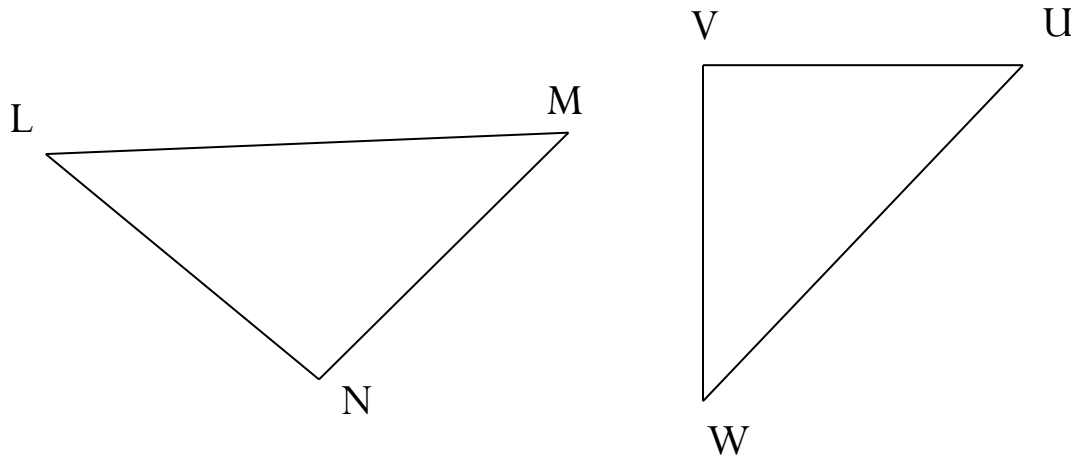# Geometry Unit 5

## Ways to Prove Triangles Congruent

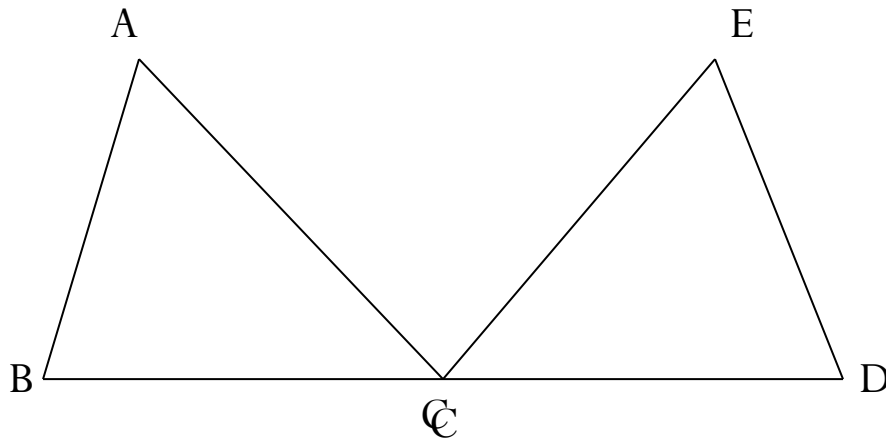# Warm-up

Mark the angles and sides of each pair of triangles to indicate that they are congruent.

1.)

$\Delta LMN \cong \Delta WUV$

2.)

$\Delta ABC \cong \Delta EDC$

# Proving Triangles Congruent

- **<u>Content Objective</u>**: Students will be able to identify and use postulates to prove that triangles are congruent.

- **<u>Language Objective</u>**: Students will be able to read diagrams of congruent triangles and explain, in writing, the postulates that prove it.

# How the Parts Relate

It is helpful to describe the parts of a triangle in terms of their relative positions.

- $\overline{AB}$ is *opposite* $<C$.
- $\overline{AB}$ is *included* between $<A$ and $<B$
- $<A$ is *opposite* $\overline{BC}$
- $<A$ is *included* between $\overline{AB}$ and $\overline{AC}$.

B

A

C
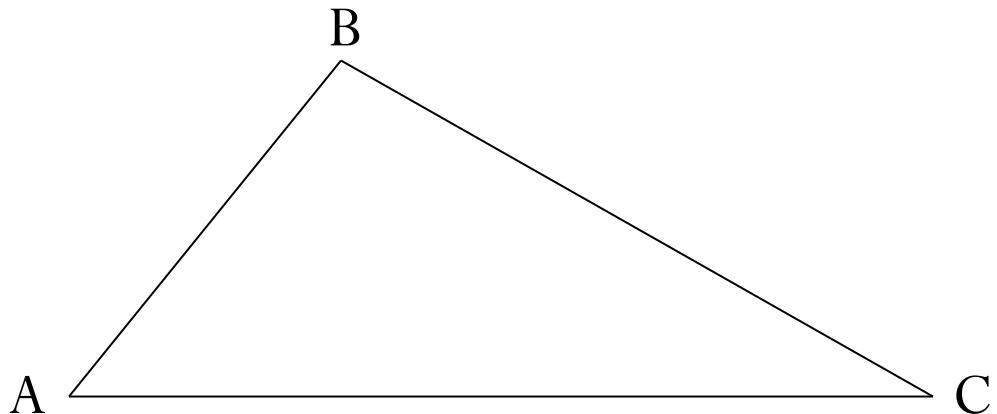
# Proving Triangles Congruent

- Reminder of the Definition of Congruent Triangles:
  - Two triangles are **congruent** if and only if their vertices can be matched up so that the *corresponding parts* (angles and sides) of the triangles are congruent.


- In order to use this definition, we would have to show that all 6 corresponding parts are congruent…
- …Or instead, lets use the following Postulates

# Postulate 12 – SSS Postulate

- **<u>SSS Postulate:</u>** If three sides of a triangle are congruent to three sides of another triangle, then the triangles are congruent.
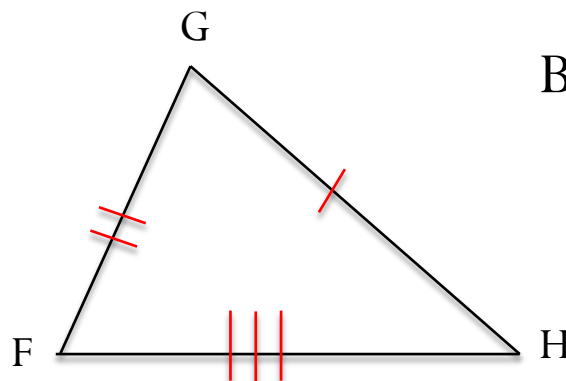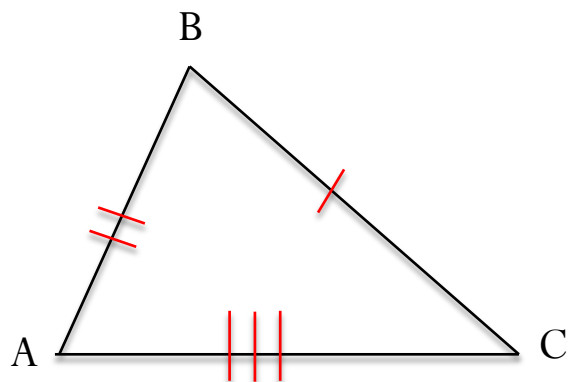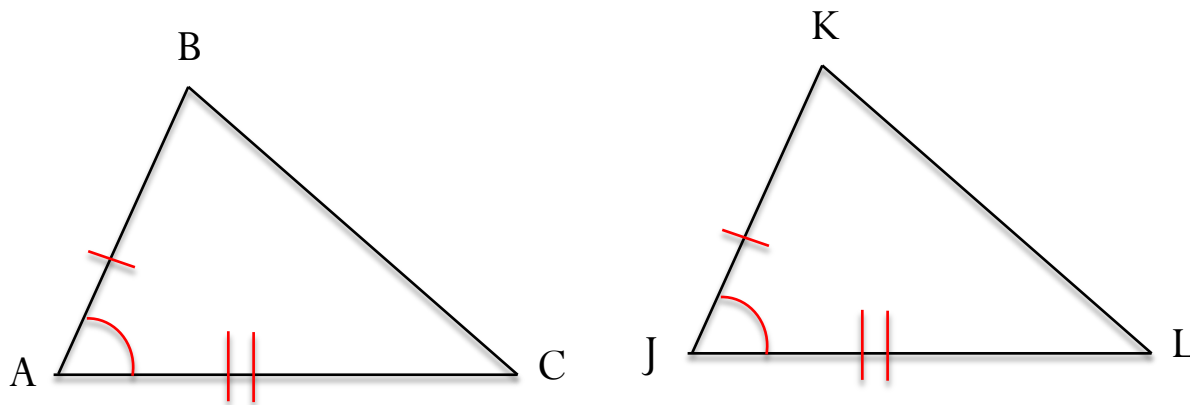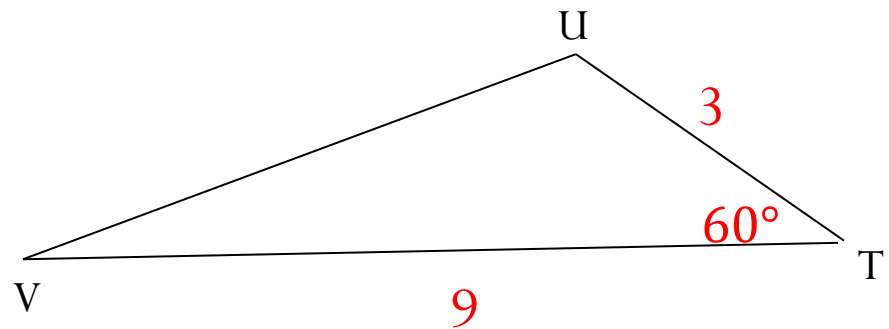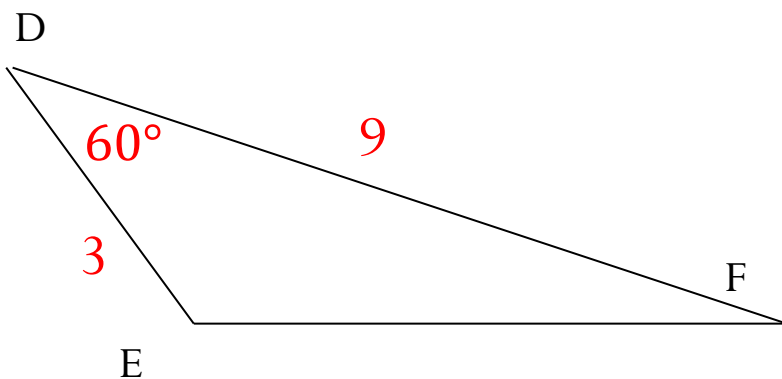
By the SSS Postulate,
$$\Delta ABC \cong \Delta FGH$$
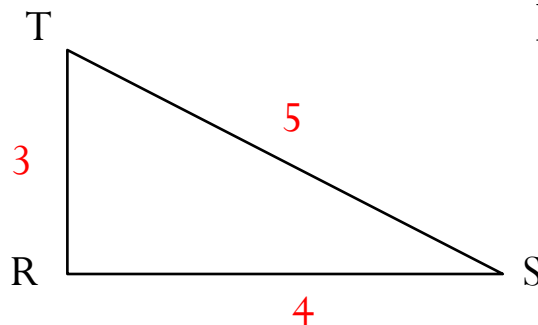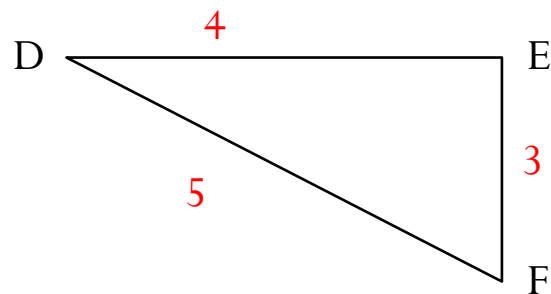
By the SSS Postulate,
$$\Delta DEF \cong \Delta SRT$$

