

Mathematics

Quarter 3- Week 3-4

**Module 2: Illustrating Triangle Congruence
& Illustrating the SAS, ASA and SSS
Congruence Postulates**



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Mathematics 8

Quarter 3- Week 3 - 4 Module 2: Illustrating Triangle Congruence &
Illustrating the SAS, ASA and SSS Congruence Postulates

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Region I

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Target

This module was designed and written with you in mind. It is here to help you master on how to illustrates triangle congruence and illustrates the SAS, ASA and SSS congruence postulates. The scope of this module permits it to be used in many different learning situations. The language and numeric used recognizes the diverse vocabulary and numeracy level of students. The lessons are arranged to follow the standard sequence of the course. But the order in which you read them can be changed to correspond with the textbook you are now using.

After going through this module, you are expected to:

Learning Competency

Lesson 1:

- Illustrates triangle congruence.
(M8GE-IIIId-1)

Lesson 2:

- Illustrates the SAS, ASA and SSS congruence postulates.
(M8GE-IIIId-e-1)

Subtasks:

1. Define congruent triangles.
2. Determine the corresponding parts of congruent triangles.
3. Identify the three congruence postulates: SAS, ASA, and SSS.
4. Relate the concept of congruency to real-life situations.

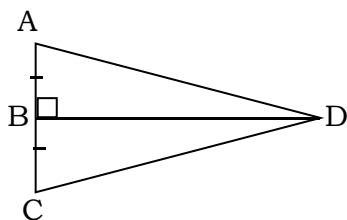
Pretest

Pre-Assessment

Direction: Read each item very carefully. Choose the letter of the correct answer. Write your answers on a separate sheet of paper.

1. What does the statement “corresponding parts of congruent triangles are congruent (CPCTC)” based on?
A. Definition B. Postulate C. Theorem D. Axiom
2. In $\triangle DOS$, what side is included between $\angle D$ and $\angle O$?
A. DO B. DS C. SD D. SO
3. $\triangle SUM \cong \triangle PRO$, which angle is congruent to $\angle M$?
A. $\angle S$ B. $\angle R$ C. $\angle P$ D. $\angle O$

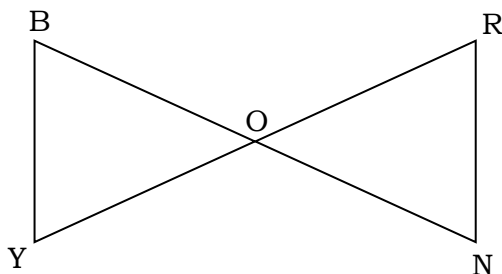
4. What does “corresponding parts” of a triangle refers to?
 A. angles B. sides C. vertex D. angles and sides
5. How many sides do you need to prove that the two triangles are congruent by SSS congruence postulate?
 A. 0 B. 1 C. 2 D. 3
6. If $\triangle ABC \cong \triangle HGF$, what is the complete congruence statement corresponds to $\triangle BAC$?
 A. $\triangle HFG$ B. $\triangle GFH$ C. $\triangle GHF$ D. $\triangle HGF$
7. If $\triangle ABC \cong \triangle DEF$, which segment is congruent to AB:
 A. BC B. AC C. DE D. EB
8. If $\triangle ABC \cong \triangle XYZ$. Which statement must be true to sides?
 A. $AC \cong XZ$ B. $BC \cong ZY$ C. $AC \cong YZ$ D. $CB \cong XZ$
9. Using the same information in item # 8, which statement must be true to angles?
 A. $\angle C \cong \angle Y$ B. $\angle A \cong \angle X$ C. $\angle B \cong \angle Z$ D. $\angle A \cong \angle Z$
10. Given the corresponding sides of the two triangles: $DE \cong LK$, $EF \cong KM$, $FD \cong ML$. What is the congruence statement?
 A. $\triangle DEF \cong \triangle LKM$ B. $\triangle DEF \cong \triangle LMK$
 C. $\triangle FED \cong \triangle LKM$ D. $\triangle EDF \cong \triangle LKM$
11. What postulate lets you immediately conclude that $\triangle ABD \cong \triangle CBD$?



