

OPTICS.

or Reflections.

tre is C, and focus of parallel rays is at P; and let the imaginary focus of the incident rays be as F, a point between P and B, and let DR be the reflected ray. From C and R draw the lines CH, RH, the one passing through D, the other parallel to FE. Then will the angle RHD be equal to HDD the angle of incidence, as alterant to is; and therefore equal to HDD, the angle of reflection is reflected the triangle HDR is indicated, and consequently DR is equal to RH. Now the lines FD and RH being parallel, the complex DDC and RHD are similar; and therefore RH/ or RD, is to PD as CR on CF: but BD vanishing, RD and FD coincide with RB and IB, whether RF is to TR as CR in CF; that is, the distance of the focus from the surface is to the distance of the imaginary focus of the incident rays, at the distance of the focus from the centre is to the distance of the imaginary focus of the incident rays from the fame. __@E.D.__

Cass. Of diverging rays falling upon a concave surface, and corresponding from a point between the focus of parallel rays and the surface.

Dass. Let ED and FB represent two diverging rays flowing from the point 3 as a radiant, which was the imaginary focus of the incident rays in the foregoing case. Then an SD as in the case selected with an DR, FD will be reflected into DR, (for the reason unmentioned in Case the second), so that the reflected ray will proceed as from the point 3, but it can be demonstrated in the case manufacturing forceing, that RB is to FB as CR to CF; that is, the distance of the focus from the surface is to that of the radiant from the fame, as the distance of the former from the centre is to that of the latter from the fame. __@E.D.__

Cass 7. Of converging rays falling upon a convex surface, and including towards a point beyond the centre.

Dass. Let AB, ED, (fig. 8) be the incident rays tending to F, a point beyond the centre C, and let DR be the reflected ray of the incident one ED. Then because the incident ray ED tend to a point beyond the centre, the reflected ray DR will proceed as from one on the contrary to, suppose 2 as as related above under Drop, VII. Through D draw the perpendicular CD, and produce it to H. Thus will EDH and HDD be the angles of incidence and reflections, while being equal, their vertical ones of DF and CDR will be so to cases constantly the vertex of the triangle FDR and bisected by the line CD+ wherefore, RD is to DF, or (3 Elements) BD vanishing, RB is to DF as RC to CF; that is, the distance of the focus of the reflected rays is to that of the imaginary focus of the incident rays, as the distance the lower from the center is to the distance of the latter from the fame. __@E.D.__

Cass 8. Of diverging rays falling upon a concave surface, and proceeding from a point beyond the centre.

Dass. Let FB, ED, be the incident rays having their radiant in F, the imaginary focus of the incident rays in the foregoing case. Then an ED was in that case reflected into DR, (FD will now be reflected into DR; so that R will be the focus of the reflected rays. But it was demonstrated in the foregoing case, that RB is to FB as

RC to CF; that is, the distance of

the focus of the reflected rays from the surface is to the distance of the radiant from the fame, as the distance of the focus of the reflected rays from the centre is to the distance of the radiant from thence. __@E.D.__

The two remaining cases may be confirmed as the converse of those under Prop. II. (p. 548-), because the incident rays in there are the reflected ones in them; or they may be demonstrated in the same manner with the foregoing, as follows.

Cass 9. Converging rays falling upon a convex surface, and tending to the surface of parallel rays, become parallel after reflection.

Dass. Let ED, RB, (fig. 8) reported two convergency rays inside to the convex surface, and tending towards F, which we will now suppose to be the focus of parallel rays; and let DR be the reflected ray and Cash center of curvature of the reflecting surfaces. Through C draw the line CD, and produces to FR, drawing ARH parallel to ED produced to F. Now it has been demonstrated Case 7 when the incident rays are supposed to tend to the point Y, that RB is to FB as RC to CF; but F in the Case being supposed to be the focus of parallel rays, it is the middle point between C and B (by proposition all), and therefore FB and FC are equal and constantly the two outer corners in the proportion, viz. RB and RC, with fe toto; which can only be upon a supposition that R is at an infinite distance from B; that is, that the reflected ray DR and DR be parallel. __@E.D.__

Cass to Diverging rays falling upon a concave surface and proceeding from the focus of parallel rays, become parallel after reflection.

Dass. Let AD, EB, BB (fig. 6) be two diverging rays incident upon the concave surface BD, as supposed in Case 4; where it was demonstrated that FB is to RB as CF to OR, then in the present each RB and CR are equal, because R is supposed to be the focus of parallel rays; therefore FB and FC are so too. Which cannot be under F be taken as the nature of distance from B; that is, and the reflected rays BF and DF be parallel. __@E.D.__

It is here observable, that in the case of diverging rays falling upon a convex surface, (see fig. 7) the further the point it is taken from B, not never the point F, the focus of the reflected rays, approaches to B, while the radiant R remains the same. For is evident from the curvature of events, thus the point D (fig. 9) may be taken so far from B, that the reflected ray DE finally proceed as from F, G, H, or even from B, or from points between B and R; and the further is it taken from B, the further the point from which it proceeds, approaches toward R is will easily appear if we suppose incident rays with that respective reflected ones, in fashion than that angles of reflection may be all equal to their reflecting angles of incidence as at those in the figure. The fact is applicable to any of the other cases of diverging or converging rays incident upon a spherical surface. That is the reason, that when rays are considered as reflected from a spherical surface, the distance of the oblique rays from the perpendicular one is taken to [all, that it may be supposed to vanish.

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