# Postulate 13 – SAS Postulate

- **SAS Postulate:** If two sides and the included angle of one triangle are congruent to two sides and the included angle of another triangle, then the triangles are congruent.
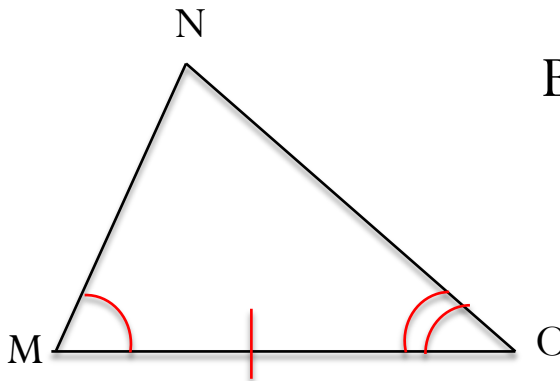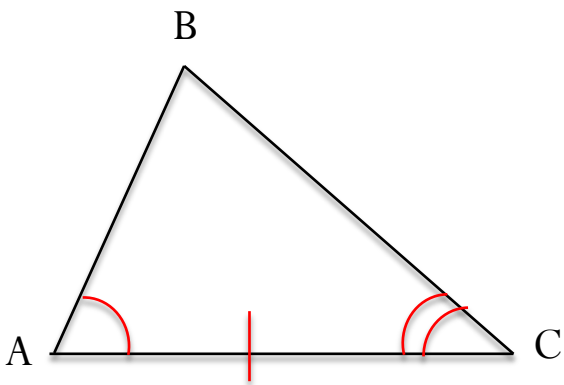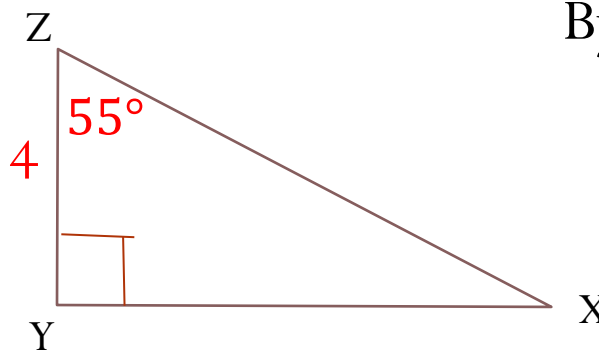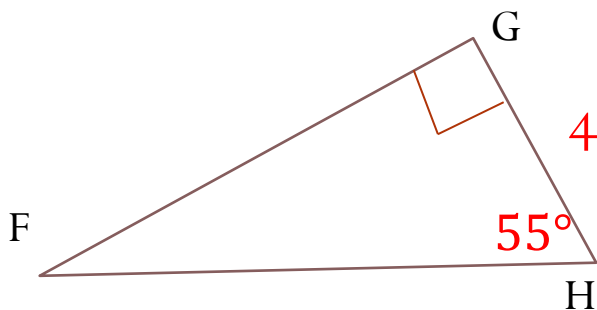
By the SAS Postulate,
$$\Delta ABC \cong \Delta JKL$$

By the SAS Postulate,
$$\Delta DEF \cong \Delta TUV$$

# Postulate 14 – ASA Postulate

- **ASA Postulate:** If two angles and the included side of one triangle are congruent to two angles and the included side of another triangle, then the triangles are congruent.
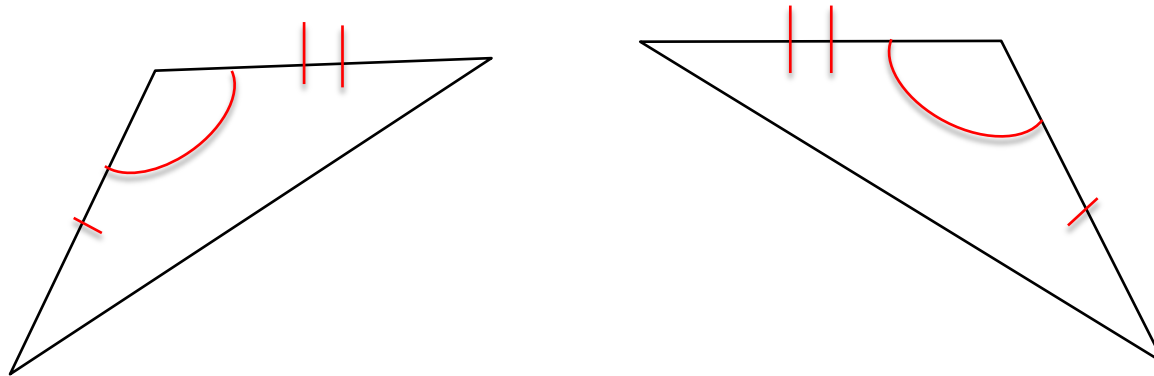
By the ASA Postulate,
$$\Delta ABC \cong \Delta MNO$$

By the ASA Postulate,
$$\Delta FGH \cong \Delta XYZ$$

B

N

A

C

M

O

G

4

55°

F

H

Z

55°

4

Y

X

# Using the Postulates

- State which postulate you can use to prove that these triangles are congruent. Explain using the sentence frame provided.



