BIRZEIT UNIVERSITY

Faculty of Science كلية العلوم

Department of Physics دائرة الفيزياء

Phys111 Report

Experiment #5: Focal Length of a Convex Lens

Name:	Bayan Saleem Alkamel	**ID #:**	1231030
Partner:		**ID #:**	
Section:	12		
Date:			

(1) Abstract:

- **Aim of the experiment:**

To find focal length of a convex lens.

- **The main result is:**
  - The focal length of the convex lens is $f = 80 \pm 1\ cm$

(2) Data:

	1.	2.	3.	4.	5.	6.
$u\ (cm)$	120	130	140	150	160	170
$v\ (cm)$	240	208	186	172	160	150
$1/u\ (cm)$	0.0083	0.0077	0.0071	0.0067	0.0062	0.0059
$1/v\ (cm)$	0.0042	0.0048	0.0054	0.0058	0.0062	0.0067

$\Delta u \approx 2cm$	$\Delta v \approx 2cm$	$f_{true} \approx 80cm$

(3)Calculations:

$\bar{u} = 145cm$	$\bar{v} = 186cm$	$\overline{\left(\frac{1}{u}\right)} = 6.983333333 \times 10^{-3} cm$	$\overline{\left(\frac{1}{v}\right)} = 5.516666667 \times 10^{-3} cm$

$$f_1 = 1/\, x_{intercept=} \frac{1}{12.8302 \times 10^{-3}} = 77.9411077cm \qquad f_2 = 1/\, y_{intercept=} \frac{1}{12.059 \times 10^{-3}} = 82.9256157cm$$

$$\bar{f} = \frac{f_1 + f_2}{2} = \frac{77.9411077 + 82.9256157}{2} = 80.43336171\ cm$$

$$\Delta\bar{f} \rightarrow \frac{\Delta\bar{f}}{f^2} = \frac{\Delta\bar{u}}{u^2} + \frac{\Delta\bar{v}}{v^2} \rightarrow \frac{\Delta\bar{f}}{(80.43336171)^2} = \frac{2}{(145)^2} + \frac{2}{(186)^2} \rightarrow \Delta\bar{f} = 0.989416927\ cm \approx 1$$

(4)Results:

- The focal length of the convex lens is $f = 80 \pm 1\ cm$

(5)Conclusions:

$f = 80 \pm 1\ cm$

Discrepancy test→ $|$True value - Exp.value$|$ ≤ 2ΔR

→ $|80 - 80|$ ≤ 2×1→ 0 ≤ 2 → **so, the result is accepted.**

The result is accepted, the value I measured is very close to the true value. Its due to many possible reasons:

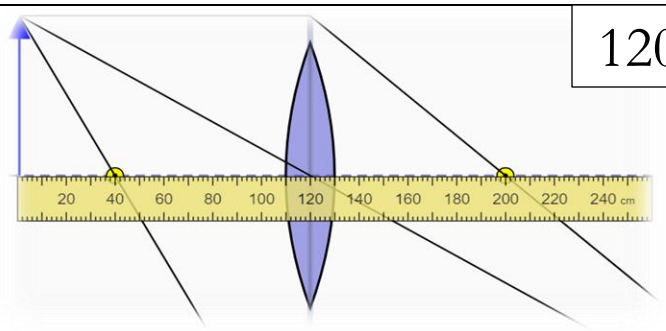
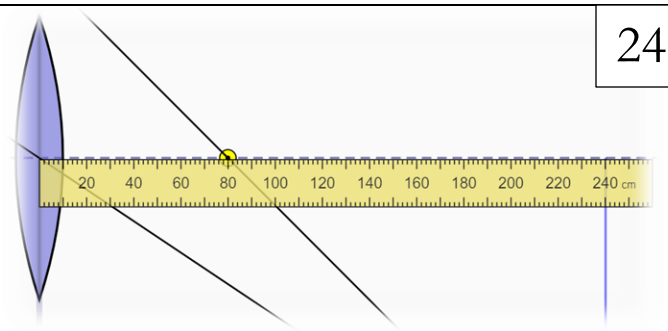
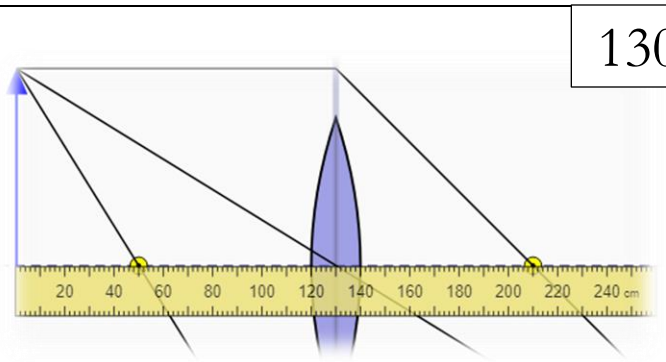
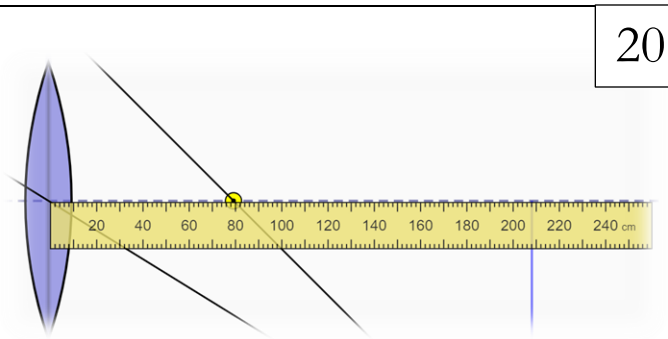
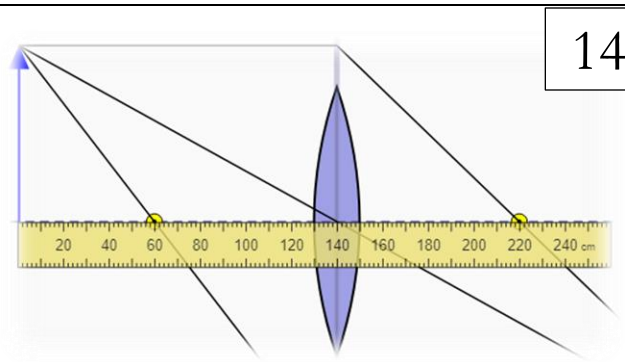
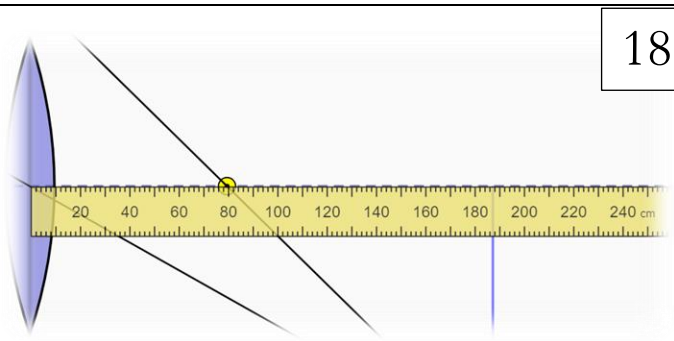
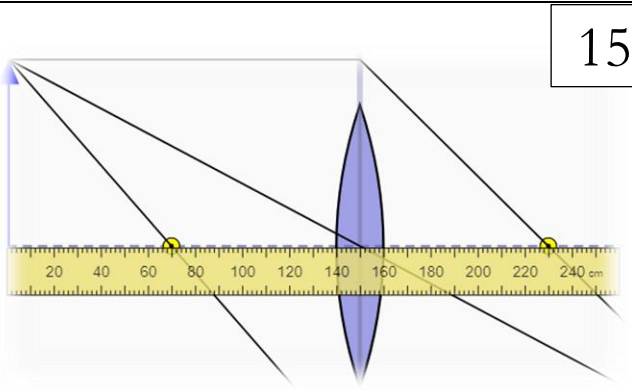
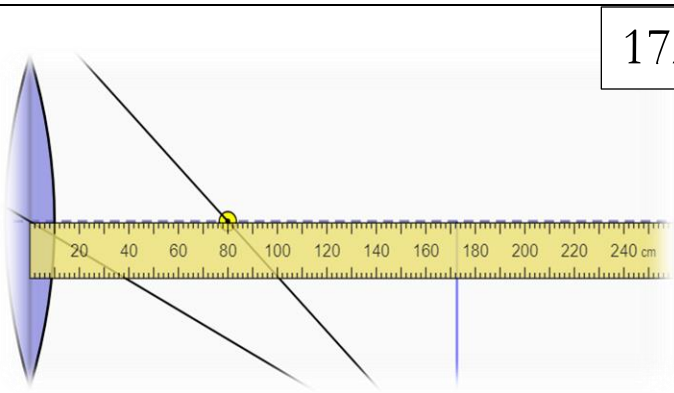
- **The method of taking measurements from the application is accurate**
- **I focused on taking measurements perfectly.**

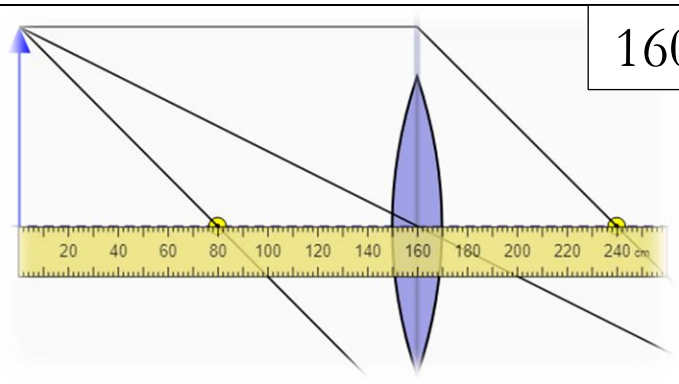
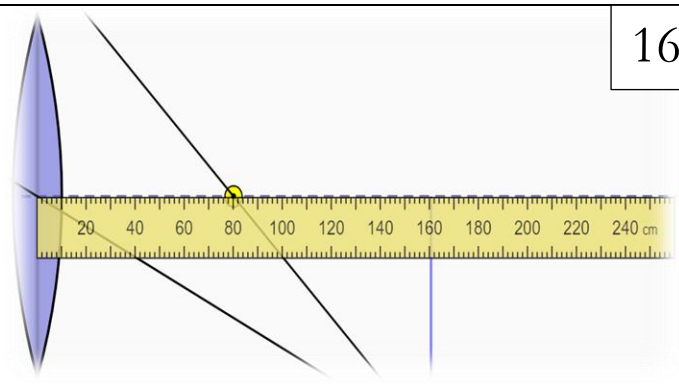
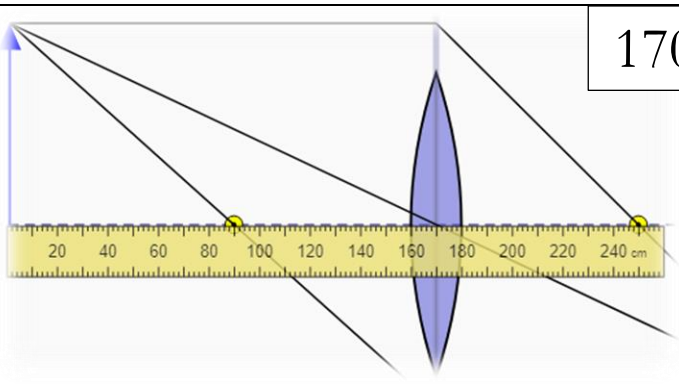
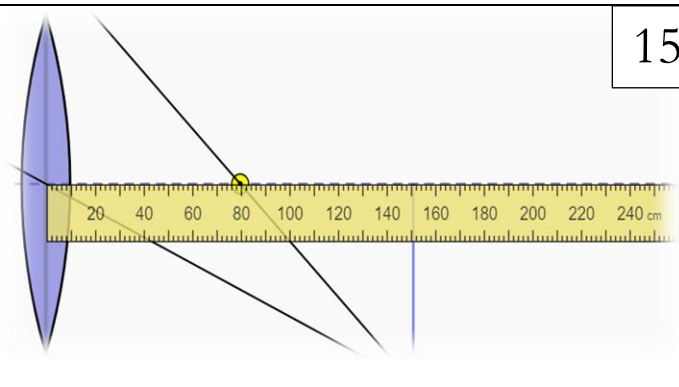
There are many mistakes that I could have made if I had not measured properly.

(Expected errors):

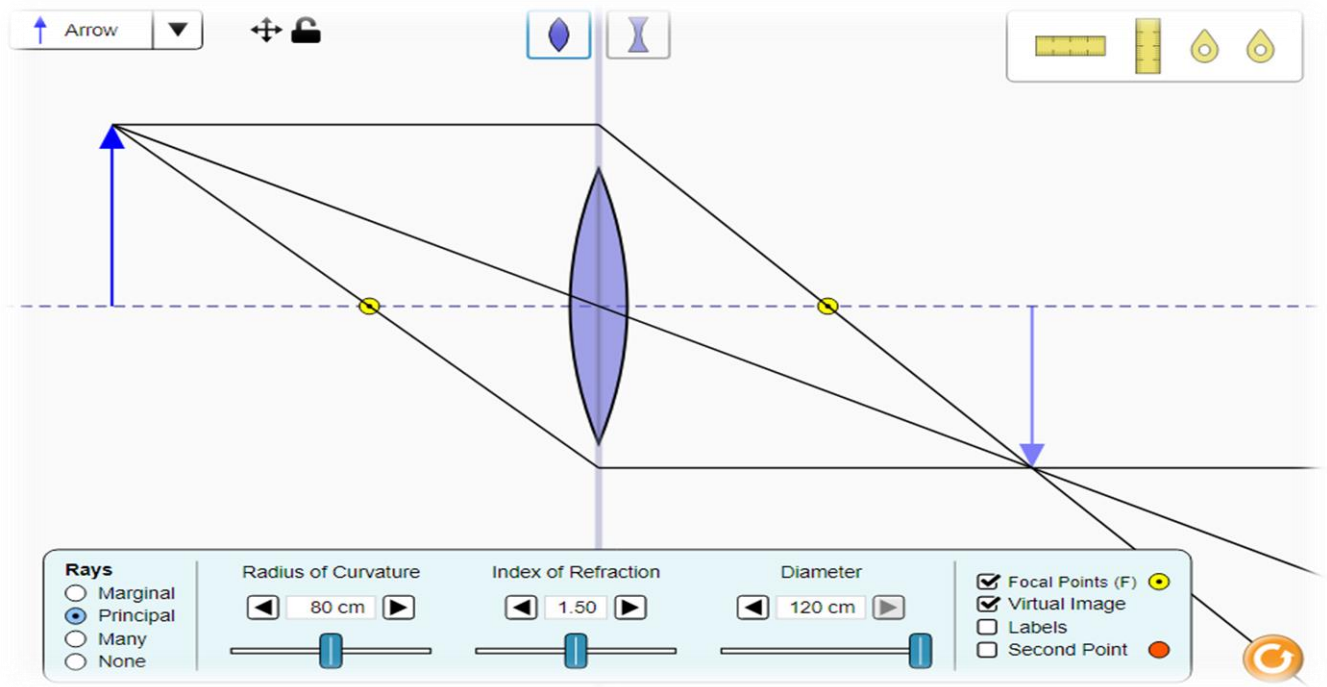
There are several possible causes of this error, including: The object was not placed at the assumed starting point, which leads to an error in the measurement. Some errors occurred in the zoom lens settings in the application, which leads to imperfect measurements

The result can be improved and made more accurate if we measure more accurately, fix the ruler in the right place, and pay attention to the lens settings in the electronic application.

	U	V
1	120 	240 
2	130 	208 
3	140 	186 
4	150 	172 

6  	160 
7  	170 
	150

Convex lens settings:



1/v (Vs) 1/u

f1(0,12.059)

f2(12.8302,0)