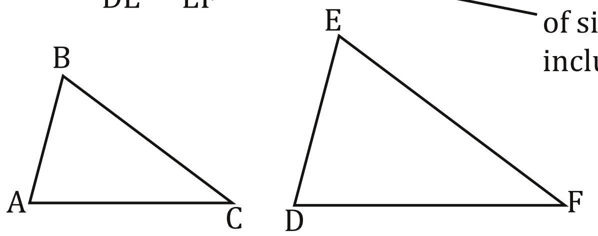
Proofs Involving Similar Triangles

We all look the same, don't we?

Okay, so if you can do proofs involving congruent triangles, then proving triangles are similar will be a piece of cake. Why? Because they are basically the same except we are proving that the triangles are exactly the same shape but different sizes. Remember for similarity we have the SSS, SAS, and AA (and AAA) theorems. There is a notation thing with similarity. The way that most proofs demonstrate that two pairs of sides have the same ratio is to write them as in the following example...

Given: $\frac{AB}{DE} = \frac{BC}{EF}$, $\angle B \cong \angle E$

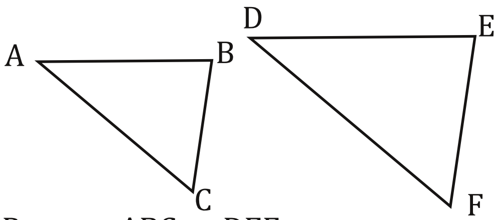
This means that $\overline{AB}$ and $\overline{DE}$ have the same ratio of similarity as $\overline{BC}$ and $\overline{EF}$. (Combined with the included angles gives us SAS similarity.)



Ready? Let's do some more analysis and then practice....

AE. 1.

Given: $\frac{AB}{DE} = \frac{AC}{DF} = \frac{BC}{EF}$



Prove: △ABC~△DEF

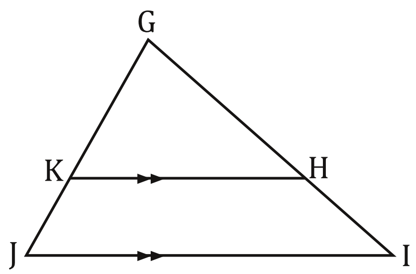
Statements	Reasons
1. $\frac{AB}{DE} = \frac{AC}{DF} = \frac{BC}{DF}$	1. Given
2. △ABC~△DEF	2. SSS

Analysis:

Working backward we must ask the key question. "How can we show two triangles are similar?" The answer? Use a similarity property such as SSS, SAS, or AA (AAA). That leads us to B1: by one of these properties. But which one? We need to start working forward. We see we have given AB/DE, AC/DF, and BC/EF. This gives us △ABC~△DEF by SSS, which is B1, and the proof is complete!

AE. 2.

Given: JI∥KH



Prove: △JGI~△KGH

Statements	Reasons
1. JI∥KH	1. Given
2. ∠J≅∠GKH	2. Corresponding Angles
3. ∠I≅∠GHK	3. Corresponding Angles
4. △JGI~△KGH	4. AA

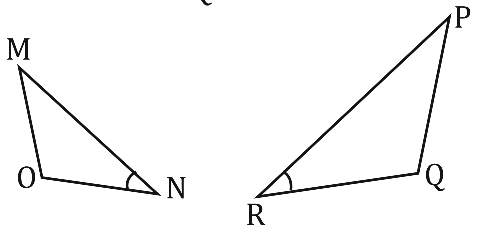
Analysis:

Working backward we must ask the key question. "How can we show two triangles are similar?" The answer? Use a similarity property such as SSS, SAS, or AA (AAA). That leads us to B1: △JGI~△KGH by one of these properties. But which one? We need to start working forward. Parallel lines... and when we see parallel lines we should look for corresponding angles or alternate interior angles. We see we have the corresponding angles ∠J≅∠GKH, and ∠I≅∠GHK. This gives us △JGI~△KGH by AA, which is B1, and the proof is complete!

Write an analysis of each proof below.

