# On the tangent lines on two circles

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## Abstract

This article examines the geometric problem of finding two lines that are simultaneously tangent to two given circles and intersect between them, and also two lines that are simultaneously tangent to two given cirles and intersect at a certain distance from those two circles. This classical problem has applications in *geometry*, *optics*, and *mechanics*. We derive precise mathematical conditions for the existence and positions of these common tangents using analytical and geometric methods.

The inspiration for this research comes from *Aristarchus of Samos*' work *On the Sizes and Distances of the Sun and Moon*[1]. While studying this treatise to understand celestial distances, I realized that its geometric principles could be applied to a mechanical problem I was investigating. This connection led to the present study on common tangents to two circles, demonstrating how ancient mathematical insights can inform modern geometric inquiries.

## References

[1] Aristarchus of Samos. *On the Sizes and Distances of the Sun and Moon.* Camillus Francischinus, Pesaro, 1572. With explanations by Pappus Alexandrinus, Latin translation and commentary by Federico Commandino.