- These triangles are congruent by the **SAS** postulate because Between the two triangles, we have two sides and their included angles congruent to one another.
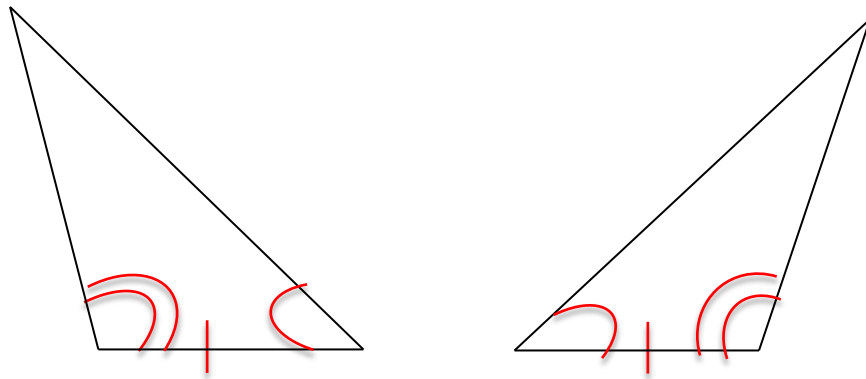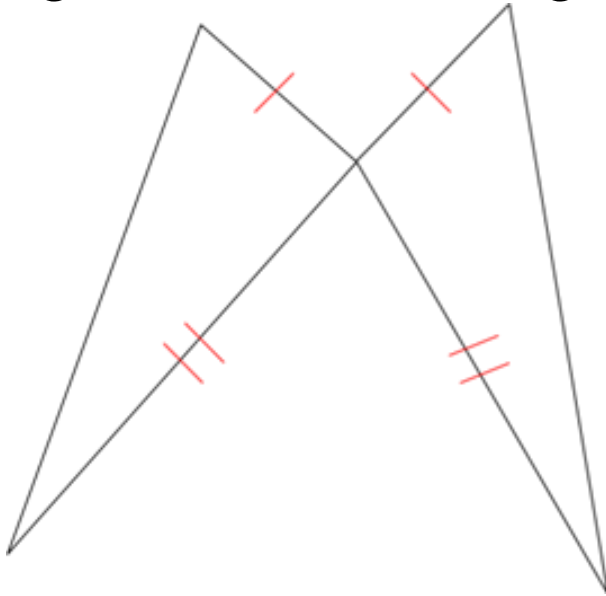
# Using the Postulates

- State which postulate you can use to prove that these triangles are congruent. Explain using the sentence provided.



- These triangles are congruent by the **ASA** postulate because Between the two triangles, we have two angles and their included sides congruent to one another.

# Using the Postulates

- State which postulate you can use to prove that these triangles are congruent. Explain using the sentence frame provided



- These triangles are congruent by the __**SAS**__ postulate because Between the two triangles, we have two sides and their included angles congruent to one another.
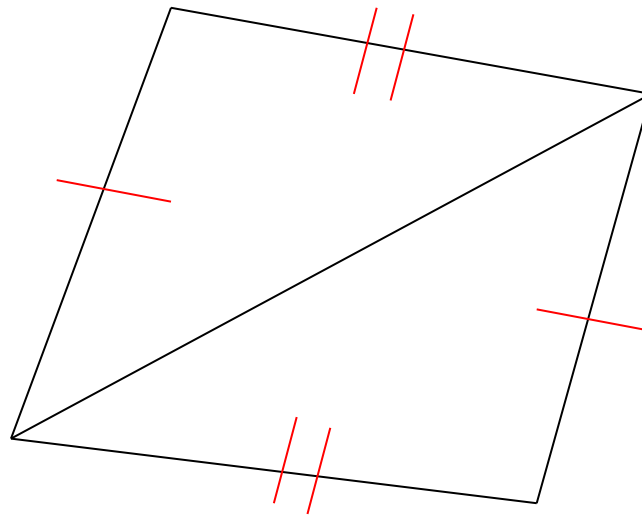
# Using the Postulates

- State which postulate you can use to prove that these triangles are congruent. Explain using the sentence frame provided.