1. Given: $\frac{MN}{PR}=\frac{ON}{QR}$, $\angle N \cong \angle R$

Analysis:



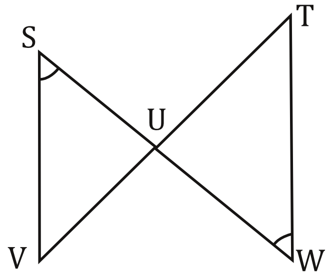
Prove: $\triangle MNO \sim \triangle PQR$

Statements	Reasons
1. $\frac{MN}{PR}=\frac{ON}{QR}$	1. Given
2. $\angle N \cong \angle R$	2. Given
3. $\triangle MNO \sim \triangle PQR$	3. SAS

2.

Given: $\angle S \cong \angle W$

Analysis:



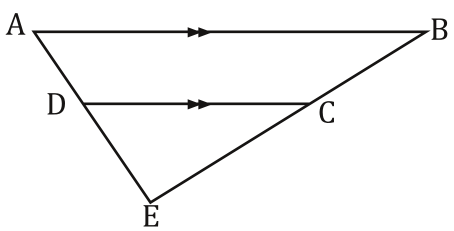
Prove: $\triangle SUV \sim \triangle TUW$

Statements	Reasons
1. $\angle S \cong \angle W$	1. Given
2. $\angle SUV \cong \angle WUT$	2. Vertical Angles
3. $\triangle SUV \sim \triangle TUW$	3. AA

3.

Given: $AB \parallel DC$

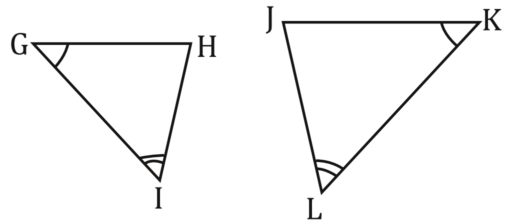
Analysis:



Prove: $\triangle ABE \sim \triangle DCE$

Statements	Reasons
1. $AB \parallel DC$	1. Given
2. $\angle A \cong \angle CDE$	2. Corresponding Angles
3. $\angle B \cong \angle DCE$	3. Corresponding Angles
4. $\triangle ABE \sim \triangle DCE$	4. AA

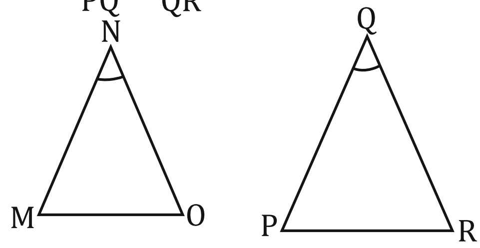
4. Given: $\angle G \cong \angle K$, and $\angle I \cong \angle L$



Prove: $\triangle GHI \sim \triangle KJL$

Statements	Reasons
1. $\angle G \cong \angle K$	1.
2.	2. Given
3. $\triangle GHI \sim \triangle KJL$	3.

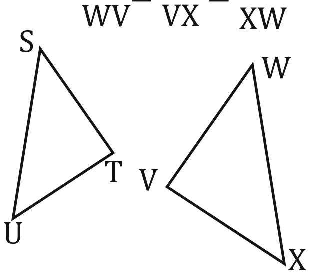
5. Given: $\frac{MN}{PQ} = \frac{NO}{QR}$, $\angle N \cong \angle Q$



Prove: $\triangle MNO \sim \triangle PQR$

Statements	Reasons
1. $\frac{MN}{PQ} = \frac{NO}{QR}$	1.
2.	2. Given
3. $\triangle MNO \sim \triangle PQR$	3.

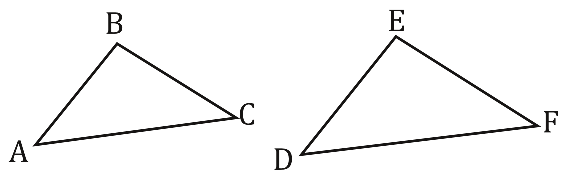
6. Given: $\frac{ST}{WV} = \frac{TU}{VX} = \frac{US}{XW}$



Prove: $\triangle STU \sim \triangle WVX$

Statements	Reasons
1.	1. Given
2.	2. SSS

7. Given: $\frac{AB}{DE} = \frac{BC}{EF} = \frac{AC}{DF}$

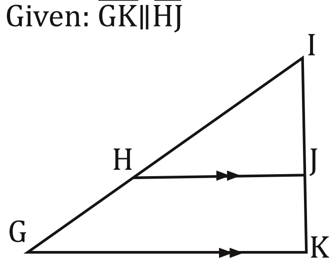


Prove: $\triangle ABC \sim \triangle DEF$

Statements	Reasons
1.	1. Given
2. $\triangle ABC \sim \triangle DEF$	2. SSS

8.

