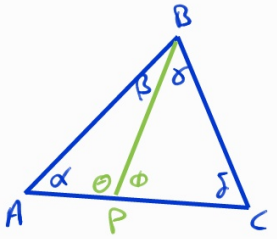
Recall: angle sum for any hyperbolic triangle is $< 180°$ $(S < 180°)$

Def: The defect D of a (hyperbolic) triangle is:

$$D = 180 - S$$

SWBQ: · Draw triangle
· Label angles
· Write expression for D
· Divide into 2 triangles
· Repeat above for each
· Add defects



$$D(\Delta ABP) = 180 - (\alpha + \beta + \theta)$$
$$+ \quad D(\Delta BCP) = 180 - (\gamma + \delta + \phi)$$
$$360 - (\alpha + \beta + \gamma + \delta + \theta + \phi)$$
$$= 180 - (\alpha + \beta + \gamma + \delta)$$
$$= D(\Delta ABC)$$

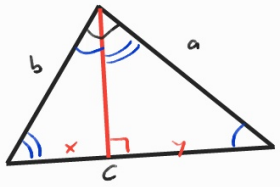
∴ Thm: Defects add!

Corollary: $D(\Delta ABC) > D(ABP)$

(since $S < 180 \Rightarrow D > 0$)

Pythagorean Theorem

(Euclidean Geometry)



$$\frac{x}{b} = \frac{b}{c} \Rightarrow b^2 = xc$$

$$\frac{y}{a} = \frac{a}{c} \Rightarrow a^2 = yc$$

$$\Rightarrow a^2 + b^2 = (x+y)c = c^2$$

Pythagorean Theorem (4.4.8)

uses: AAA similarity ← uses $A = \frac{1}{2}bh$, which is SMSG 20

Σ angles $= \pi$ ← parallel postulate

AAA Congruence

(hyperbolic geometry)

Suppose not. Then no sides match
(else ASA)
Thus, 2 sides must be larger: