Dangers and Uses of Electromagnetic Radiation

Low Energy ↓ **ENERGY** ↑ High Energy

Low Frequency ↓ **FREQUENCY** ↑ High Frequency

Long Wavelength ↓ **WAVELENGTH** ↑ Short Wavelength

Type of Radiation	Uses and/or Dangers
gamma rays	see class notes for details
X-rays	
ultraviolet	
visible	
infrared	
microwaves	
radiowaves	

Provide definitions for each of the following terms:

- incandescent light source (give examples): hot, therefore glows (like a poker in the fire)
  stove plate, sun, stars, incandescent light bulb
- fluorescence: elevated electronic state relaxes and gives of photon of light
  excite -> relax -> light passport
- phosphorescence: like fluorescence but slower
  excite -> wait (time delay) -> relax -> light
  glow in the dark stickers
- chemiluminescence: any light from a chemical reaction that is not due to heat, cool chemical reaction
  glow stick
- bioluminescence: chemiluminescent reaction in biological organism
  fireflies, angler fish
- converging vs diverging rays:
  come together go apart

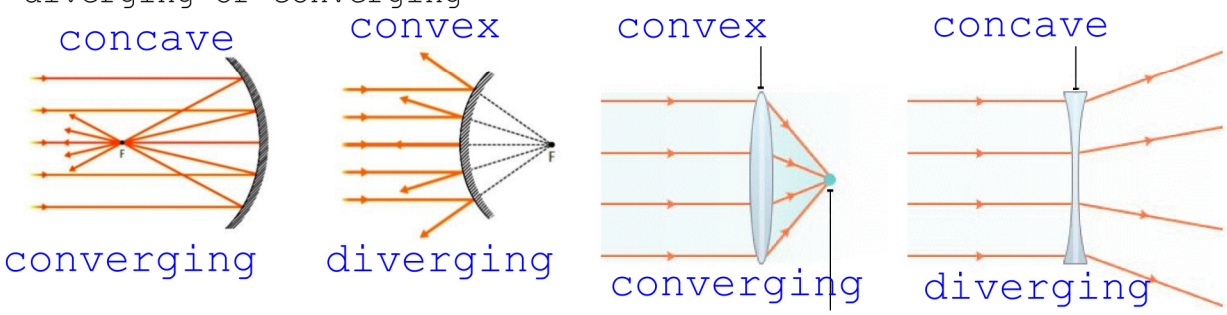
What is the colour temperature relationship for incandescent light sources?

colour depends on temperature

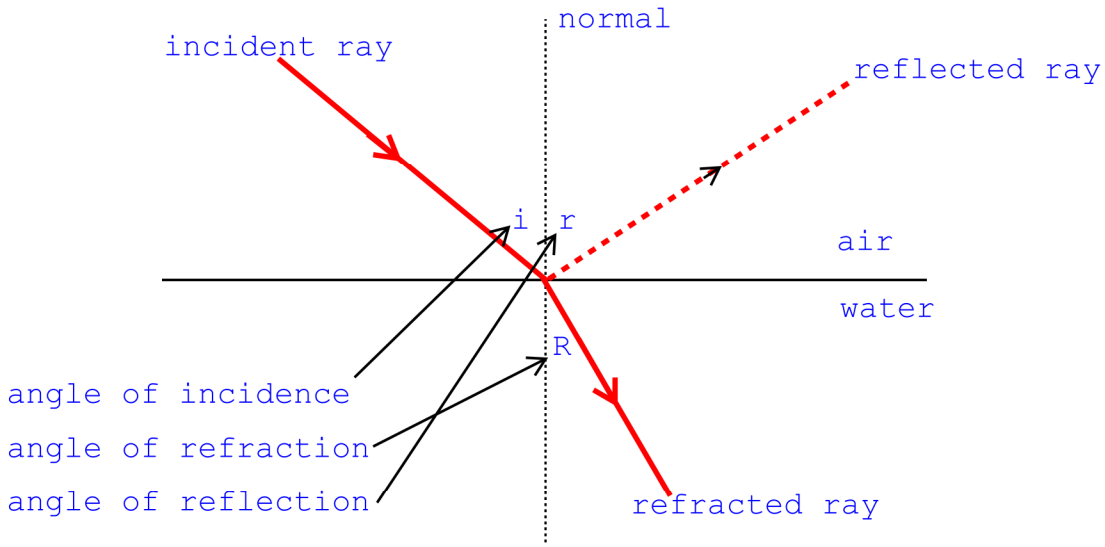
red -> orange -> yellow -> white -> blue -> violet

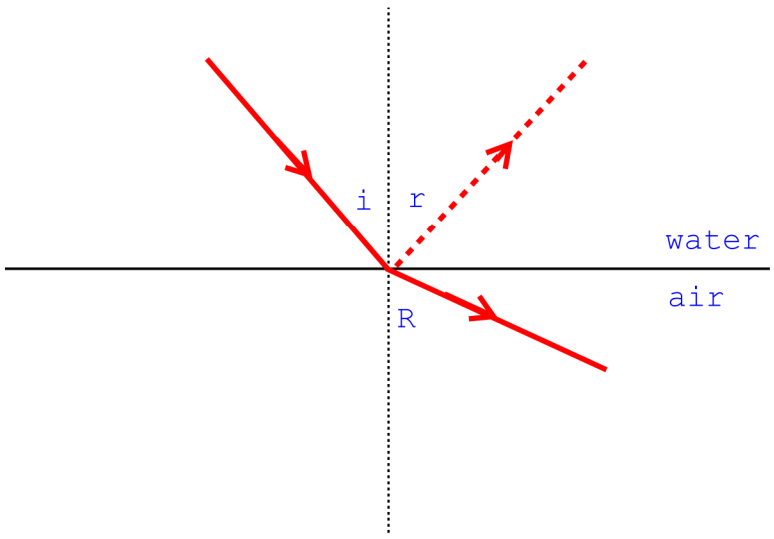
coolest to hottest

Label each mirror or lens as either concave or convex **AND** diverging or converging