Given: $\overline{GK} \parallel \overline{HJ}$

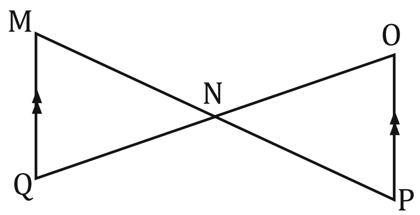


Prove: $\triangle GIK \sim \triangle HIJ$

Statements	Reasons
1.	1. Given
2.	2. Corresponding Angles
3. $\angle G \cong \angle JHI$	3.
4. $\triangle GIK \sim \triangle HIJ$	4.

9.

Given: $\overline{MQ} \parallel \overline{OP}$

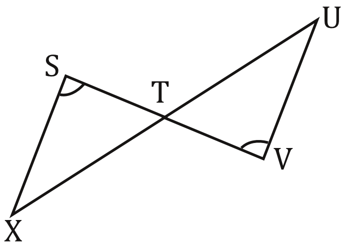


Prove: $\triangle MNQ \sim \triangle PON$

Statements	Reasons
1.	1. Given
2. $\angle QMN \cong \angle OPN$	2.
3.	3. Vertical Angles
4. $\triangle GIK \sim \triangle HIJ$	4.

10.

Given: ∠S≅∠V

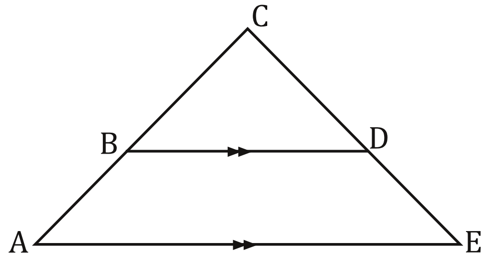


Prove: △STX~△VUT

Statements	Reasons
1.	1. Given
2. ∠STX≅∠UTV	2.
3. △GHI~△KJL	3.

11.

Given: $\overline{AE} \parallel \overline{BD}$

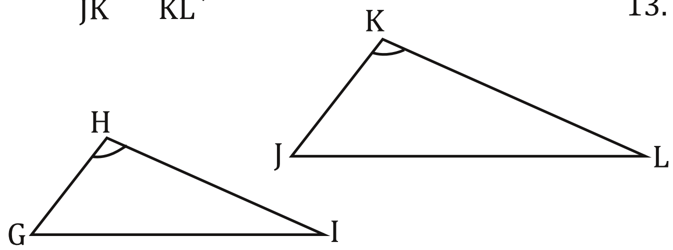


Prove: △ACE~△BCD

Statements	Reasons
1. $\overline{AE} \parallel \overline{BD}$	1.
2.	2. Corresponding Angles
3.	3.
4.	4. AA

12.

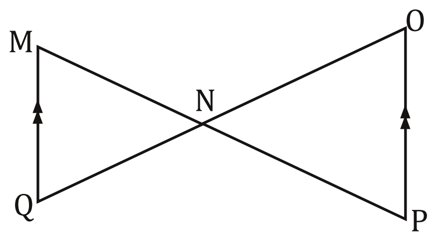
Given: $\frac{GH}{JK} = \frac{HI}{KL}$, ∠H≅∠K



Prove: △GHI~△JKL

Statements	Reasons
1.	1. Given
2.	2. Given
3. △MNO~△PQR	3.

