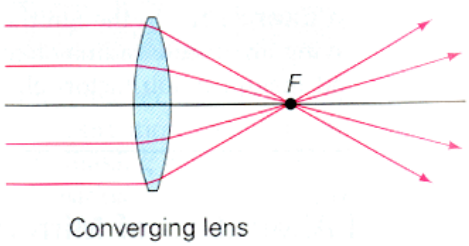
TELESCOPE LENS ACTIVITY

STEP 1: FILL IN THE BLANKS

Use the diagram on the right to help you fill the following phrases below:



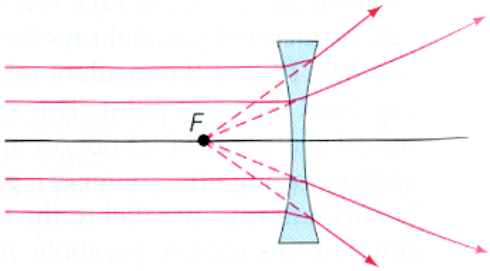
Converging lens

come together **~~converging~~** **diverging**

move apart **thicker** **thinner**

The two primary types of lenses are **converging** and _____. Converging lenses cause light rays to converge, or _____. Diverging lenses cause light rays to diverge, or _____.

Converging lenses are typically _____ Diverging lenses are typically _____ in the middle.



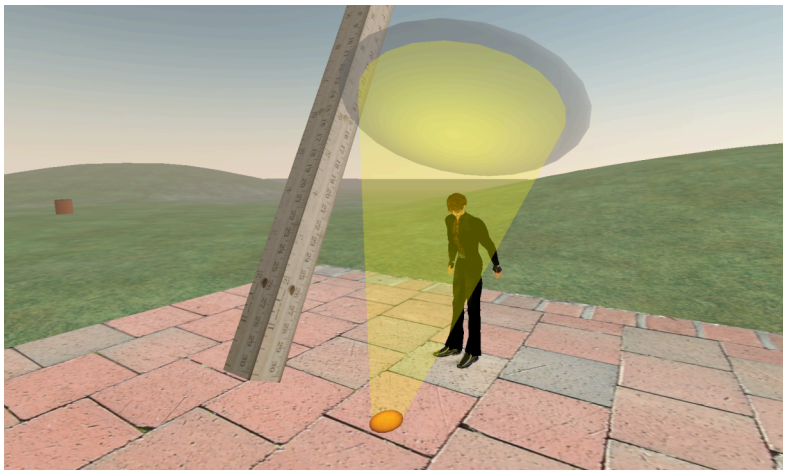
Diverging lens

STEP 2: MEASURE THE DIAMETERS

You will be given a bag of eight random lenses. Put a post-it note on each lens to label it A, B, C, D, etc.. Sort the lenses into two piles, ***converging*** **(+)** *or* ***diverging (-)****. Mark which type each is in the first column of the tables in the spreadsheet. Have each person in the group measure the* ***diameter*** *(in centimeters) of the lens and enter the values in the spreadsheet.*

STEP 3: MEASURE THE FOCAL LENGTHS

Determine the ***focal length*** *(in centimeters) of the converging lenses by holding them above the ground outside and focusing light rays to make an image of the Sun. The focal length is the distance from the middle of the lens (inside the glass) to the image of the Sun. Since it is awkward to use a ruler to measure that distance, you will likely have to estimate this by measuring the distance along the edge of the lens. Record these values in your spreadsheet.*



STEP 4. MAKE A SIMPLE TELESCOPE

Go back inside. Hold one converging lens close to your eye and another one at arm's length and try to look through both lenses at an object on the far side of the room. Move the far lens back and forth until the object comes into focus. Repeat this with the other converging lenses. When you find a combination that magnifies the size of distant objects, record the focal length of the near lens f_e*, the focal length of the far lens* f_o*, and the distance* L *between them. Are your measurements consistent with the prediction that* $L=f_o+f_e$? *Are the images you see right-side-up OR upside-down?*

TELESCOPE LENS SPREADSHEET

Group: _____

STEP 1: FILL IN THE BLANKS

The two primary types of lenses are **converging** and _____.

Converging lenses cause light rays to converge, or _____.

Diverging lenses cause light rays to diverge, or _____.

Converging lenses are typically _____ in the middle.

Diverging lenses are typically _____ in the middle.

STEP 2: MEASURE THE DIAMETERS

diameter (in cm)

	+ or -	trial #1	#2	#3	#4	Average
Lens A						
Lens B						
Lens C						
Lens D						
Lens E						
Lens F						
Lens G						
Lens H						

STEP 3: MEASURE THE FOCAL LENGTHS

focal length (in cm)

	+ or -	trial #1	#2	#3	#4	Average
Lens A						
Lens B						
Lens C						
Lens D						
Lens E						
Lens F						
Lens G						
Lens H						

STEP 4: MAKE A SIMPLE TELESCOPE

	f_{near}	f_{far}	f_{near} + f_{far}	distance between	Right-side up or upside down?
Pair 1					
Pair 2					
Pair 3					
Pair 4					
Pair 5					