- A. SAS B. ASA C. AAS D. SSS

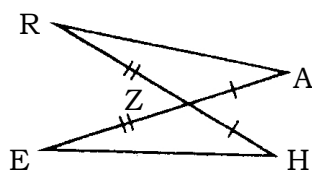
For items **12-13**. Given the corresponding congruent parts of the two triangles. Identify the Postulate used.

- A. SSS B. SAS C. ASA D. AAS



12. $BO \cong NO$; $RO \cong YO$; $BY \cong RN$
 13. $\angle B \cong \angle N$; $BY \cong NR$; $\angle Y \cong \angle R$

For items **14-15**. Using the figure below. Answer the following.



14. Which postulate prove that the two triangles drawn above are congruent?
 A. SSS B. SAS C. ASA D. AAS
15. Which among the congruence statements is correct?
 A. $\triangle RAZ \cong \triangle HEZ$ B. $\triangle ZAR \cong \triangle EZH$
 C. $\triangle ZRA \cong \triangle ZHE$ D. $\triangle RAZ \cong \triangle EHZ$

Lesson 1 Illustrating Triangle Congruence

Start this module by assessing your knowledge and skills in differentiating terms as discussed in Module 1. These knowledge and skills may help you in understanding the concepts of this module and achieve the targets for this learning material.



Jumpstart

Activity 1: Who Am I

From the given jumbled letters, identify the correct term and classify if it is undefined or defined terms then illustrate/draw.

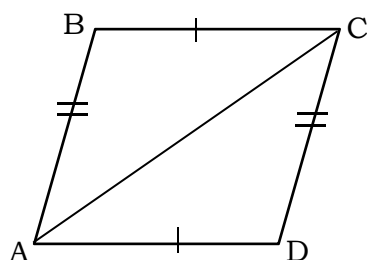
JUMBLED LETTERS	TERM	UNDEFINED TERMS	DEFINED TERMS	SYMBOL/ILLUSTRATION FOR THE TERM
1. IENL				
2. AYR				
3. NEGAL				
4. NOPTI				
5. LRATNIGE				

Guide Questions:

1. Were you able to determine the correct word from the jumbled letters correctly?
2. Is there any confusion in classifying the terms and showing the symbol/illustration?
3. Did you find difficulty in the conduct of the activity? What did you do to overcome this difficulty?

Activity 2: Pair Me Not

Let ABCD be a parallelogram and AC be one of its diagonals.



- a. How many pair of congruence statement can you create from the given figure above? List them all.
- b. Give the pair/s of corresponding angles of the triangles.
- c. Give the pair/s of corresponding sides of the triangles.

Guide Questions:

1. What can you say about $\triangle ABC$ and $\triangle CDA$?
2. Were you able to determine all the congruence statements? How?
3. Can you give other congruence statements for the two triangles? If yes, what are those? If no, justify your answer.



Discover

By now, you must be well aware of a triangle that it is a 2-dimensional figure with three sides, three angles and three vertices. Two or more triangles are said to be congruent if their corresponding sides or angles are the same. In other words, Congruent triangles have the same shape and dimensions/size.

Congruency is a term used to describe two objects with the same shape and size. The symbol for congruency is \cong . In triangles, to remember this important idea, some find it helpful to use the acronym CPCTC, which stands for "**C**orresponding **P**arts of **C**ongruent **T**riangles are **C**ongruent". Congruency is neither calculated nor measured but is simply determine by visual inspection.

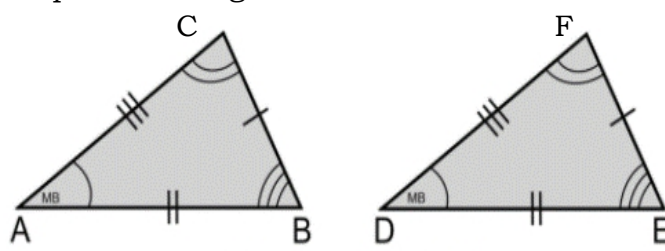
When you name congruent polygons known as congruence statement, you must list corresponding vertices in the same order.

To help you understand better, try to explore the following illustrative examples below on congruent triangles.

Illustrative Example 1.

Given the triangles below.

1. Give one congruence statements then list all the six corresponding parts.
2. Name the other possible congruence statements.



Solution:

1. Congruence statement: $\triangle ABC \cong \triangle DEF$

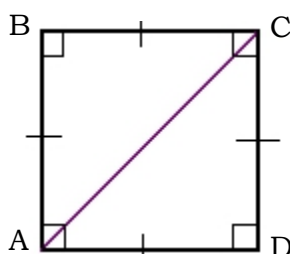
When triangles are congruent, six facts are always true.	
Corresponding sides are congruent.	Corresponding angles are congruent.
$\overline{AB} \cong \overline{DE}$	$\angle A \cong \angle D$
$\overline{BC} \cong \overline{EF}$	$\angle B \cong \angle E$
$\overline{CA} \cong \overline{FD}$	$\angle C \cong \angle F$

2. Other possible congruence statements.

- | | | |
|--|--|--|
| a. $\triangle BCA \cong \triangle EFD$ | b. $\triangle CAB \cong \triangle FDE$ | c. $\triangle ACB \cong \triangle DFE$ |
| d. $\triangle BAC \cong \triangle EDF$ | e. $\triangle CBA \cong \triangle FED$ | |

Illustrative Example 2.

Let ABCD be a square and AC be one of its diagonals. What can you say about $\triangle BAC$ and $\triangle CDA$. Explain your answer (Essay type).



Solution:

In a square, all the four sides are congruent. Hence sides AB and CD are congruent, and also sides BC and DA are congruent. The two triangles have common side AC. Triangle ABC has three sides congruent to corresponding three

sides in triangle CDA. The triangles are also right triangles and isosceles.

There are infinite examples of congruent objects which we see or observe in our daily life. A simple example is a pack of biscuits which has all biscuits of the same size and shape, if they are not broken. We can say all the biscuits are congruent.

A few more examples of congruency are:

- Earrings of the same set.
- Cigarettes in a pack.
- Wheels of a bicycle.
- Pages of a particular book
- Your little fingers of both hands. Other fingers and thumbs are also congruent. Many of your body organs, like kidneys and lungs are congruent. Even if a body is cut vertically from the center into two halves, both halves are congruent.



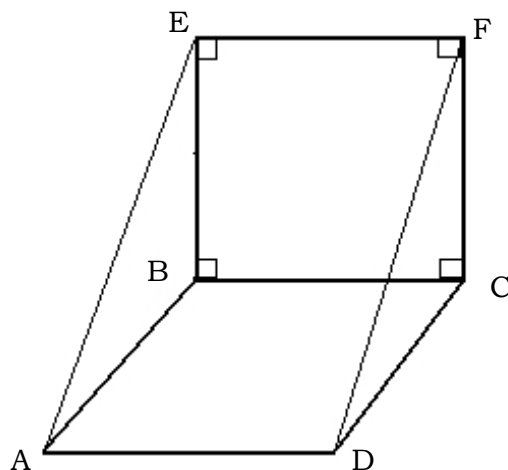
Explore

Activity 3: Jot Me Down

Read and answer as directed. Write your answers on your answer sheet.

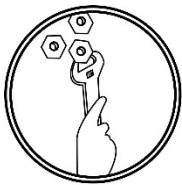
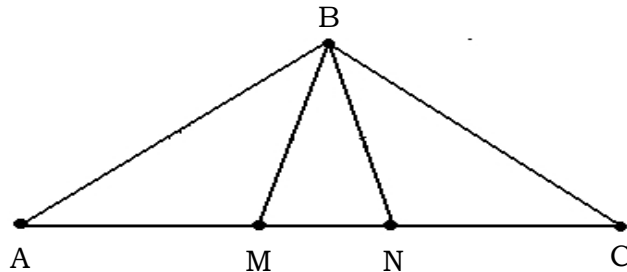
Given the figure below. ABCD is a parallelogram and BEFC is a square. Show that the two triangles are congruent.

1. Give one congruence statements then list all the six corresponding parts.
2. Name the other possible congruence statements.



Activity 4: Write Me Right

___ In the isosceles triangle ABC , \overline{BA} and \overline{BC} are congruent. M and N are points on AC such that MA is congruent to MB and NB is congruent to NC . Show that $\triangle AMB$ and $\triangle CNB$ are congruent. Explain your answer (Essay type).

**Deepen**

Reflect on the activities you have done in this lesson by completing the following statements. Write your answers on your journal notebook.

I learned that ...

I was surprised that ...

I noticed that ...

I discovered that ...