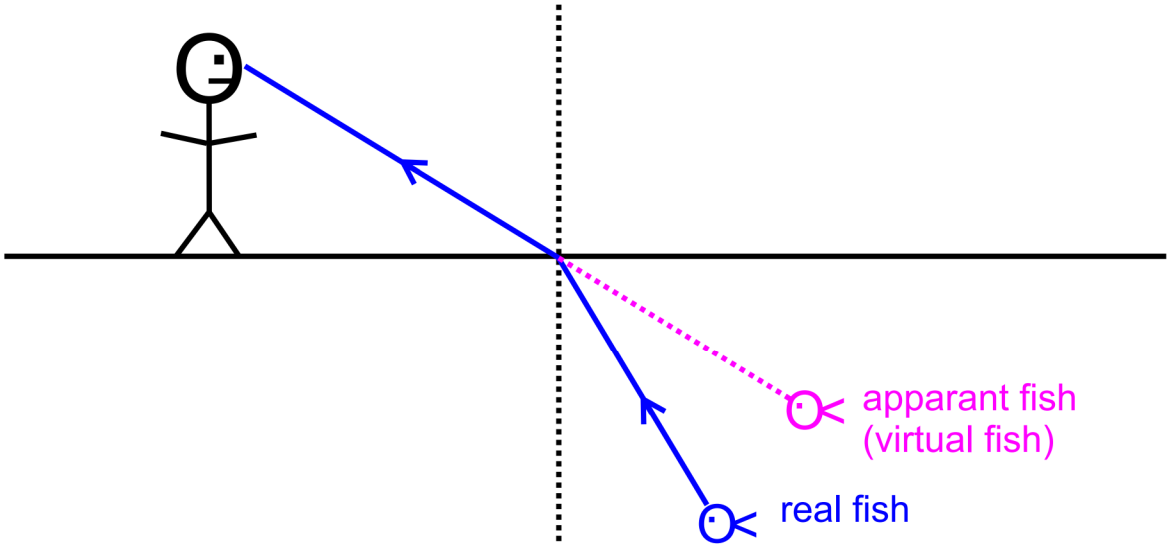


Draw two diagrams that illustrate the principle of refraction. The first diagram should be for a ray of light travelling from air to water (from less optically dense to more optically dense). The second diagram should be for a ray of light travelling from water to air (from more optically dense to less optically dense). Label completely! Which way does the ray bend???



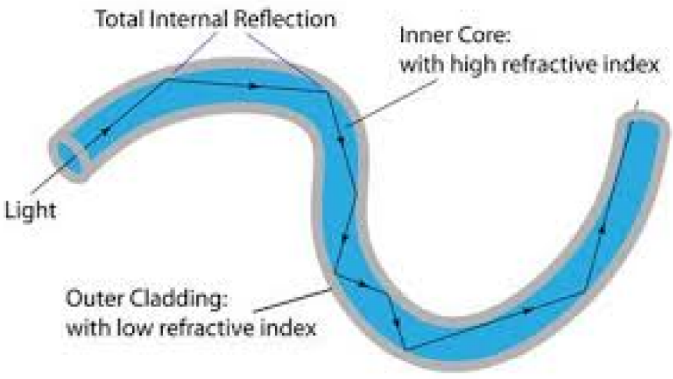


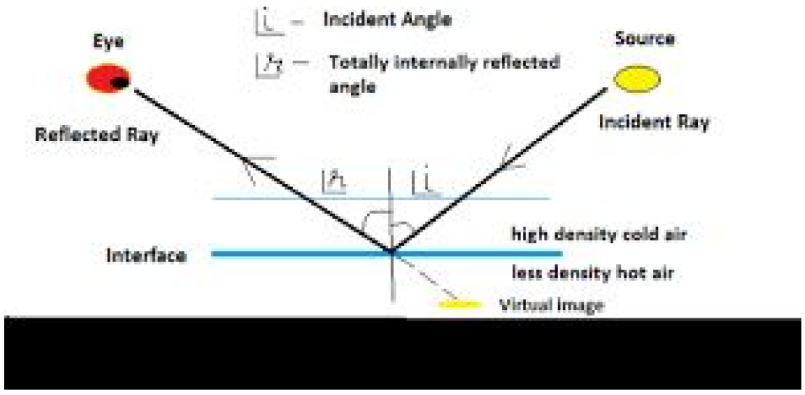
Redraw a diagram that explains why an object in water such as a fish appears closer to the surface than it actually is. Include the label APPARENT LIGHT RAY to help explain this.



