Look at the Latex file for deriving the equations

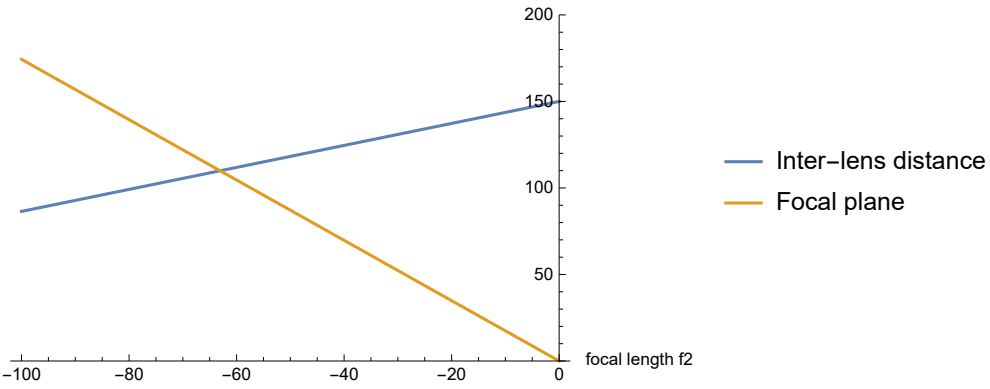
```
EFL[f1_, f2_, d_] := f1 f2 / (f1 + f2 - d) (*Effective focal length*)
FP[f1_, f2_, d_] := f1 f2 / (f1 + f2 - d) (1 - d / f1)
(*Focal plane wrt the second lens. Positive means on the right side of the lens*)
yim[f1_, f2_, d_, θ_] := f1 f2 / (f1 + f2 - d) θ (*Image height*)
```

Given f1, f2, θ, and the image height y, what is the inter-lens distance d?

```
d[f1_, f2_, θ_, y_] := f1 + f2 - f1 f2 θ / y (*Inter-lens distance*)
```

Where is the focal plane wrt the second lens?

```
f1 = 150;
θ = 1.04432 * π / 180; (*Incident angle. In the 'Beamsplitter parameter' nb,
look at the centered angle AT THE OBJECTIVE for beam No.1 = beam No.16*)
ymax = 15. / 2; (*Position of beam No.16 on the PMT wrt the symmetry axis. There
 are 16 channels with 15 interspaces of 1mm. Therefore, ymax = (16-1)/2 *)
Plot[{d[f1, f2, θ, ymax], FP[f1, f2, d[f1, f2, θ, ymax]]}, {f2, -100, 0},
 AxesLabel → {"focal length f2", ""}, PlotRange → {0, 200},
 PlotLegends → {"Inter-lens distance", "Focal plane"}]
(*conclusion: longer |f2|, shorter d, longer FP*)
```




```
f2 = -50;
Plot[{d[f1, f2, θ, ymax], FP[f1, f2, d[f1, f2, θ, ymax]]},
  {f1, 0, 200}, AxesLabel → {"f1", ""}, PlotRange → {0, 600},
  PlotLegends → {"Inter-lens distance", "Focal plane"}];
(*conclusion: longer f1, longer d, shorter FP*)
```

```
f2 = -50;
d[f1, f2, θ, ymax]
FP[f1, f2, d[f1, f2, θ, ymax]]
d[f1, f2, θ, ymax] + FP[f1, f2, d[f1, f2, θ, ymax]]
```

```
118.227
```

```
87.1605
```

```
205.387
```