I was pleased that ...

Lesson 2	Illustrating SAS, ASA and SSS congruence postulates.
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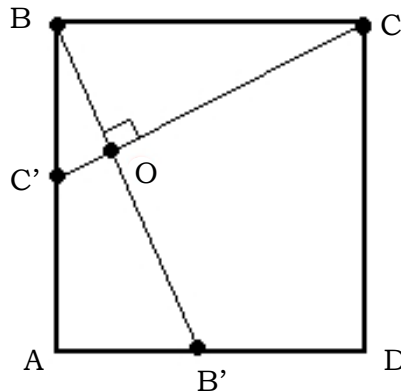
The good news is that when proving congruent triangles, it is not necessary to prove all six facts to show congruency. There are certain ordered combinations of these facts that are sufficient to prove triangles congruent. These combinations guarantee that, given these facts, it will be possible to draw triangles which will take on only one shape (be unique), thus insuring congruency.



Jumpstart

Activity 5: State Me Congruently

□ABCD is a square. C' is a point on BA and B' is a point on AD such that $\overline{BB'}$ and $\overline{CC'}$ are perpendicular. State all possible congruence statement then list all the corresponding parts.



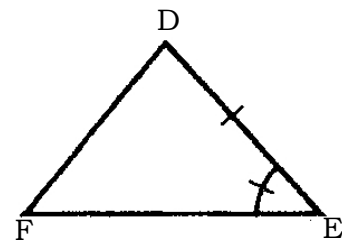
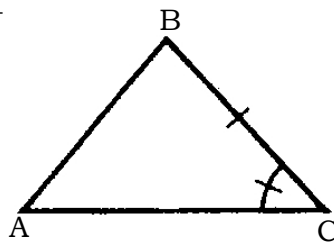
Guide Questions:

1. Were you able to determine all the congruence statements and corresponding parts of the two congruent triangles?
2. Did you find difficulty in the conduct of the activity? What did you do to overcome this difficulty?

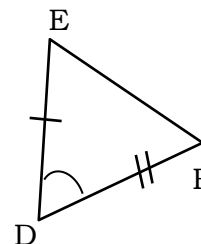
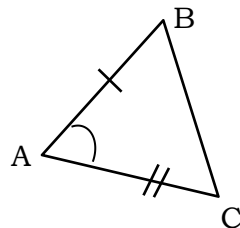
Activity 6: Find Me

Indicate the additional information needed to enable us to apply the specified congruence postulate.

1. For ASA: $\angle B \cong$ _____
For SAS: $\overline{AC} \cong$ _____



2. For SSS: $\overline{BC} \cong$ _____
For ASA: $\angle C \cong$ _____



Guide Questions:

1. Were you able to determine the corresponding parts correctly?
2. Is there any confusion in finding the pair for the corresponding parts?
3. Did you find difficulty in the conduct of the activity? What did you do to overcome this difficulty?



Discover

Triangle congruences are the rules or the methods used to prove if two triangles are congruent. Two triangles are said to be congruent if and only if one of them can be made to superpose on the other so as to cover it exactly.

There are more ways as well to prove the congruency of triangles, but in this lesson, we will restrict ourselves to these postulates only.

Before going into the detail of these postulates of congruency, it is important to know how to mark different sides and angles with a certain sign which shows their congruency. You will often see the sides and angles of a triangle are marked with a little tic marks to specify the sets of congruent angles or congruent sides.

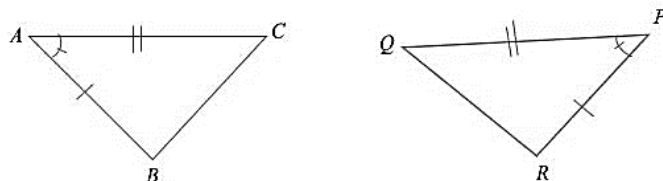
You will see in the diagrams below that the sides with one tic mark are of the same measurement, the sides with two tic marks also have the same length, and the sides with the tic marks are equal as well. Same goes for the angles.

Side – Angle – Side Congruence Postulate

Side Angle Side (SAS) is a rule used to prove whether a given set of triangles are congruent. In this case, two triangles are congruent if two sides and one included angle in a given triangle are equal to the corresponding two sides and one included angle in another triangle.

