


01/08/2016

PRISM

(Reverse) Calculations of Angle of Minimum Deviation $\angle \delta$ by Geometrical means

Assumptions Refractive Index of the Prism =1.5. (You can replace the RI ' μ ' with suitable number)

$\angle i$	$\sin i$	$\sin r =$ $(\sin i)/1.5$	$\angle r =$ $\sin^{-1} r$	$\angle j = 60 - \angle r$	$\sin j$	$\sin e = 1.5 \times \sin j$	$\angle e =$ $\sin^{-1} e$	$\angle \delta = \angle i + \angle e - 60$
10	0.1736	0.1157	6.64	53.36	0.8024	1.2036		
20	0.3420	0.228	13.18	46.82	0.7292	1.0938		
25	0.4226	0.2817	16.36	43.64	0.6901	1.0351		
30	0.5000	0.3333	19.47	40.53	0.6498	0.9747	77.1	47
35	0.5735	0.3823	22.48	37.52	0.6090	0.9135	65.99	41
40	0.6427	0.4285	25.37	34.63	0.5683	0.8524	58.47	38.47
45	0.7071	0.4714	28.15	31.85	0.5277	0.7915	52.32	37.32
50	0.7660	0.5107	30.71	29.29	0.4892	0.7338	47.20	37.2 
55	0.8191	0.5461	33.1	26.9	0.4524	0.6786	42.73	37.73
60	0.8660	0.5773	35.26	24.74	0.4185	0.6277	38.88	38.88
65	0.9063	0.6042	37.17	22.83	0.388	0.582	35.59	40.59
70	0.9396	0.6264	38.78	21.22	0.3619	0.5428	32.87	42.73
75	0.9659	0.6439	40.08	19.92	0.3407	0.5111	30.73	45.73
80	0.98481	0.6565	41.03	18.97	0.3251	0.4876	29.18	49.18
85	0.9961	0.6641	41.61	18.29	0.3138	0.4707	28.08	53.08
90	1.0000	0.6667	41.81	18.19	0.3122	0.4683	27.92	57.92

The Angle of Deviation $\angle \delta$ is minimum around

Angle of Incidence $\angle i = 48$ to 49 degrees and starts increasing again.

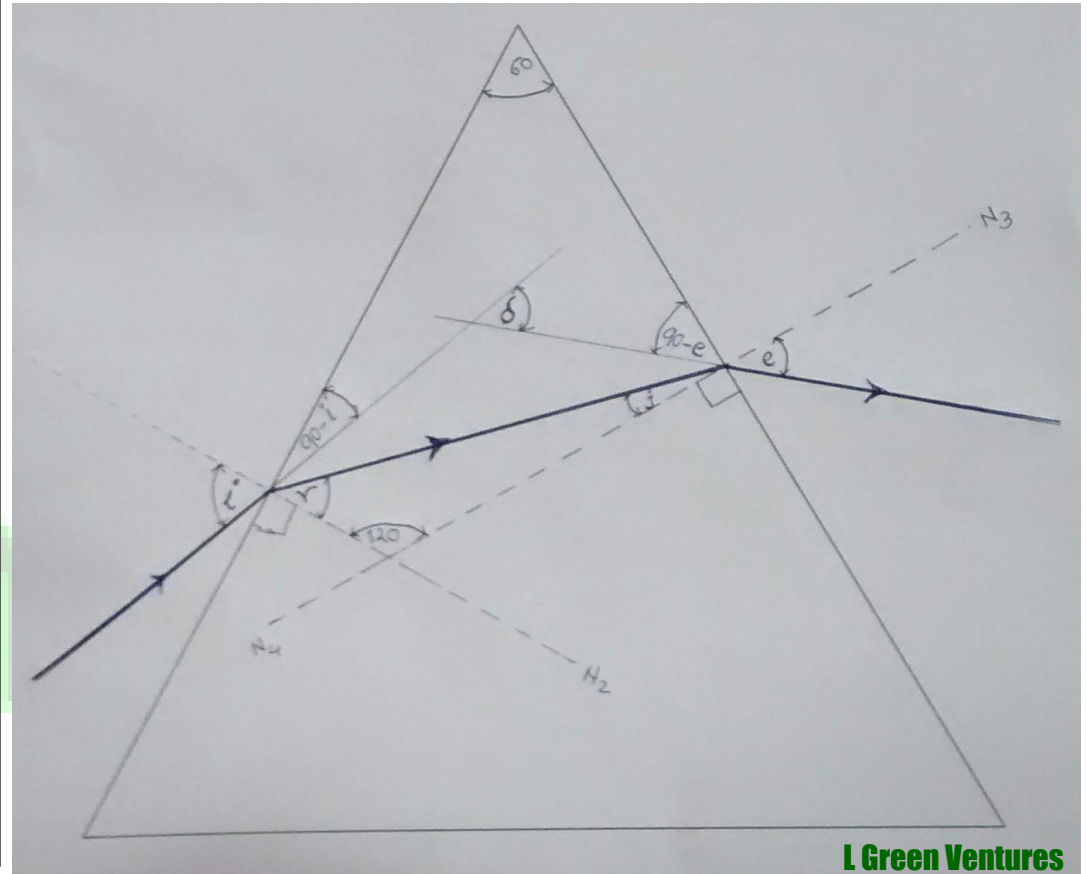
Therefore this Angle of Incidence is called as Angle for Minimum Deviation.

If noticed; this happens at $\angle i = \angle e$. And the refracted ray in the prism after first refraction is parallel to the base of the prism.

Assumptions Refractive Index of the Prism =1.5.
 (You can replace the RI ' μ ' with suitable number)

- 1) Start with angle of Incidence $\angle i$
- 2) Find out $\sin i$
- 3) $\sin r = (\sin i)/1.5$ {Law of Refraction}
- 4) Find out $\angle r = \sin^{-1} r$
- 5) $\angle j = 60 - \angle r$
- 6) Find out $\sin j$
- 7) $\sin e = 1.5 \times \sin j$ {Law of Refraction}
- 8) Find out $\angle e = \sin^{-1} e$
- 9) $\angle \delta = \angle i + \angle e - 60$ {Applying Geometry}

$$\angle \delta = \angle i + \angle e - 60$$



The Angle of Deviation $\angle \delta$ is minimum around Angle of Incidence $\angle i = 48$ to 49 degrees and starts increasing again. Therefore this Angle of Incidence is called as Angle for Minimum Deviation. If noticed; this happens at $\angle i = \angle e$. And the refracted ray in the prism after first refraction is parallel to the base of the prism.