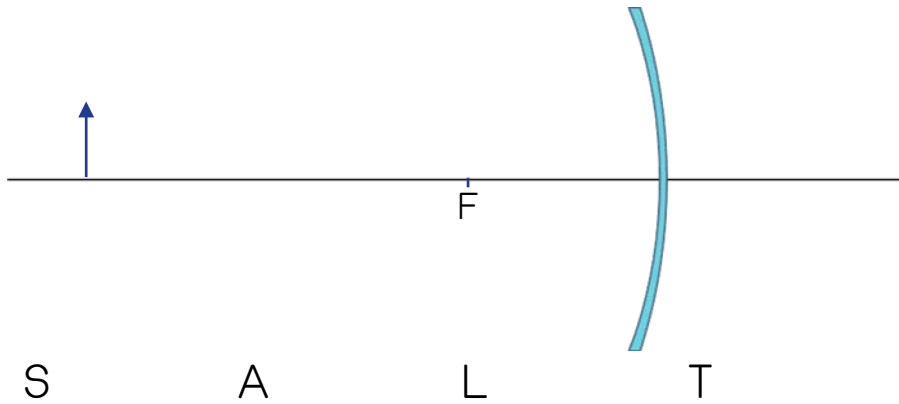
#24 Use the Laws of Reflection to draw the mirror image of the object.

COOKIE



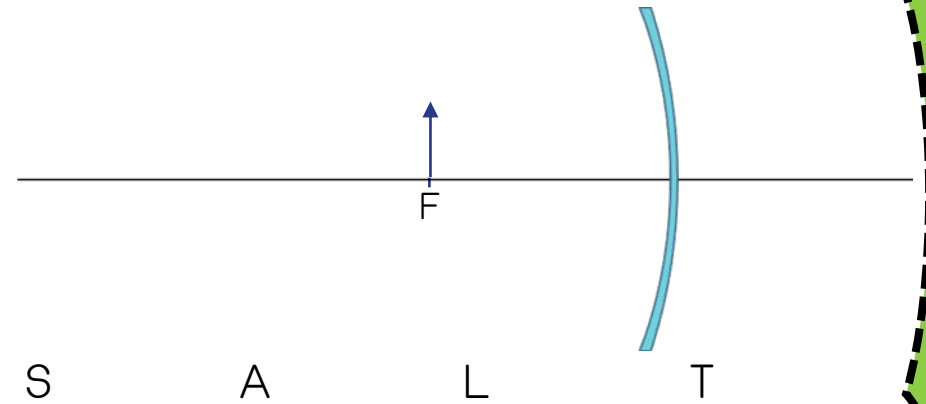
Name:

#25 Measure and label C, then draw at least 3 rays to determine the SALT of the image.



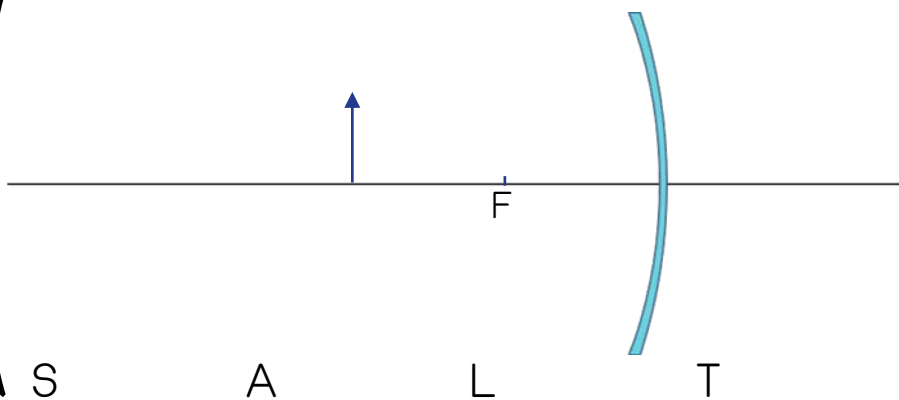
Name:

#27 Measure and label C, then draw at least 3 rays to determine the SALT of the image.



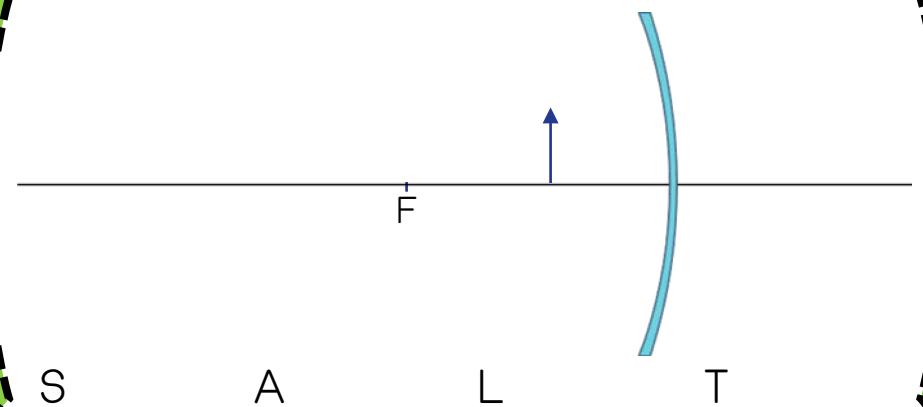
Name:

#26 Measure and label C, then draw at least 3 rays to determine the SALT of the image.



Name:

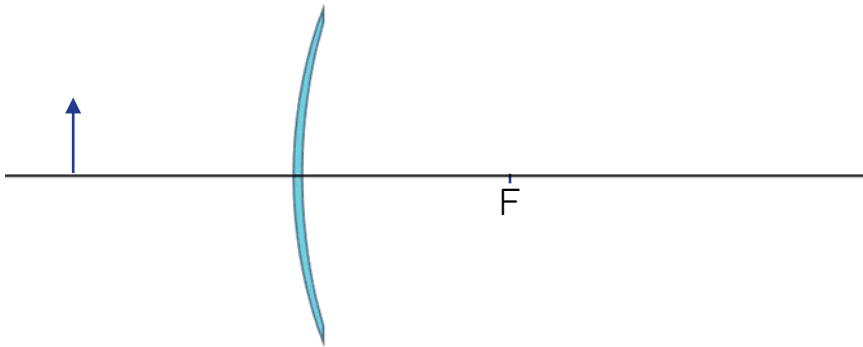
#28 Measure and label C, then draw at least 3 rays to determine the SALT of the image.



Name:

#29

Measure and label C, then draw at least 3 rays to determine the SALT of the image.

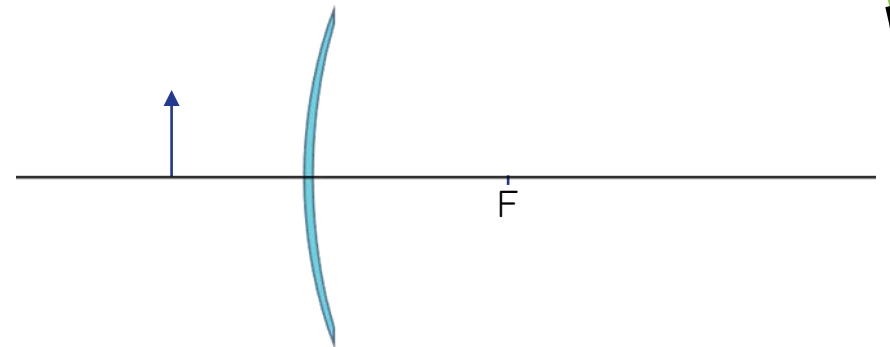


S A L T

Name:

#31

Measure and label C, then draw at least 3 rays to determine the SALT of the image.

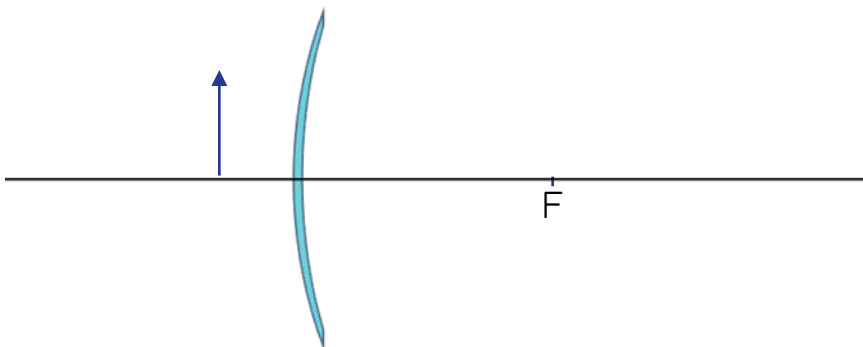


S A L T

Name:

#30

Measure and label C, then draw at least 3 rays to determine the SALT of the image.

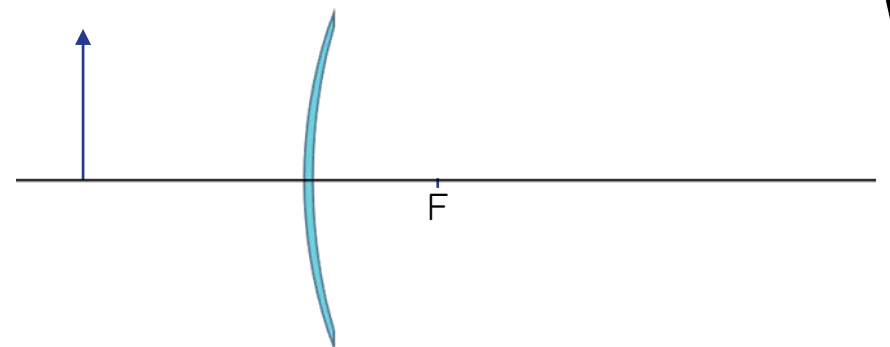


S A L T

Name:

#32

Measure and label C, then draw at least 3 rays to determine the SALT of the image.



S A L T

Name:



#33

Use your own words to define "refraction".

Name:

#34

State the two rules for refraction.

Name:

#35

What causes the refraction of light?

Name:

#36

Using your understanding of refraction, draw the actual location of the fish.



Name:

#37

Calculate the speed of light in glass.

$$n_{\text{glass}} = 1.52$$

Name:

#39

Calculate the speed of light in ice.

$$n_{\text{ice}} = 1.31$$

Name:

#38

Calculate the index of refraction of salt.

$$v_{\text{salt}} = 1.96 \times 10^8 \text{ m/s}$$

Name:

#40

Your friend calculates the index of refraction of diamond to be 0.41. Is this answer reasonable? Explain.

Name:

#41

Define "critical angle" in your own words.

Name:

#43

Explain why diamonds sparkle so much.

Name:

#42

Describe the two conditions that need to be met for total internal reflection to occur.

Name:

#44

How do fiber optic cables work?

Name:

#45

The critical angle of water is  $48.8^\circ$ . Draw a diagram to show the path of the light if it travels from water into air at an angle of incidence of  $48.8^\circ$ .

Name:

#47

The critical angle of water is  $48.8^\circ$ . Draw a diagram to show the path of the light if it travels from water into air at an angle of incidence less than  $48.8^\circ$ .

Name:

#46

The critical angle of water is  $48.8^\circ$ . Draw a diagram to show the path of the light if it travels from water into air at an angle of incidence greater than  $48.8^\circ$ .

Name:

#48

The critical angle of water is  $48.8^\circ$ . Draw a diagram to show the path of the light if it travels from air into water at an angle of incidence of  $48.8^\circ$ .

Name:

#49

Could total internal reflection occur in these situations? Circle the correct answer.