- These triangles are congruent by the **SSS** postulate because Between the two triangles, we have the three sides each triangle congruent to one another.
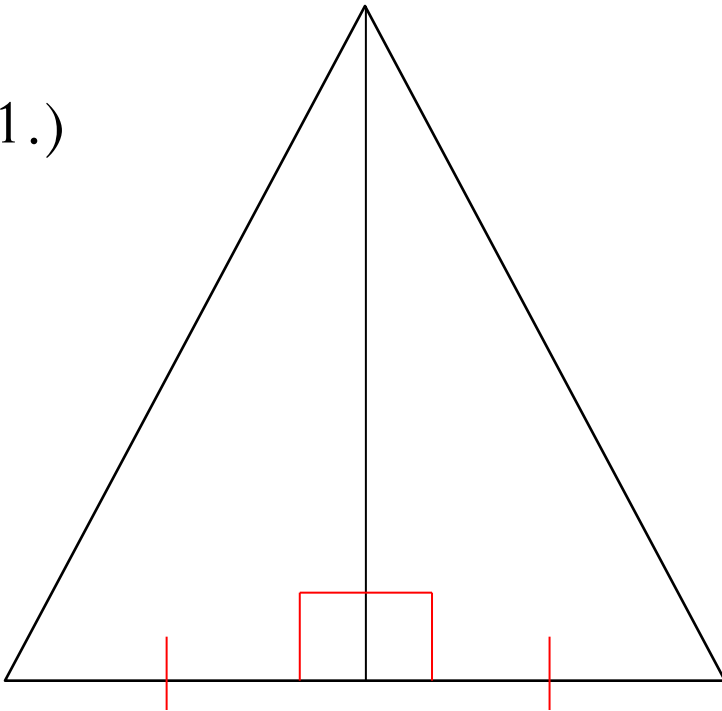
# Exit Ticket

Can the two triangles be proved congruent? If so, what postulate can be used to prove it? Use the following sentence frame to explain:
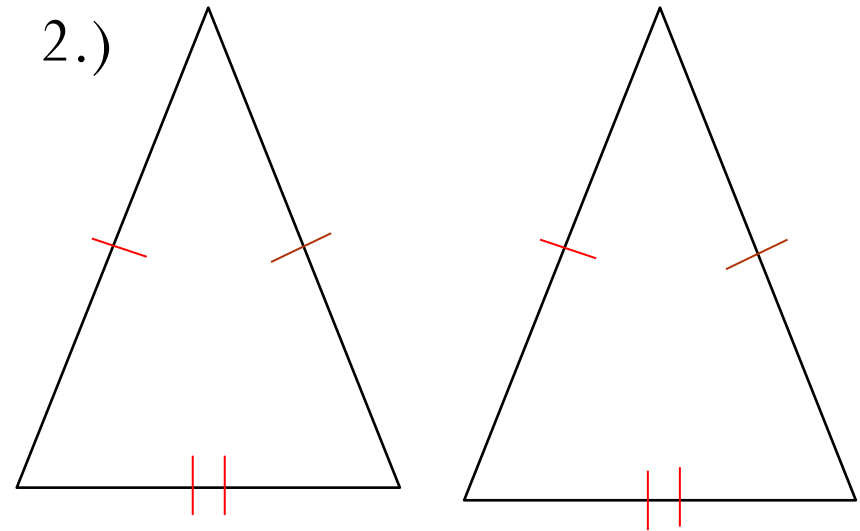
These triangles are congruent by the _____ postulate because _____.
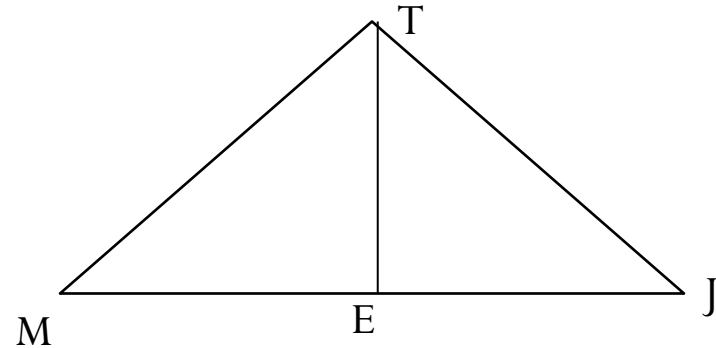
1.)

2.)

# Using the Postulates

Supply the missing statements and reasons in the following proof.

Given: $E$ is the midpoint of $\overline{MJ}$

$\qquad \overline{TE} \perp \overline{MJ}$

Prove: $\Delta MET \cong \Delta JET$

| Statements | Reasons |
|---|---|
| 1. $E$ is the midpoint of $\overline{MJ}$ | 1. Given |
| 2. $\overline{ME} \cong \overline{EJ}$ | 2. Def. of Midpoint |
| 3. $\overline{TE} \perp \overline{MJ}$ | 3. Given |
| 4. $<MET \cong <JET$ | 4. Def. of Perp. Lines |
| 5. $\overline{TE} \cong \overline{TE}$ | 5. Reflexive |
| 6. $\Delta MET \cong \Delta JET$ | 6. SAS Postulate |