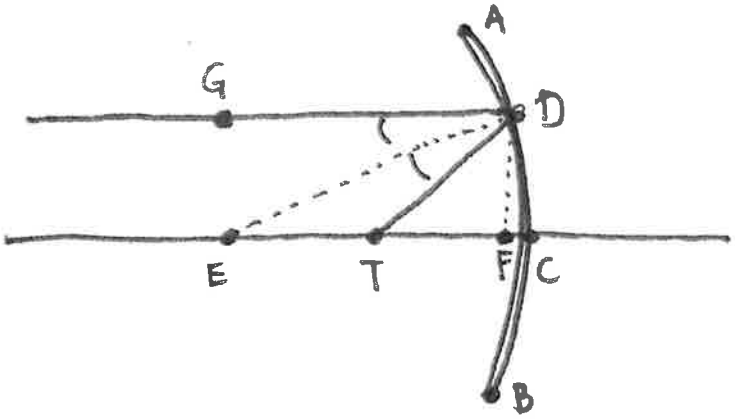
ASG vol 3

Ex 12.6 (Focal length of a spherical mirror)



a) Since $\overline{DE}$ is the radius of curvature of the mirror, it is perpendicular to the surface. By the law of reflection, $\boxed{\measuredangle GDE = \measuredangle EDT}$

b) Since ~~$\measuredangle GDF = 90°$~~, $\overline{GD} \parallel \overline{EF}$, $\measuredangle DTF = \measuredangle GDT$

or $\boxed{\measuredangle DTF = 2\measuredangle EDT}$

c) $\tan(\measuredangle DEF) = \overline{DF}/\overline{EF}$ and

$\tan(\measuredangle DTF) = \overline{DF}/\overline{TF}$ but for small angles $\measuredangle DEF$,

$\tan(\measuredangle DEF) = \measuredangle DEF \approx \measuredangle GDE = \frac{1}{2}\measuredangle DTF$

or $\dfrac{\overline{DF}}{\overline{EF}} = \frac{1}{2}\measuredangle DTF = \frac{1}{2}\dfrac{\overline{DF}}{\overline{TF}}$

or $\overline{EF} = 2\overline{TF}$ but for rays near the axis, $\overline{FC} \sim 0$

so $\boxed{\overline{EC} = 2\overline{TC}}$