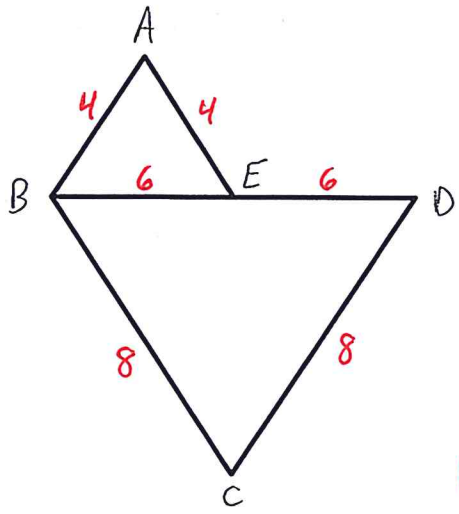
Geometric Proofs

Emphasis on Similarity by Side – Side - Side

Prove each of the following using Side –Side - Side:

1. **Given:** AB = 4, BE = 6, AE = 4
   CB = 8, ED = 6, CD = 8

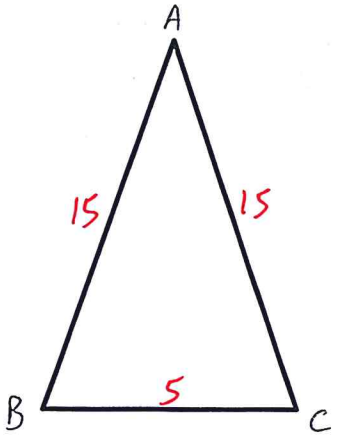
Prove: Δ ABE ~ Δ CBD

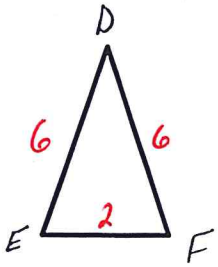


Statements	Reasons
① $AB = 4;\ BE = 6;\ AE = 4$ $CB = 8;\ ED = 6;\ CD = 8$	① Given.
② $\frac{AB}{CB} = \frac{4}{8} = \frac{1}{2}$	② ÷ T/B by 4
③ $\frac{AE}{CD} = \frac{4}{8} = \frac{1}{2}$	③ ÷ T/B by 4
④ $\frac{BE}{BD} = \frac{6}{12} = \frac{1}{2}$	④ ÷ T/B by 6
⑤ $\frac{AB}{CB} = \frac{AE}{CD} = \frac{BE}{BD} = \frac{1}{2}$	⑤ Transitive Prop.
⑥ $\Delta ABE \sim \Delta CBD$	⑥ SSS.

2. **Given:** BC = 5, AC = 15, AB = 15
   FE = 2, DF = 6, DE = 6

Prove: Δ DEF ~ Δ ABC

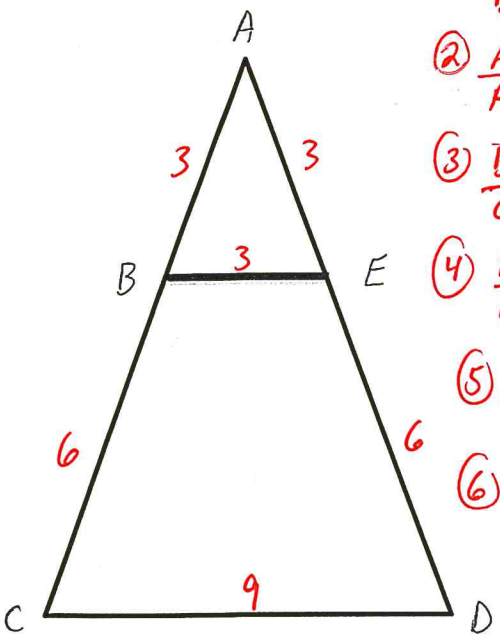




Statements	Reasons
① $BC = 5;\ AC = 15;\ AB = 15$ $FE = 2;\ DF = 6;\ DE = 6$	① Given.
② $\frac{DE}{AB} = \frac{6}{15} = \frac{2}{5}$	② ÷ T/B by 3
③ $\frac{DF}{AC} = \frac{6}{15} = \frac{2}{5}$	③ ÷ T/B by 3
④ $\frac{EF}{BC} = \frac{2}{5}$	④ Already Reduced.
⑤ $\frac{DE}{AB} = \frac{DF}{AC} = \frac{EF}{BC} =$	⑤ Transitive Property
⑥ $\Delta DEF \sim \Delta ABC$	⑥ SSS.

