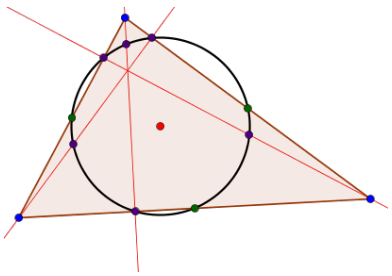
Euclidean Geometry:
An Introduction to Mathematical Work

Math 3600

Spring 2015



More Content

The following are come challenging tasks having to do with the theory of equal content. The first two are important to us. The rest are opportunities to show off.

14.1 Problem. Given two rectangles, P and R, construct a square S so that, when taken together the content of R and S is equal to the content of P.

14.2 Problem. Use the theory of content to give a new proof of the midline theorem, Theorem 3.6.

14.3 Challenge. Given a line ℓ and given two points A and B not lying on ℓ, construct a circle passing through A and B and tangent to ℓ.

14.4 Challenge. Given two lines ℓ and m and a point P not on either line, construct a circle through P and tangent to both ℓ and m.

14.5 Conjecture. Let ABC be a triangle, $\overleftrightarrow{DE}$ a line parallel to the base BC, and F the midpoint of segment DE, where D lies on ray AB and E lies on ray AC. Let AF meet BC at G. Then G is the midpoint of BC.

14.6 Conjecture. Let Γ be a circle with center O. Let A be a point outside the circle, and AB and AC tangents to Γ from A, with B, C lying on Γ. Let BC meet OA at D. Then the rectangle on OA and OD has equal content with the square on OB.

14.7 Conjecture. Let ABC be a right triangle with right angle at A. Let AD be the altitude from A to side BC. The square on side AD has equal content with the rectangle on BD and DC.

14.8 Conjecture. Let ABC be a triangle and D a point on side BC. Let E be the midpoint of BC and draw the parallel to AD through E. Let this new line meet the union of AB and AC at a point F. Then the segment DF cuts the triangle into two polygons of equal content.