13. Given: $\overline{MQ} \parallel \overline{OP}$

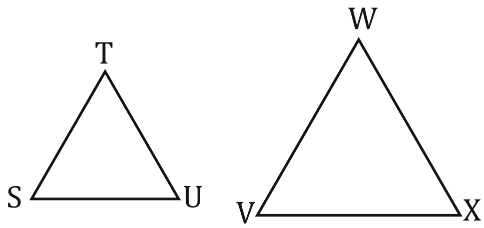


Prove: △MQN~△OPN

Statements	Reasons
1. $\overline{MQ} \parallel \overline{OP}$	1.
2. ∠QMN≅∠OPN	2.
3.	3. Alternate Interior
4. △MQN~△OPN	4.

14.

Given: △STU and △VWX are equilateral.

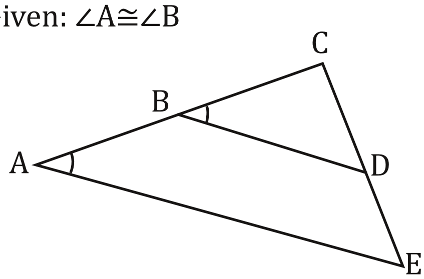


Prove: △STU~△VWX

Statements	Reasons
1. ∠S≅∠V	1. Def of Equilateral Triangles
2. ∠T≅∠W	2.
3. ∠U≅∠X	3.
4.	4. AAA

15.

Given: ∠A≅∠B

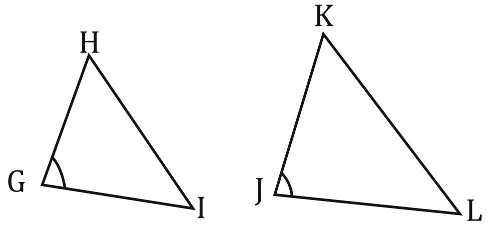


Prove: △ABE~△BCD

Statements	Reasons
1.	1. Given
2. ∠C≅∠C	2.
3. △GHI~△KJL	3.

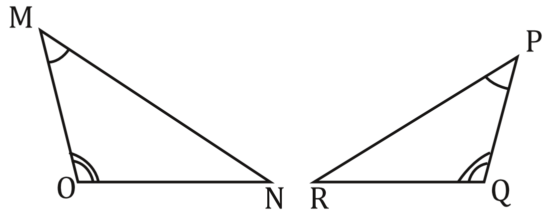
16.

Given: $\frac{GH}{KJ} = \frac{GI}{JL}$, $\angle G \cong \angle J$



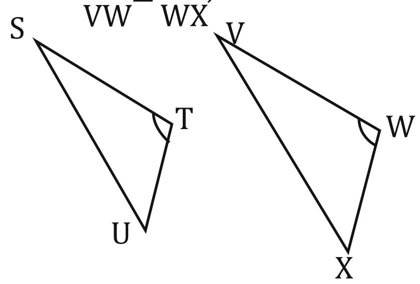
Prove: $\triangle GHI \sim \triangle JKL$

17. Given: $\angle M \cong \angle P$, $\angle O \cong \angle Q$



Prove: $\triangle OMN \sim \triangle DBC$

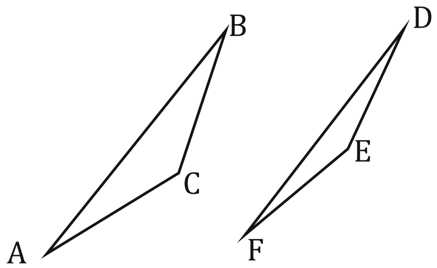
18.
Given: $\frac{ST}{VW} = \frac{TU}{WX}$, $\angle T \cong \angle W$



Prove: $\triangle STU \sim \triangle VWX$

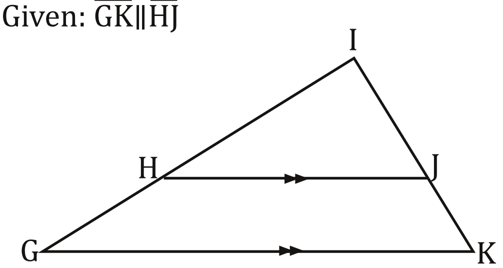
19.

