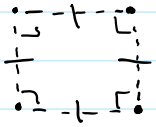
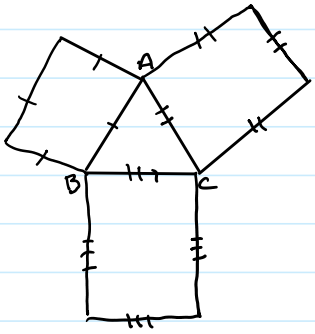
Lecture 14

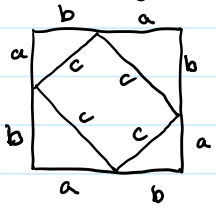
Saturday, February 10, 2024 10:40 AM

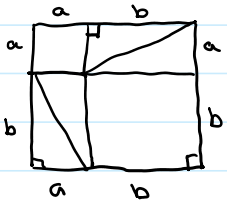
I-46: Given a line segment, construct a square on it.



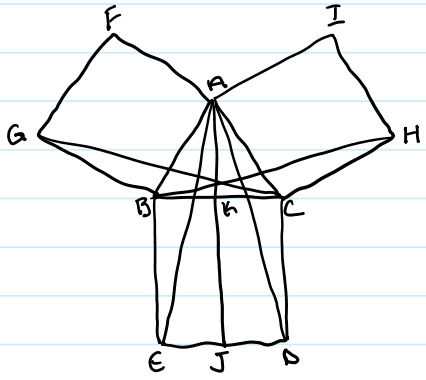


I-47: (pythagoream Theorem)  $a^2 + b^2 = c^2$





$\therefore\ a^2 + b^2 = c^2$

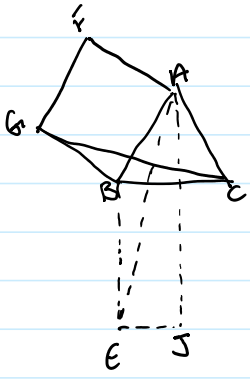


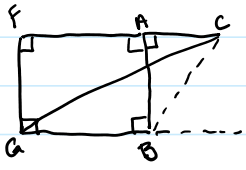
Proof: **Step 1**: $\angle GBC = \angle ABE$ (both are $\angle$ + $\angle ABC$) and $\angle ACD = \angle HCB$ (both are $\angle$ + $\angle ACB$)

Step 2: (S-A-S $\cong$)

$\triangle GBC \cong \triangle ABE$ and $\triangle ACD \cong HCB$

Step 3:





area (ABGF) = 2 area ($\triangle$CBG)

similarly, area (ACHI) = 2 area ($\triangle$BCH)

= 2 area ($\triangle$ACD)

= area (CDJK)

= 2 area ($\triangle$ABE)

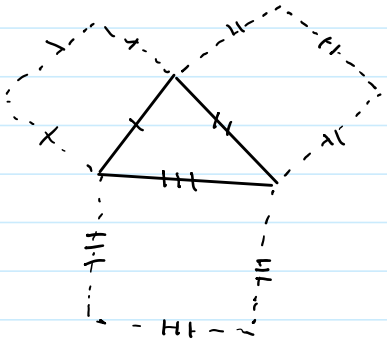
= area (BEJK)

Step 4: area (ABGF) + area (ACHI)

= area (BEJK) + area (CDJK)

= area (BCDE)

I-48) Converse of the pythagorean theorem

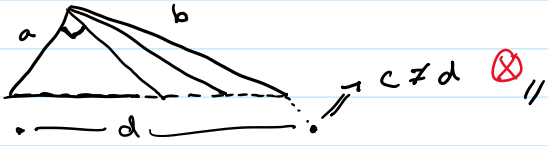


$a^2+b^2=c^2$

=> you have a right angle opposite

Suppose not, Build a right triangle with short sides a and b...

=>



$c^2 = a^2 + b^2 = d^2$ (by I-47)

=> $c = d$