Focusing Sun's rays to a point by a spherical-mirror

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Abstract

We show in this short communication, a proof without words, for the proposition that: If a parabolic-mirror focuses, by reflection, Sun's rays parallel to its axis at a unique point, viz., its focus, then it necessarily follows that a spherical-mirror too, does so. That is, a spherical-mirror focuses, by reflection, Sun's rays parallel to its axis at a unique point, viz., its center. The point is also known as the 'Burning point of the mirror'.

Key Words: Reflection, Parabolic-mirror, Spherical-mirror, Focusing, Burning point of a mirror

Introduction

It is a well known fact that a parabolic mirror focuses Sun's rays parallel to its axis at a unique point, viz., its focus but it is impossible for a spherical-mirror to focus Sun's rays parallel to its axis at a unique point In this communication we prove, without words, that it is possible to focus Sun's rays parallel to its axis at a unique point.

Proposition

If a parabolic-mirror focuses, by reflection, Sun's rays parallel to its axis at a unique point, viz., its focus, then it necessarily follows that a spherical-mirror too, does so. That is, a spherical-mirror focuses, by reflection, Sun's rays parallel to its axis at a unique point, viz., its center.

Proof without words

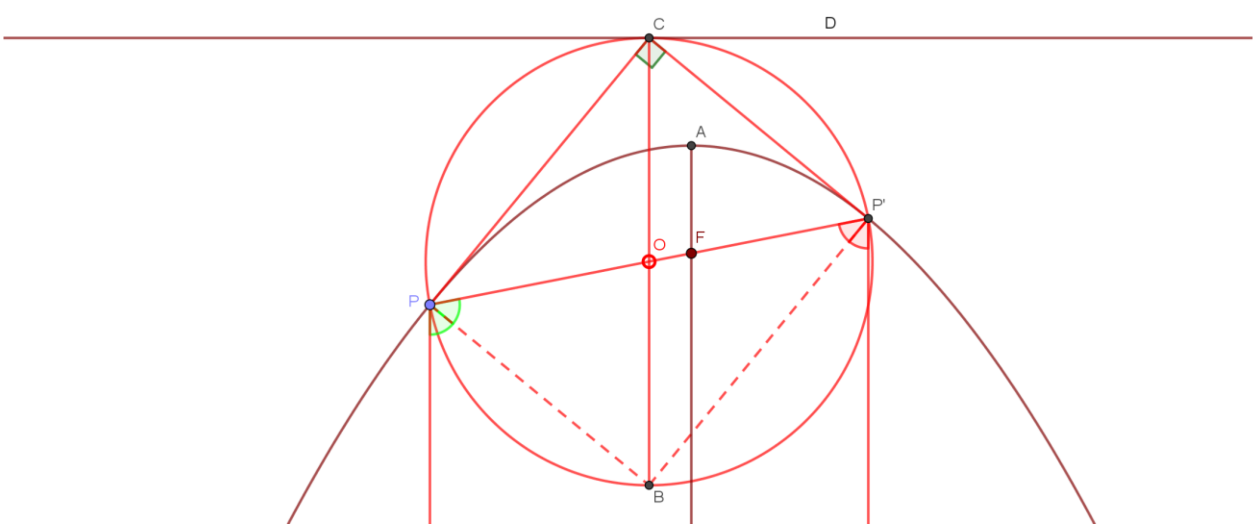

Fig. 1. PCP' is an arbitrary parabola. D is its directrix; F, the focus; A, the apex and AF, the axis. PP' is an arbitrary focal chord. PC, P'C are the tangents to the parabola at P, P' intersecting at the point C on the directrix. The lines through P, P' parallel to the axis are the incident rays of light from the Sun. The reflected rays pass along the line PF. The circle is drawn with P P' as diameter. O is the center of the circle. CB is the axis of the spherical mirror.

Note: A Survey of literature[1-7] shows that it had been proven that it was impossible to focus Sun's rays at a unique point (sometimes called the 'Burning point of the mirror'), using a spherical mirror. It came to be accepted as a true result and is used in books and rsarch today. Our proof above disproves it. Falsification of such an accepted result could lead to new theoretical results and results of practical significance in communications, defense and other fields. Our result is in accordance with the result of Euclid and Ptolemy.

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