3. **Given:** AB = 3, AE = 3, BE = 3
BC = 6, ED = 6, CD = 9

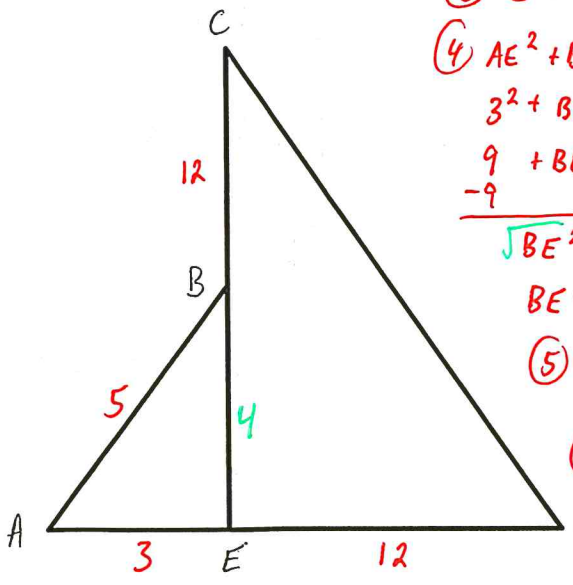
Prove: Δ ABE ~ Δ ACD



Statements	Reasons
① $AB = 3$; $AE = 3$; $BE = 3$; $BC = 6$; $ED = 6$; $CD = 9$	① Given.
② $\frac{AB}{AC} = \frac{3}{9} = \frac{1}{3}$	② ÷ T/B by 3
③ $\frac{BE}{CD} = \frac{3}{9} = \frac{1}{3}$	③ ÷ T/B by 3
④ $\frac{AE}{AD} = \frac{3}{9} = \frac{1}{3}$	④ ÷ T/B by 3
⑤ $\frac{AB}{AC} = \frac{BE}{CD} = \frac{AE}{AD} = \frac{1}{3}$	⑤ Transitive Property
⑥ $\Delta ABE \sim \Delta ACD$	⑥ SSS.

4. **Given:** $\overline{CE} \perp \overline{AD}$
AE = 3, AB = 5
DE = 12, CB = 12

Prove: Δ CDE ~ Δ BAE



Statements	Reasons
① $\overline{CE} \perp \overline{AD}$; $AE = 3$; $AB = 5$; $DE = 12$; $CB = 12$	① Given.
② $\angle AEB$ & $\angle DEC$ are Rt $\angle$'s	② Def $\perp$
③ ΔAEB & ΔDEC are Rt Δ's.	③ Def Right. Δ
④ $AE^2 + BE^2 = AB^2$; $3^2 + BE^2 = 5^2$; $9 + BE^2 = 25$; $-9 \quad -9$; $\sqrt{BE^2} = \sqrt{16}$; $BE = 4$	④ Pythagorean Theorem
$DE^2 + CE^2 = CD^2$; $12^2 + 16^2 = CD^2$; $144 + 256 = CD^2$; $\sqrt{400} = \sqrt{CD^2}$; $20 = CD$	
⑤ $\frac{CD}{BA} = \frac{20}{5} = \frac{4}{1}$	⑤ ÷ T/B by 5
⑥ $\frac{DE}{AE} = \frac{12}{3} = \frac{4}{1}$	⑥ ÷ T/B by 3
⑦ $\frac{CE}{BE} = \frac{16}{4} = \frac{4}{1}$	⑦ ÷ T/B by 4
⑧ $\frac{CD}{BA} = \frac{DE}{AE} = \frac{CE}{BE} =$	⑧ Transitive Property
⑨ $\Delta CDE \sim \Delta BAE$	⑨ SSS