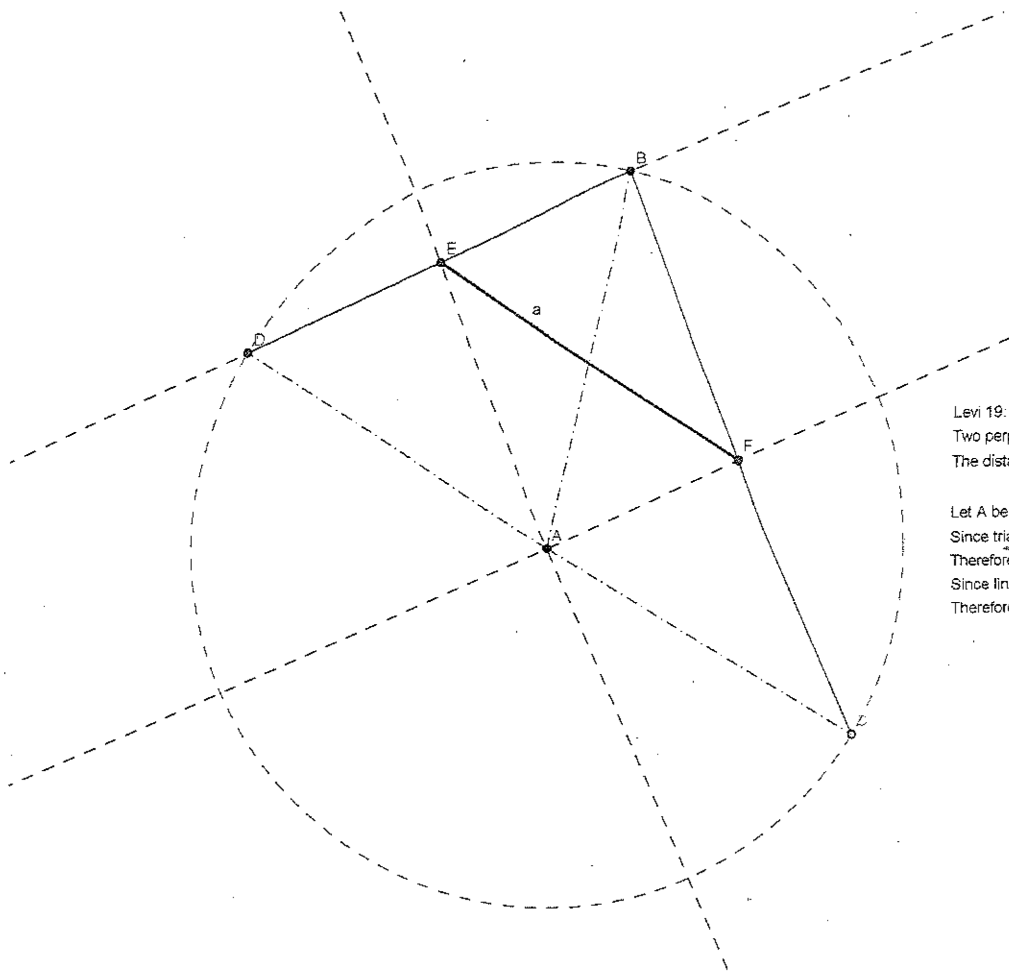


Levi 19:

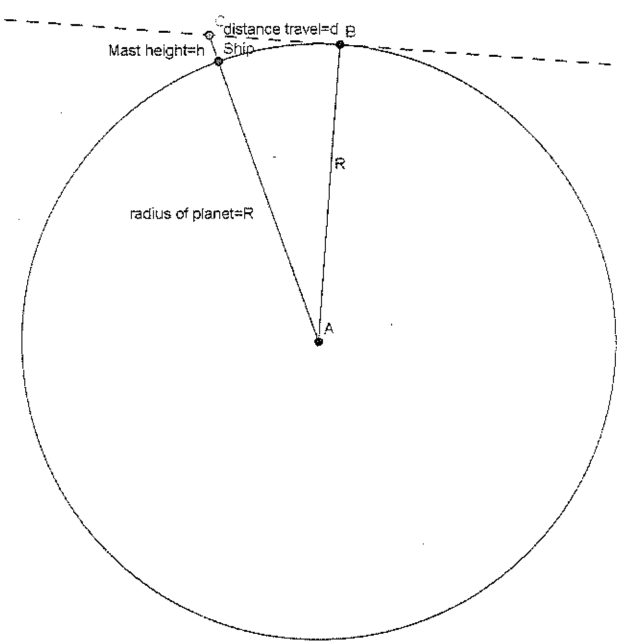
Two perpendicular chords are drawn from a point on a circle. The point will be B and the other end point of the chords will be C and D.

The distance between the midpoints of the chords, E and F, is a. Find the diameter of the circle.

Let A be the point of intersection between the perpendicular bisectors of the two perpendicular chords.
Since triangles DBA and BCA can both be broken into two congruent triangles by the perpendicular bisectors, legs DA, BA, and CA must all be equal.
Therefore point A is the center of the circle and the length of line segments AD, AB, and AC are equal to the radius.
Since line segments EF and AB both are hypotenuses of triangles with legs equal to AE and AF, they must be equal.
Therefore the radius is equal to a and the diameter is equal to 2a.

beautifully done!

How do you know they



Problem 4.2. To compute the earth's radius from the mast of a sailing ship.

You are on a strange planet on an islad with your crew and your sailing ship. Its mast is 50 meters above sea level. You have some of the crew sail the ship directly towards the setting sun. Its mast completely disappears over the horizon when it is 2 kilometers away. What is the radius of the planet?

Assume the planet is spherical.

Let h be the mast's height , d the distance sailed and R the planet's radius.

Draw a picture of the situation, marking R, h, and d on your diagram.

Let h be the mast's height , d the distance sailed and R the planet's radius.

Let θ be angle CAB.

Since θ is extremely small, the small angle approximation shows that line segment BC is approximately equal to d.

By the pythagorean therom, $R^2+d^2=(R+h)^2$.

After subtracting R^2, $d^2=h(h+2R)$.

Solving for R, $(d^2/h-h)/2=R$.

The planets radius therefore is equal to $(2000^2/50-50)/2=39{,}975$ meters. ✓

4.2 | 5+
19 | 5+ ← nice!

Greg Geitner