What is total internal reflection. Illustrate this concept by sketching optical fibre and a road mirage.

total internal reflection occurs when an incident ray in a MORE OPTICALLY DENSE media strikes the surface and an angle of incidence that is greater than the ``critical angle``

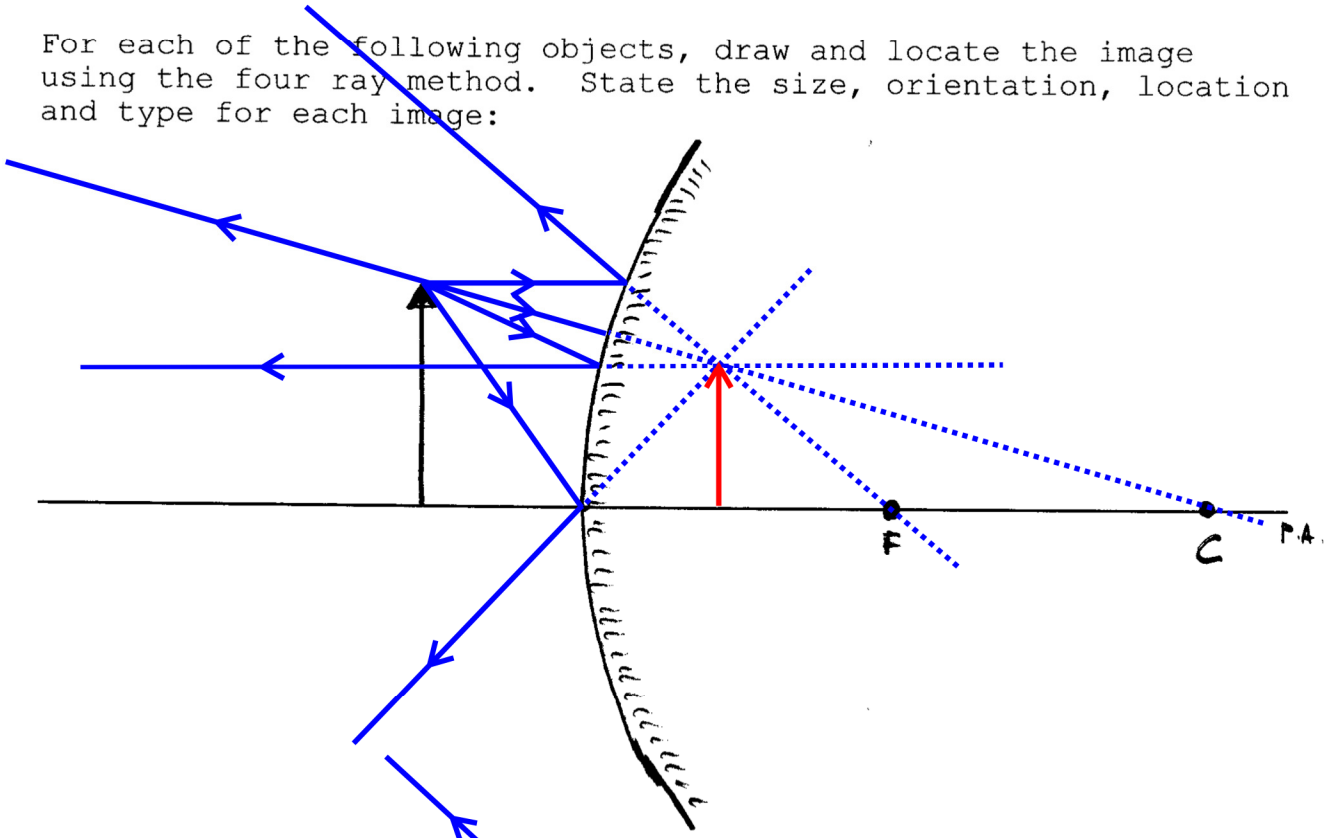


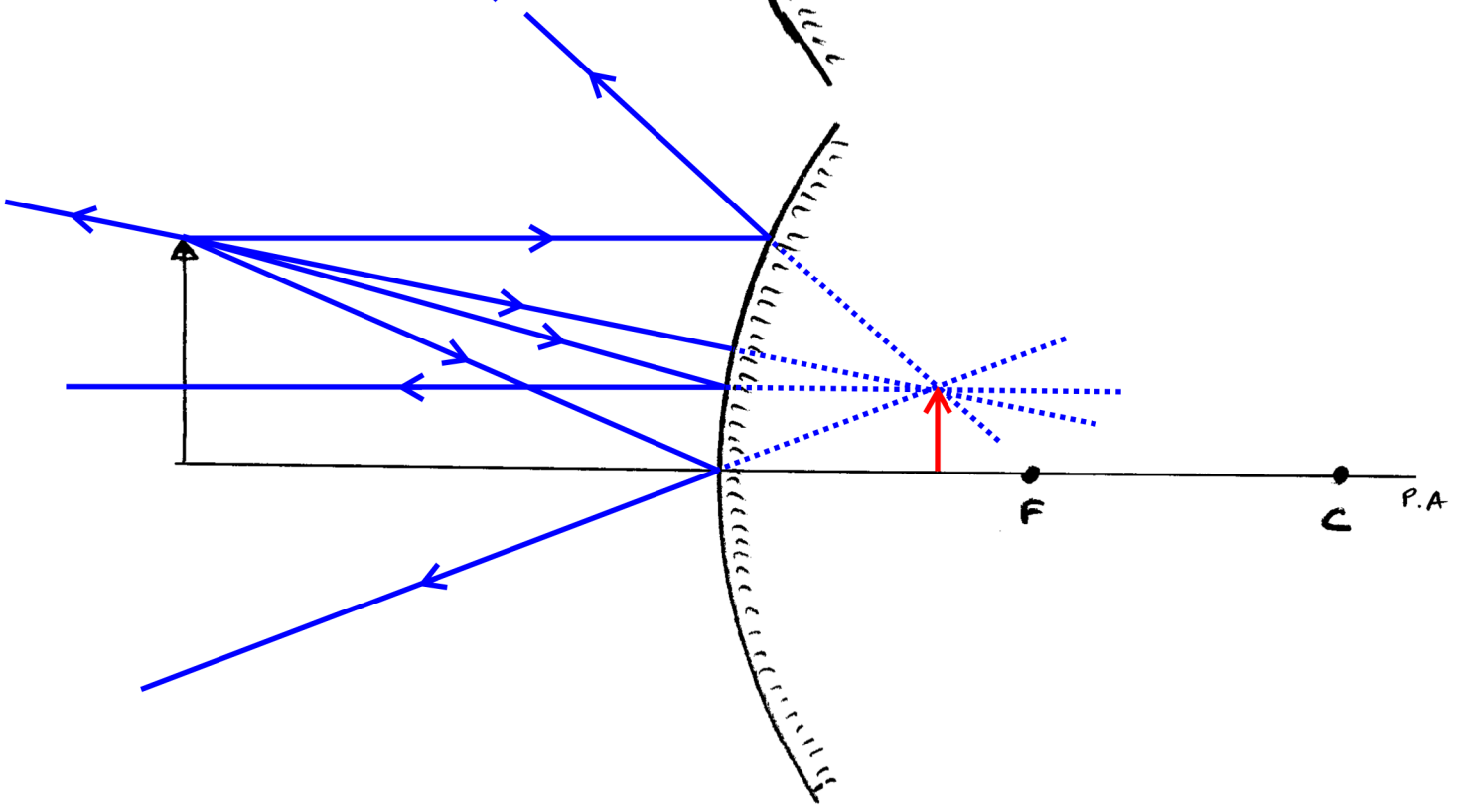


Name:_____

Convex Mirror Ray Diagrams

For each of the following objects, draw and locate the image using the four ray method. State the size, orientation, location and type for each image:

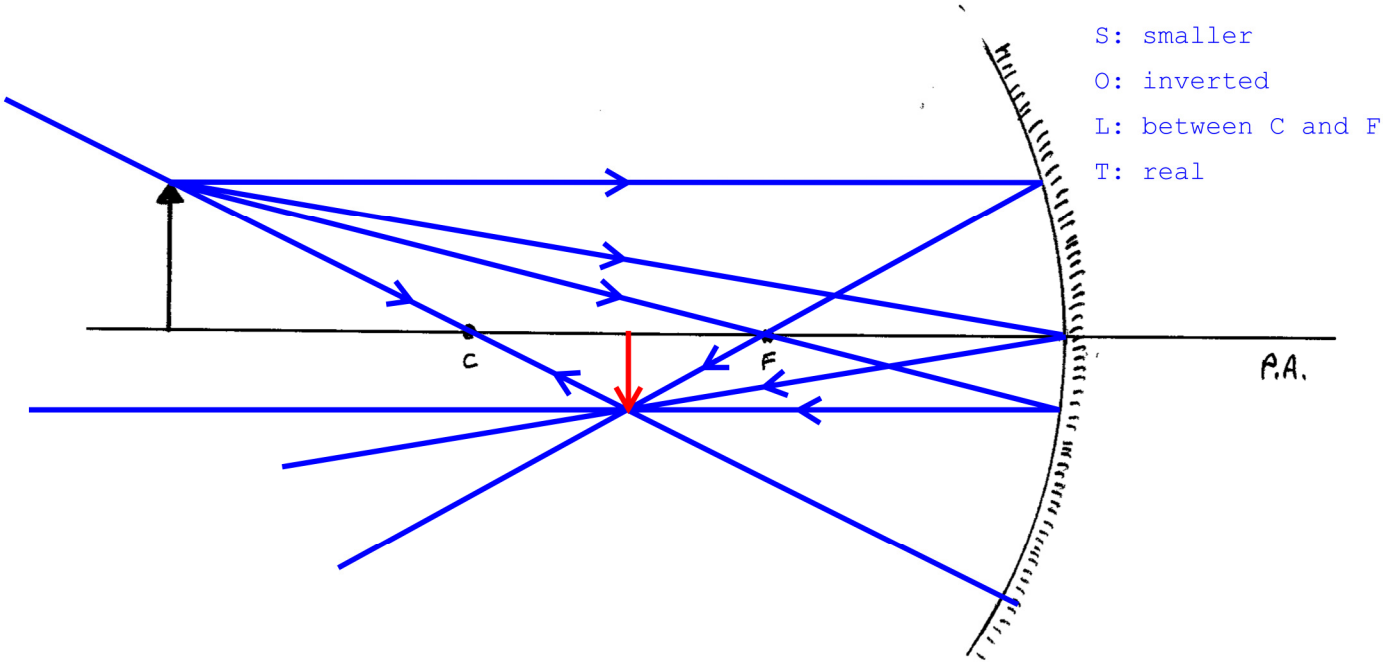




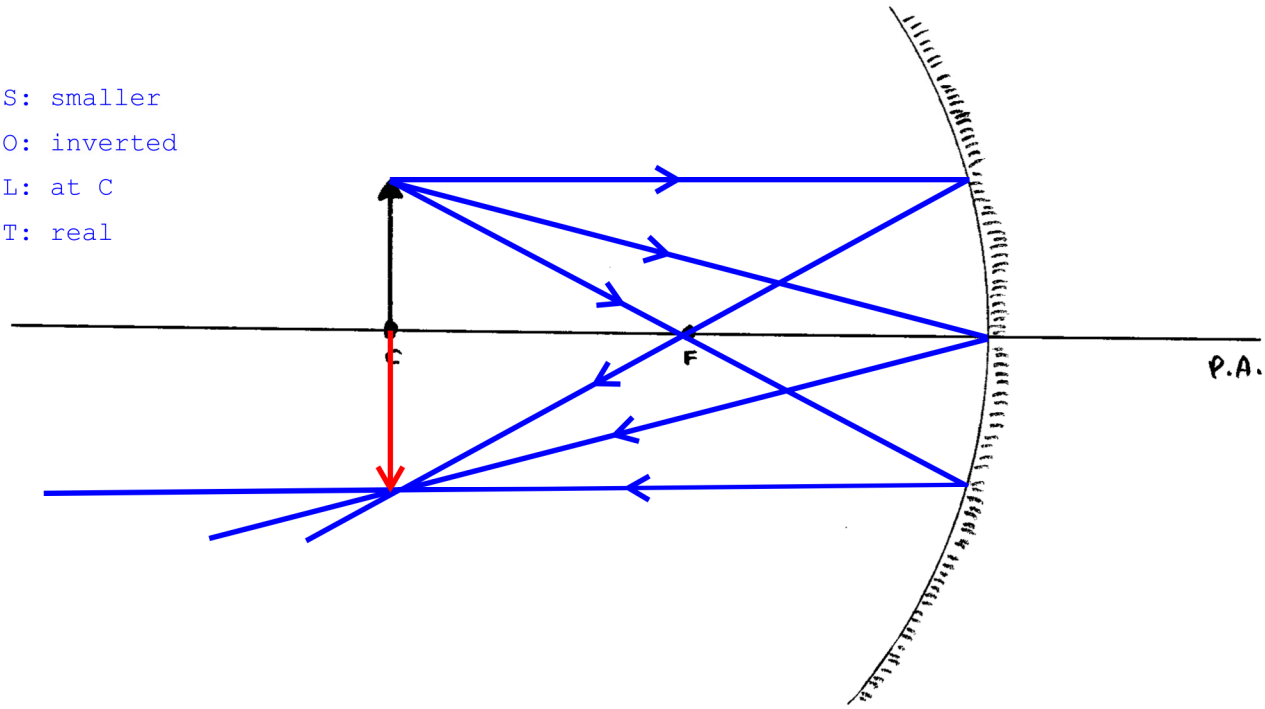
Name:_____

Concave Mirror Ray Diagrams

For each of the following objects, draw and locate the image using the four ray method. State the size, orientation, location and type for each image:



S: smaller
O: inverted
L: between C and F
T: real



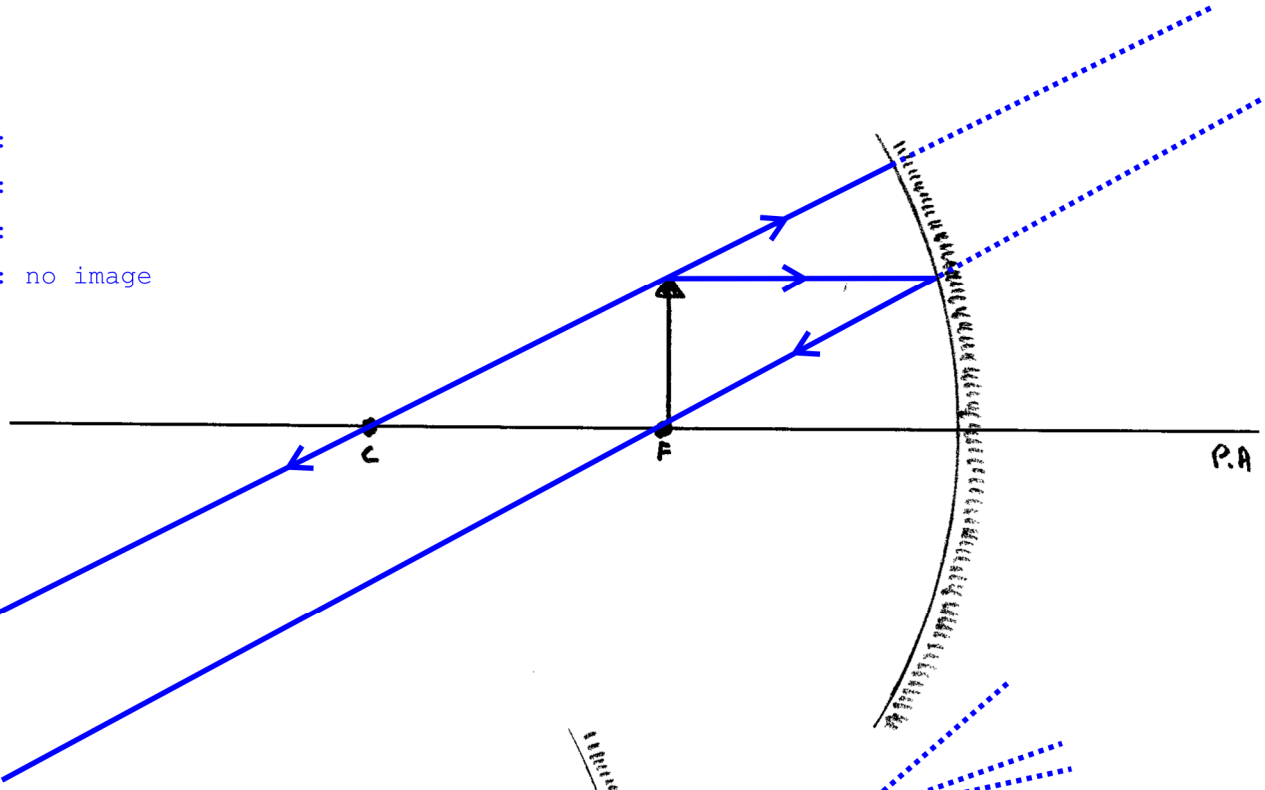
S: smaller
O: inverted
L: at C
T: real

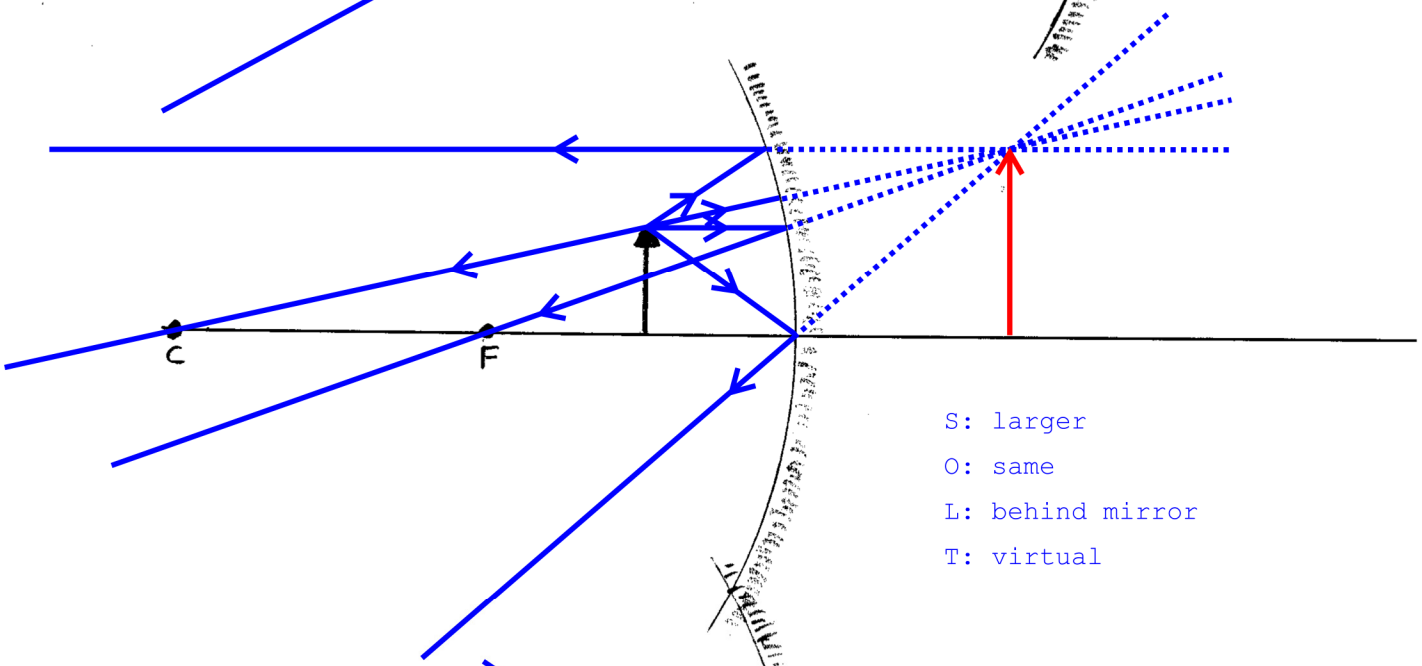
S:

O:

L:

T: no image





S: larger

O: same

L: behind mirror

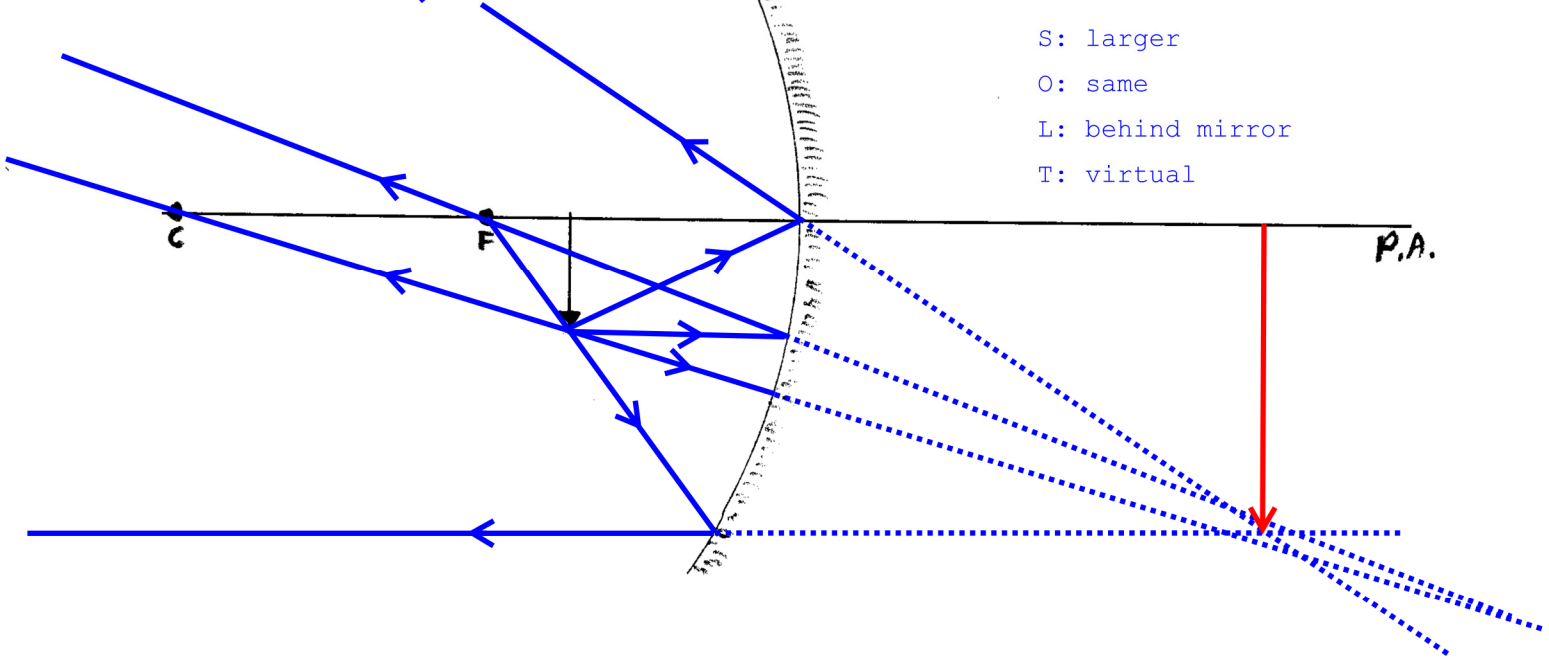
T: virtual

S: larger

O: same

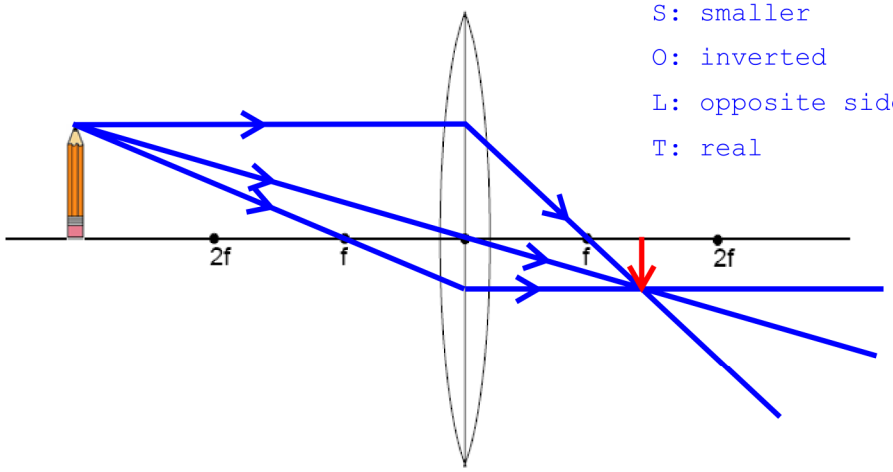
L: behind mirror

T: virtual



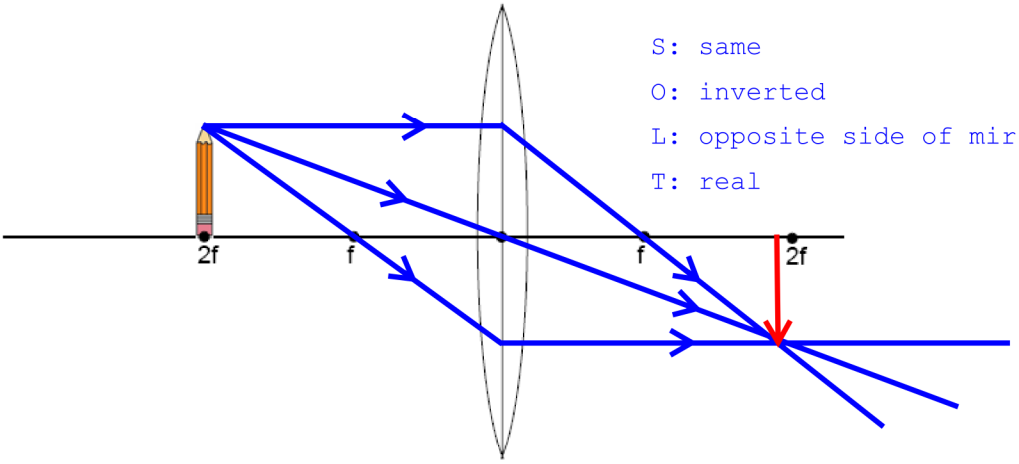
Converging & Diverging Lenses Ray Diagrams

(1)



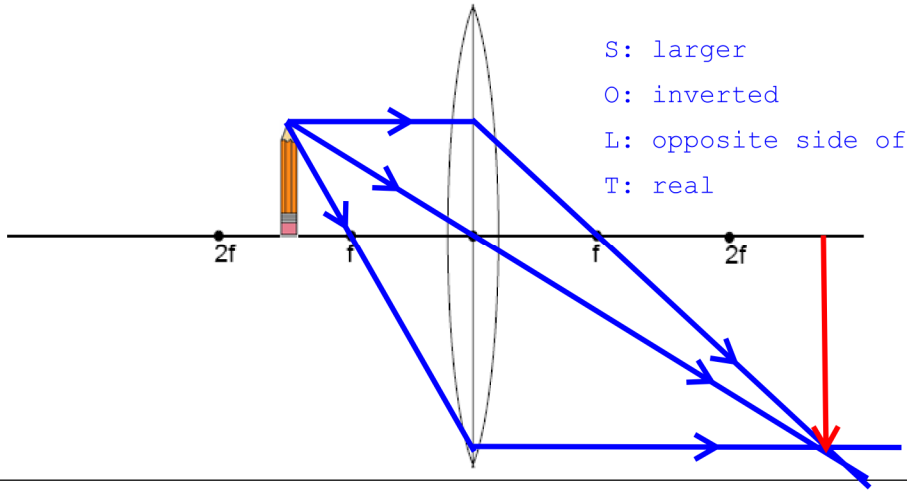
S: smaller
O: inverted
L: opposite side of mirror
T: real

(2)



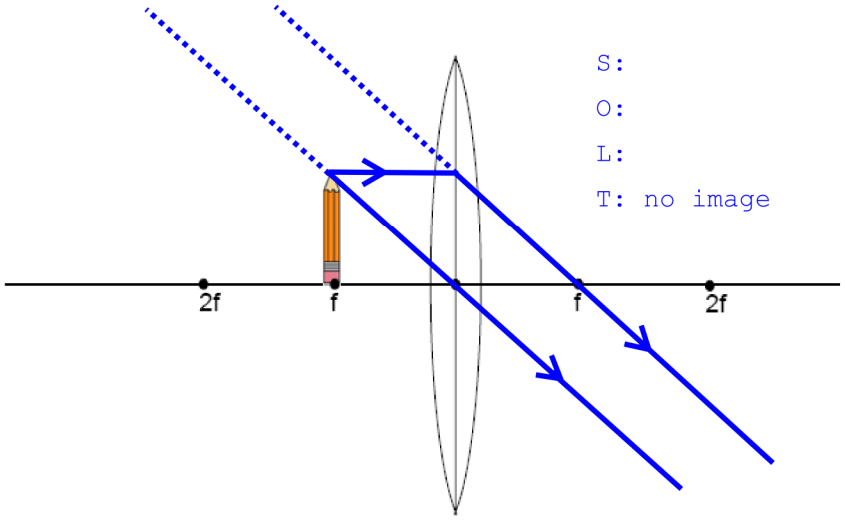
S: same
O: inverted
L: opposite side of mirror
T: real

(3)



S: larger
O: inverted
L: opposite side of mirror
T: real

(4)



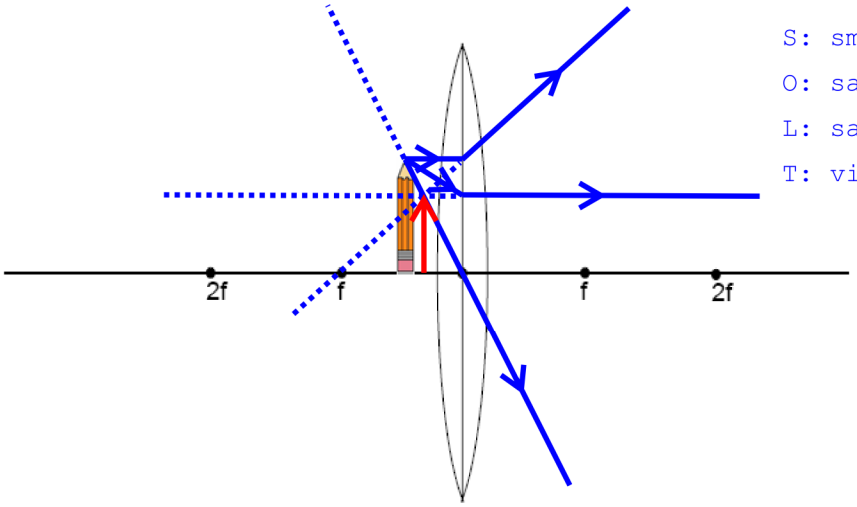
S:

O:

L:

T: no image

(5)



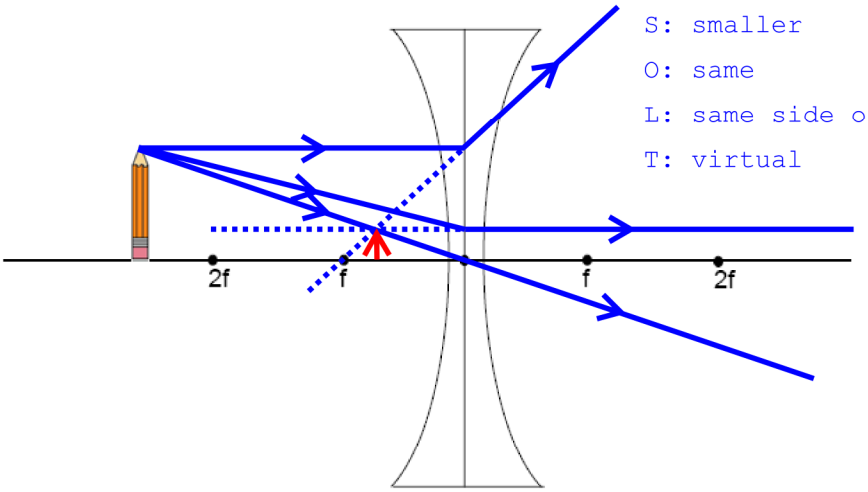
S: smaller

O: same

L: same side of lens

T: virtual

(6)



S: smaller

O: same

L: same side of lens

T: virtual