Given: $\frac{AB}{FD} = \frac{BC}{DE} = \frac{CA}{EF}$



Prove: $\triangle ABC \sim \triangle FDE$

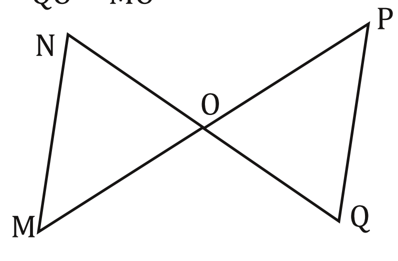
20.
Given: $\overline{GK} \parallel \overline{HJ}$



Prove: $\triangle GIK \sim \triangle HIJ$

21.

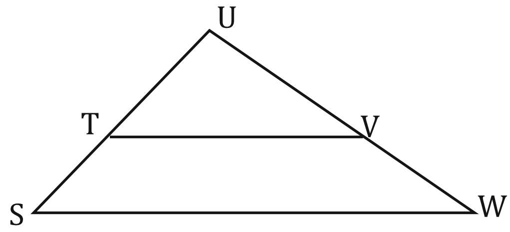
Given: $\frac{NO}{QO} = \frac{PO}{MO}$



Prove: $\triangle MNO \sim \triangle PQO$

22.

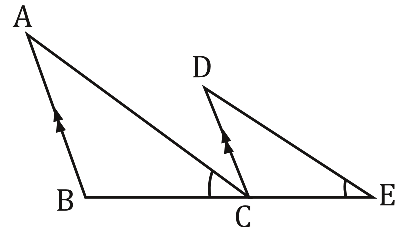
Given: $\angle S \cong \angle UTV$



Prove: $\triangle SUW \sim \triangle TUV$

23.

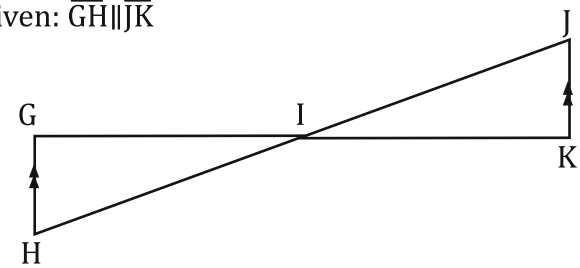
Given: $\overline{AB} \parallel \overline{DC}$, $\angle ACB \cong \angle E$



Prove: $\triangle ABC \sim \triangle DCE$

24.

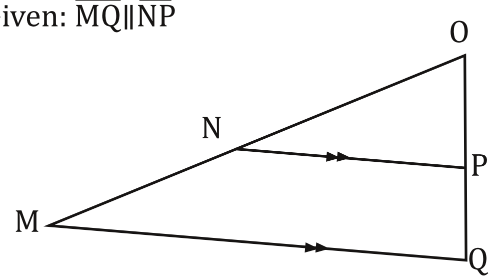
Given: $\overline{GH} \parallel \overline{JK}$



Prove: $\triangle GHI \sim \triangle KJI$

25.

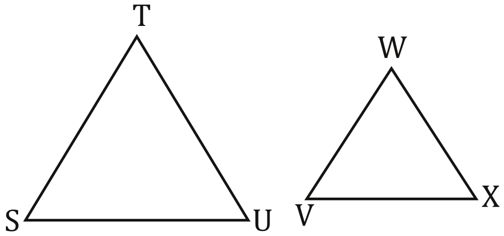
Given: $\overline{MQ} \parallel \overline{NP}$



Prove: $\triangle QMO \sim \triangle PNO$

26.

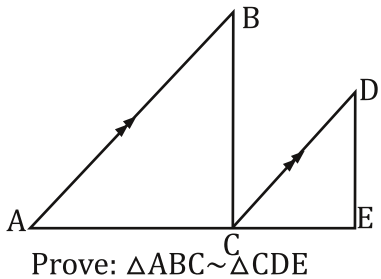
Given: $\triangle ABD$ and $\triangle BCD$ are equilateral



Prove: $\triangle STU \sim \triangle VWX$

27.

Given: $\frac{AB}{DC} = \frac{AC}{CE}$, $\overline{AB} \parallel \overline{CD}$



Prove: $\triangle ABC \sim \triangle CDE$