Remember that the included angle must be formed by the given two sides for the triangles to be congruent.

Illustration of SAS rule:

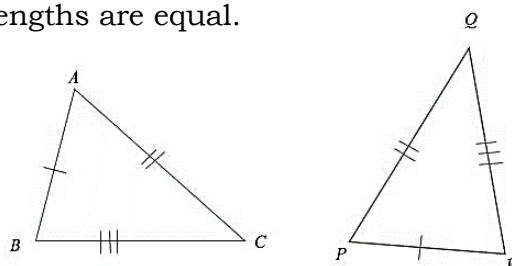


Given that; length $AB = PR$, $AC = PQ$ and $\angle QPR = \angle BAC$, then;
Triangle ABC and PQR are congruent ($\triangle ABC \cong \triangle PQR$)

Side – Side – Side Congruence Postulate

The side – side – side rule (SSS) states that: Two triangles are congruent if their corresponding three side lengths are equal.

Illustration:

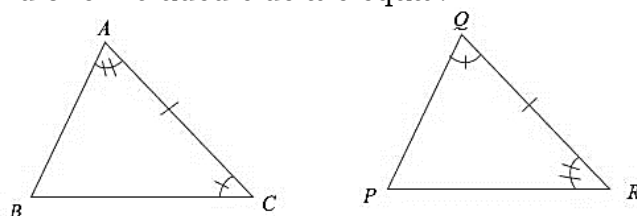


Triangle ABC and PQR are said to be congruent ($\triangle ABC \cong \triangle PQR$), if length $AB = PR$, $AC = PQ$, and $BC = QR$.

Angle – Side – Angle Congruence Postulate

The Angle – Side – Angle rule (ASA) states that: Two triangles are congruent if their corresponding two angles and one included side are equal.

Illustration:



Triangle ABC and PQR are congruent ($\triangle ABC \cong \triangle PQR$), if length $\angle BAC = \angle PRQ$, $\angle ACB = \angle PQR$

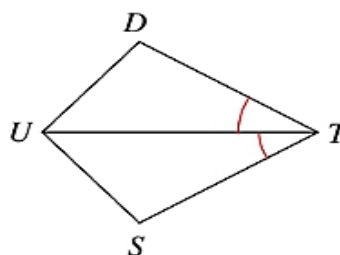
To help you understand better, try to explore the following illustrative examples below on congruence postulates.

Illustrative Example 1.

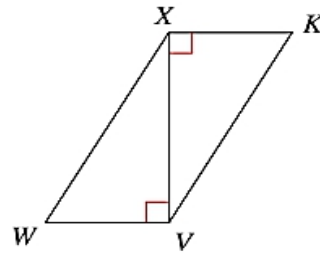
State what additional information is needed in order to know that the triangles are congruent for the given congruence postulate.

- a. Congruence Postulate: ASA

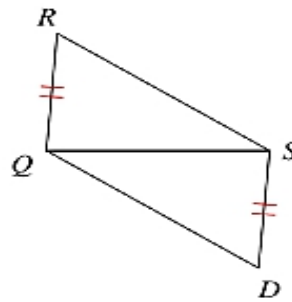
Additional Information: $\angle DUT \cong \angle SUT$



- b. Congruence Postulate: SAS
 Additional Information: $\overline{VW} \cong \angle \overline{XK}$

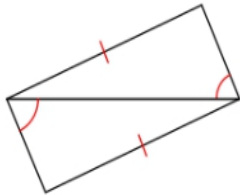


- c. Congruence Postulate: SSS
 Additional Information: $\overline{RS} \cong \overline{DQ}$

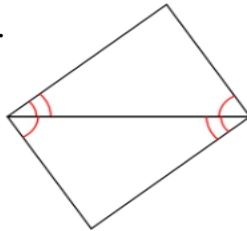


Illustrative Example 2. State the congruence postulates that proves the triangles if it is congruent or not.

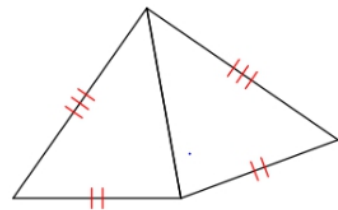
a.



b.



c.