- a) Light travels from air to ice. Yes/No
- b) Light travels from ice to air. Yes/No
- c) Light travels from glass to water. Yes/No
- d) Light travels from diamond to ice. Yes/No
- e) Light travels from ice to water. Yes/No

$n_{\text{air}} = 1.00$ ,  $n_{\text{ice}} = 1.31$ ,  $n_{\text{water}} = 1.33$ ,  $n_{\text{glass}} = 1.52$ ,  $n_{\text{diamond}} = 2.42$

Name:

#51

Explain how a retro-reflector can keep athletes safe at night?

Name:

#50

What is a "retro-reflector"? How does it work?

Name:

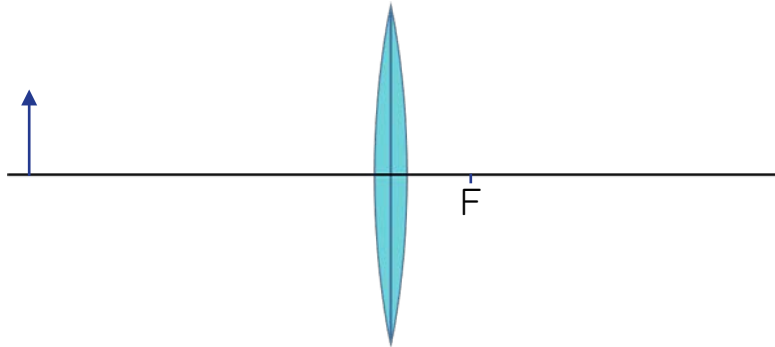
#52

What would happen if street signs used mirrors instead of retro-reflectors? Include a diagram.

Name:

#53

Measure and label  $2F$ ,  $F$  and  $2F'$ , then draw at least 3 rays to determine the SALT of the image.

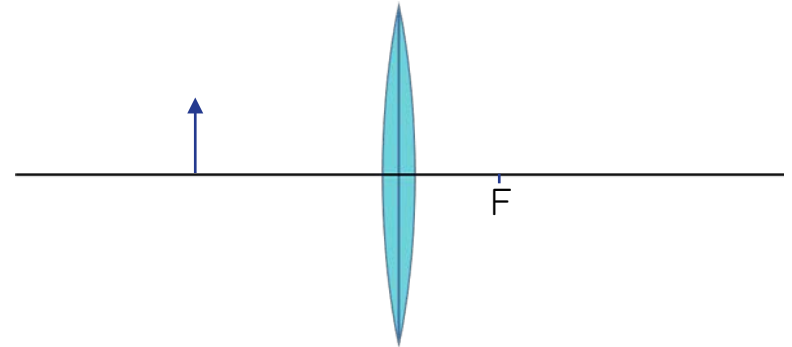


S                    A                    L                    T

Name:

#55

Measure and label  $2F$ ,  $F$  and  $2F'$ , then draw at least 3 rays to determine the SALT of the image.

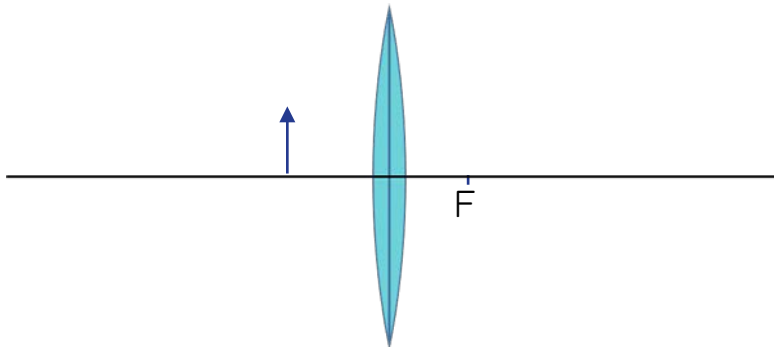


S                    A                    L                    T

Name:

#54

Measure and label  $2F$ ,  $F$  and  $2F'$ , then draw at least 3 rays to determine the SALT of the image.

