

INTRODUCTION

1. **(1 Point)** Watch videos, concepts 1-3 to become familiar with ray tracing modelling versus a purely mathematical modelling method.
2. **(1 Point)** General introduction, say a few words about: how a purely mathematical methodology differs from a purely geometric methodology when doing optical system's performance determinations. (Note: light is more accurately modelled as a wave and not a ray, WHY USE RAYS?)

EXERCISE 1

1. **(1 Point)** For SOFTWARE EXERCISE 1, download and open FRED; this is the name of the Optical Engineering software we will use.
2. **(1 Point)** For SOFTWARE EXERCISE 1, place two or more optical components (at a distance of your choosing), onto the optical axis. Roll and magnify the view of these objects in space from an angle and perspective somewhat or radically different than what I demonstrated. Use the SNIPPING TOOL (or any other method: such as the jpeg function found in the software tool bar) to copy and paste a picture of these objects onto the Word or PDF or Publisher document of your lab report.
3. **(1 Point)** For SOFTWARE EXERCISE 1, answer this: what color is the z-axis (the assumed optical axis) within this FRED software?

SCORE SHEET
RAY TRACING
LAB 9
13 points = 100%
Submitted by:

EXERCISE 2

1. **(1 Point)** For SOFTWARE EXERCISE **2**, download the zip version and extract/un-compress it and then open the file “Singlet finite Conjugate Ideal Lens.frd” within the FRED software.
2. **(1 Point)** For SOFTWARE EXERCISE **2**, snip and copy onto your lab report a picture of the GREEN RAYS’ focal point, similarly as I demonstrated with the red rays’ focal point.

EXERCISE 3

1. **(1 Point)** For SOFTWARE EXERCISE **3**, download and open the file “Singlet Finite Conjugate Thick Lens”.
2. **(1 Point)** For SOFTWARE EXERCISE **3**, place onto your lab report the pictures of both the GREEN RAYS’ and RED RAYS’ focal points similarly as I did.
3. **(1 Point)** For SOFTWARE EXERCISE **3**, answer this: name one difference between the ideal lens focal point, versus a real lens focal point.

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EXERCISE 4

1. (1 Point) For SOFTWARE EXERCISE **4**, download and open “Fan Rays”.
2. (1 Point) For SOFTWARE EXERCISE **4**, modify (use your intuition) to modify both optical sources, so that each of these fan ray sources are reduced to emitting only one ray.
3. (1 Point) For SOFTWARE EXERCISE **4**, place on your report a picture showing a single ray emitting out of both of these optical sources.

In case you are having difficulty doing this I can email to you directly these .frd files, just email to me a request to have these .frd files emailed directly to you.

In theory your computer should automatically extract and un-compress the .zip version of these file(s) found on the lab webpage, immediately after it downloads it (them) and then convert them (it) to the .frd format, thus (in theory) prompting FRED to operate if and when you attempt to open such a .frd file.

If you want to attempt to correct the problem (if you have one) before emailing me, I suggest looking in your download folder and or your program files (X86) folder. See if anything with an .frd extension can be found there or anywhere.

Another way to overcome an older computer's issue might be to purchase WINZIP (or get a free temporary version), which is a program that allows you to compress and decompress files unto and from .zip formats.