Answer: a. Not congruent

b. ASA

c. SSS



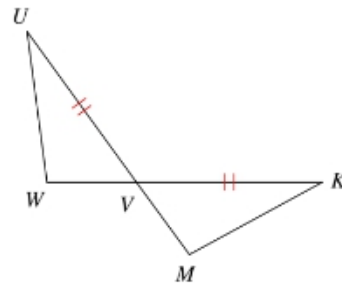
Explore

Activity 7: Find My Peer

State the additional information needed in order to show that the triangles are congruent for the given congruence postulate.

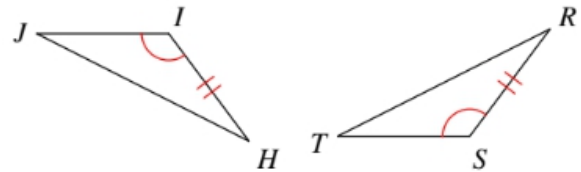
- a. Congruence Postulate: SAS

Additional Information: _____



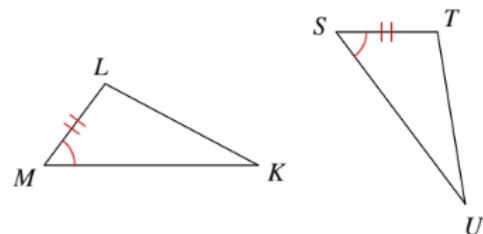
- b. Congruence Postulate: SAS

Additional Information: _____



- c. Congruence Postulate: ASA

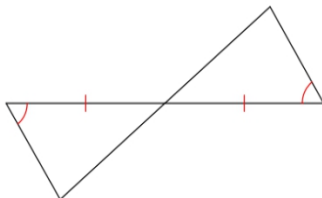
Additional Information: _____



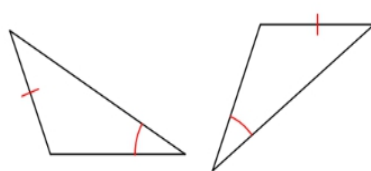
Activity 8: Identify Me

State the congruence postulate that proves the triangles if it is congruent or not.

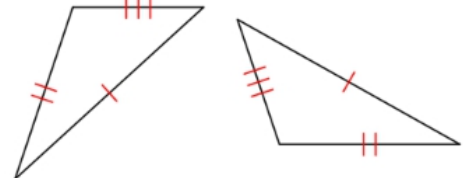
a.



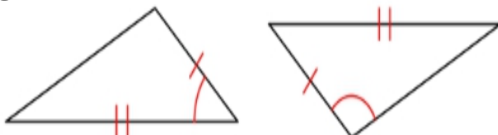
e.



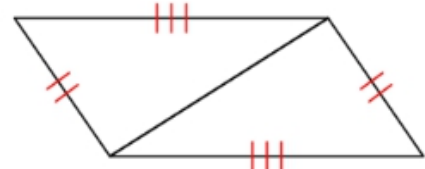
f.



g.