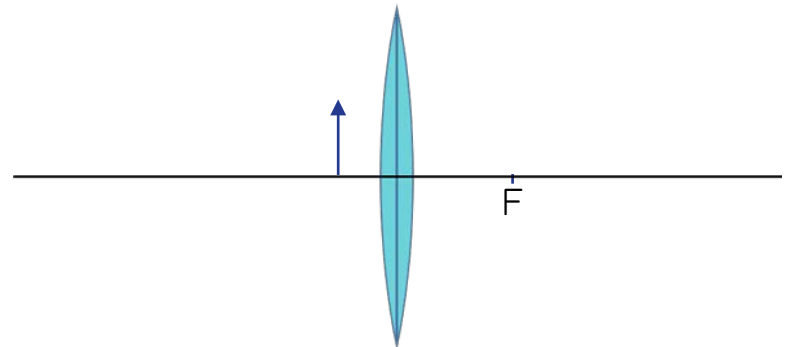


S                    A                    L                    T

Name:

#56

Measure and label  $2F$ ,  $F$  and  $2F'$ , then draw at least 3 rays to determine the SALT of the image.

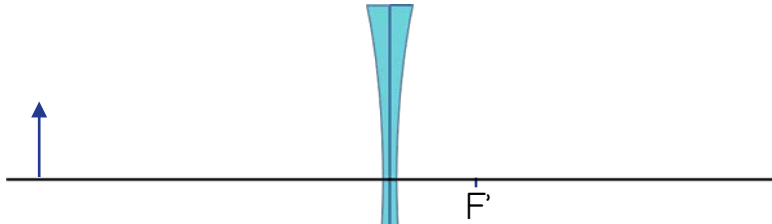


S                    A                    L                    T

Name:

#57

Measure and label  $2F$ ,  $F$  and  $2F$ , then draw at least 3 rays to determine the SALT of the image.

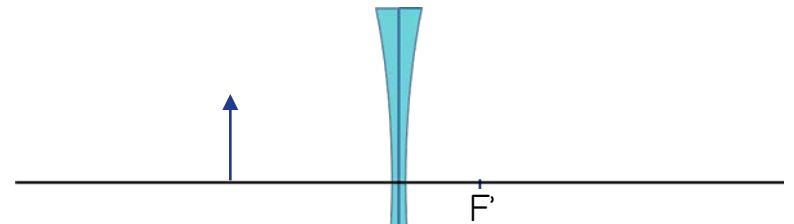


S                      A                      L                      T

Name:

#59

Measure and label  $2F$ ,  $F$  and  $2F$ , then draw at least 3 rays to determine the SALT of the image.

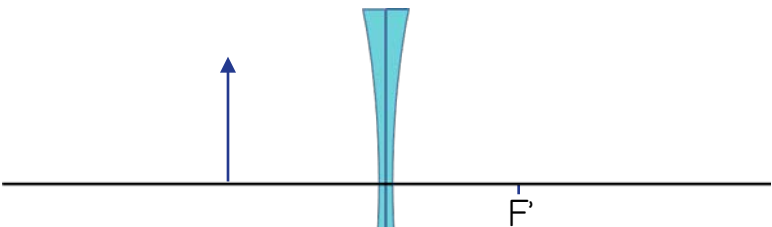


S                      A                      L                      T

Name:

#58

Measure and label  $2F$ ,  $F$  and  $2F$ , then draw at least 3 rays to determine the SALT of the image.

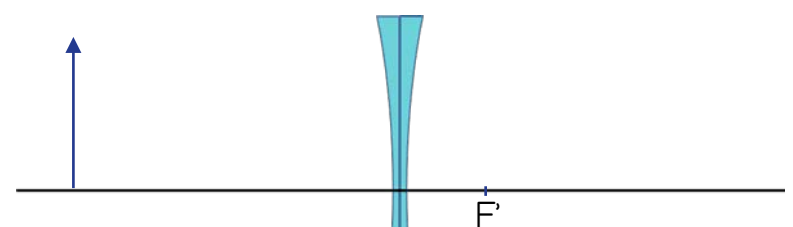


S                      A                      L                      T

Name:

#60

Measure and label  $2F$ ,  $F$  and  $2F$ , then draw at least 3 rays to determine the SALT of the image.



S                      A                      L                      T

Name: