**Conclusion**

The experiments, with the exception of A1, yielded results which were “within the ballpark”, or general scope of agreement, with each other. The focal length of the concave mirror was found to be between 19 to 25 centimeters, and the focal length of the converging lens was found to be between 18 to 26 centimeters.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Type** |  |  |  |  | **Within Error Margin** |
| Concave  Mirror | A1 | 6 | 67% | 74% | NO |
| A2 | 19.5 | 3% | 16% | NO |
| A3 | 21 | 10% | 9% | YES |
| A4 | 23 | 10% | X | X |
| Converging  Lens | B1 | 26 | 2% | X | X |
| B2 | 21 | 3% | X | X |
| B3 | 19 | 6% | X | X |
| B4 | X | X | X | X |

The experiments with the greatest potential for accuracy also required the greatest attention to setup and precision. Referring to A2 and B1, great care was needed to ensure that the laser beams were parallel with each other as well as with the principal axis of the mirror/lens. Any deviation was a source of error. Other sources of error included misperception of when images came into best focus (methods A3, B2, B3) and misperception while comparing object and image size (method A1). These errors were accounted for by taking the delta of the maximum and minimum lengths at which the perceptual changes were barely noticeable.

As discussed in more detail in “Discussion Part A”, the “accepted” value for the focal length of the concave mirror, obtained in A4, had a 10% uncertainty. As such, the percent differences should only be regarded as percent difference with respect to technique A4 and not to an exact value. The experiment could be improved by having an exact accepted value provided for both the mirror and lens.

Technique B2 could be improved by using the Sun as the distant light source instead of a light bulb in order to ensure that the instance rays are parallel with the lens. (This would essentially be the same concept as a focused beam from a magnifying glass used by kids to burn leaves and ants.)