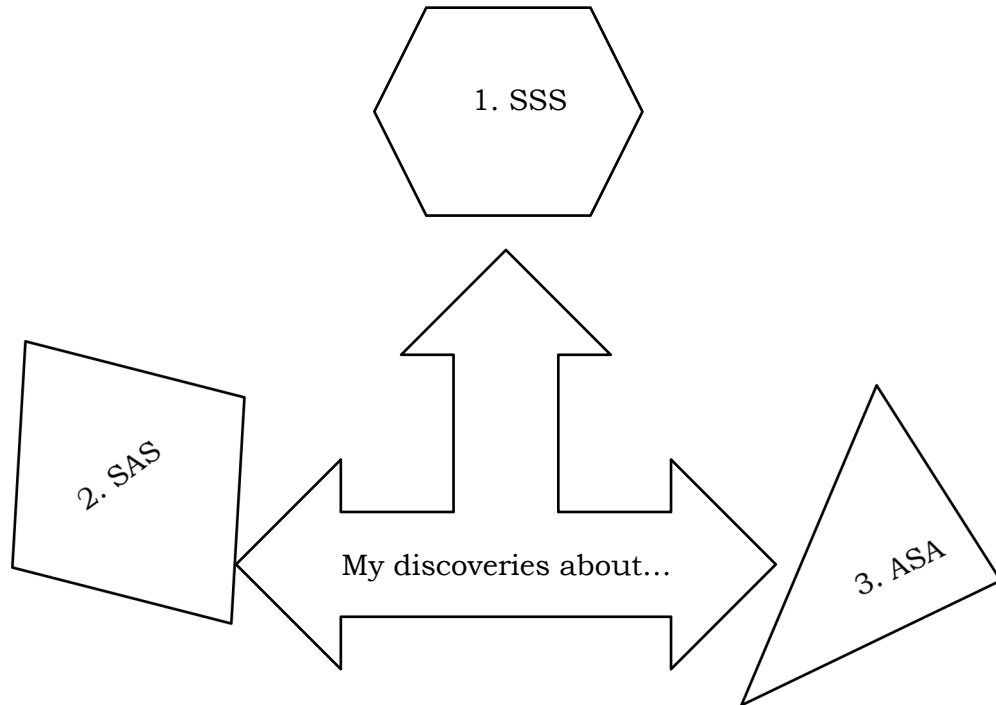


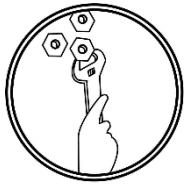
h.



Activity 9: Complete Me

Complete the Shape Chart about your discoveries in proving triangles using the different congruence postulates. Write your answer on a separate sheet of paper.





Deepen

For this activity, you will work individually creating a project using nothing but triangles. You will create a piece of original artwork on an illustration board (1/8) using any coloring materials, pencil and ruler.

The objective of this project is to use the concepts learned in this module and create an original piece of artwork that incorporates congruent triangles.

Your project will be created using only triangles and will be graded on the originality and neatness.

Rubric

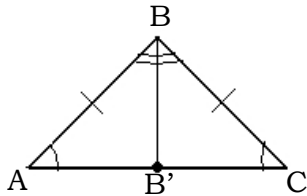
Indicators	5	4	3	2	1
	Excellent	Very Good	Good	Fair	Poor
Composition and design - Shows the use of congruent triangles					
Neatness of artwork					
Originality					
Overall look of the artwork - Shows the overall concepts of congruent triangles					
TOTAL					



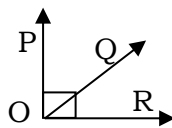
Gauge

Directions: Read each item very carefully. Choose the letter of the correct answer. Write your answers on a separate sheet of paper.

- When to say that two figures are congruent?
 - same color
 - same shape
 - same shape and size
 - same shape and color
- In $\triangle DOS$, what side is included of $\angle S$ and $\angle O$?
 - DO
 - DS
 - SD
 - SO
- $\triangle SUM \cong \triangle PRO$, which angle is congruent to $\angle U$?
 - $\angle S$
 - $\angle R$
 - $\angle P$
 - $\angle O$
- $\triangle ABC$ is an isosceles triangle. BB' is the angle bisector.



- Which is true about the bisector of the vertex angle of an isosceles triangle?
- It is parallel to the base.
 - It is parallel to the left leg.
 - It is coinciding to the base.
 - It is perpendicular to the base at its midpoint
- What does “corresponding parts” of a triangle refers to?
 - angles
 - sides
 - vertex
 - angles and sides
 - Given the figure below. $\angle POR$ is bisected by OQ .

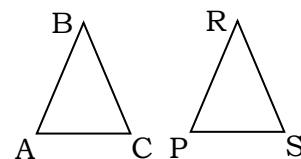


What can you say about $\angle POQ$ and $\angle ROQ$?

- Congruent
 - Intersecting
 - Parallel
 - Perpendicular
- Evaluate the figure on the left. Which congruence statement is correct?

- $\triangle ABC \cong \triangle RSP$
- $\triangle ABC \cong \triangle PRS$

- $\triangle BCA \cong \triangle PSR$
- $\triangle CAB \cong \triangle RSP$

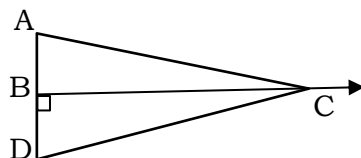


8. Identify which of the following statements say that two triangles are congruent?
- A. If and only if their vertices can be matched up so that corresponding parts (angles and sides) of the triangle are congruent.
 - B. If and only if their sides can be matched up so that corresponding parts (angles and sides) of the triangle are congruent.
 - C. If and only if their vertices can't be matched up so that corresponding parts (angles and sides) of the triangle are different.
 - D. All of the above

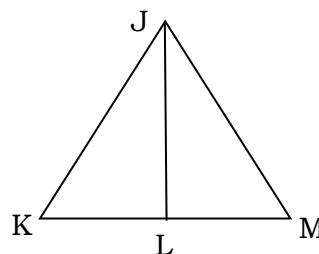
9. Listed below are the six pairs of corresponding parts of congruent triangles. Create the name of the congruent triangles.

$\overline{SA} \cong \overline{JO}$, $\overline{AD} \cong \overline{OY}$, $\overline{SD} \cong \overline{JY}$, $\angle D \cong \angle Y$, $\angle A \cong \angle O$, and $\angle S \cong \angle J$

- A. $\triangle ASD \cong \triangle JOY$
 - B. $\triangle ADS \cong \triangle YJO$
 - C. $\triangle SAD \cong \triangle JOY$
 - D. $\triangle SAD \cong \triangle JYO$
10. BC is perpendicular bisector of AD. Formulate a congruence statement for the two triangles. What would it be?

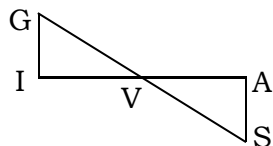


- A. $\triangle ABC \cong \triangle DBC$
 - B. $\triangle ABC \cong \triangle DCB$
 - C. $\triangle BAC \cong \triangle DBC$
 - D. $\triangle ABC \cong \triangle CBD$
11. Which among the triangle congruence postulates states that “If two sides and the included angle of one triangle are congruent to two sides and the included angle of another triangle, then the two triangles are congruent.”
- A. SSS
 - B. ASA
 - C. SAS
 - D. AAS
12. Using the diagram below, what additional congruence statement is needed to show that $\triangle KJL \cong \triangle MJL$ by SAS congruence theorem?



- A. $\angle K \cong \angle L$
 - B. $\angle K \cong \angle M$
 - C. $\angle J \cong \angle M$
 - D. $\angle L \cong \angle L$
13. Jan knows that $AB = XY$ and $AC = XZ$. What other information must he know to prove $\triangle ABC \cong \triangle XYZ$ by SAS postulate?
- A. $\angle B \cong \angle Y$
 - B. $\angle C \cong \angle Z$
 - C. $\angle A \cong \angle X$
 - D. $\angle A \cong \angle Z$

14. $\triangle GIV \cong \triangle SAV$. Deduce a statement about point V.

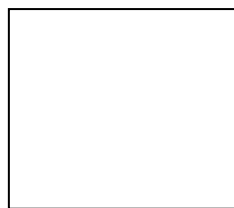


- A. V is in the interior of $\triangle GIV$
- C. V is in the exterior of $\triangle SAV$

- B. V is in the midpoint of GS
- D. V is collinear with G and I.

15. You are tasked to make a design of the flooring of a chapel using triangle. The available materials are square tiles. How are you going to make the design?

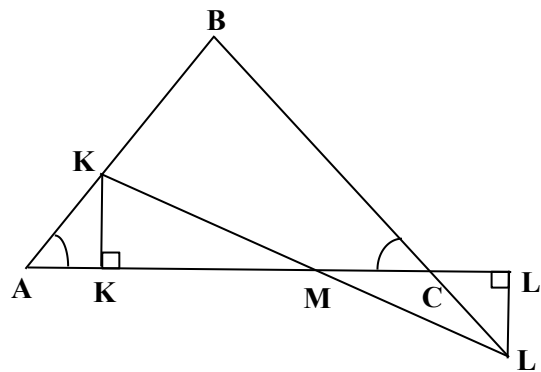
- A. Applying triangle congruence by ASA.
- B. Applying triangle congruence by SAS.
- C. Applying triangle congruence by SSS.
- D. Applying triangle congruence by AAS.





Additional Activities

$\triangle ABC$ is an isosceles triangle with segment \overline{BA} and \overline{BC} which are congruent. Point K is on \overline{AB} and point L is on \overline{BC} . Both $\overline{KK'}$ and $\overline{LL'}$ are perpendicular to \overline{AC} . Segment $\overline{KK'}$ and $\overline{LL'}$ are congruent. Show that $\triangle KKM$ and $\triangle LL'M$ are congruent.



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