

Student Name

Mathematics Stage 5 Paths

PROPERTIES OF GEOMETRICAL FIGURES

Book 1 Identify and explain congruence

Version: 260207

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OVERVIEW

SYLLABUS CONTENT

MA5-GEO-P-01 establishes conditions for congruent triangles and similar triangles and solves problems relating to properties of similar figures and plane shapes

Identify and explain congruence

- Identify figures as congruent figures if translations, reflections and rotations can move one figure exactly on top of another
- Match the sides and angles of 2 congruent polygons
- Indicate 2 polygons are congruent using the symbol ($\equiv$) and name the vertices in matching order
- Determine that having equal radii is the condition for 2 circles to be congruent

CONGRUENCE

CONGRUENT SHAPES

- **Congruent** shapes are identical - they have the same angles, side lengths and area.
- If you **translate** (slide), **reflect** (flip), or **rotate** (spin) a shape, then the image is **congruent** to the original.



CORRESPONDING SIDES AND ANGLES

- The **corresponding** (or matching) vertices, angles, and sides of two **congruent** shapes are equal.

Example Identify corresponding sides and angles in congruent figures.

Worked Example	Your Turn
Identify the matching vertices.	Identify the matching vertices.

Key ideas

1. If two figures are, then they are exactly identical.
2. If you, or a shape, then the image is congruent to the original.
3. If two figures are congruent, sides and angles are equal.

1 Identify the matching vertices.

a

$A-D, B-E, C-F$

b

$S-Q, U-P, T-R$

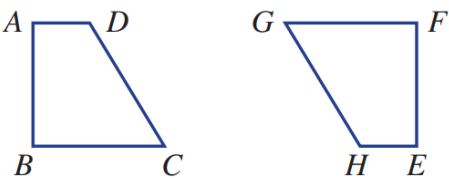
c

$A-H, D-G, C-F, B-E$

d

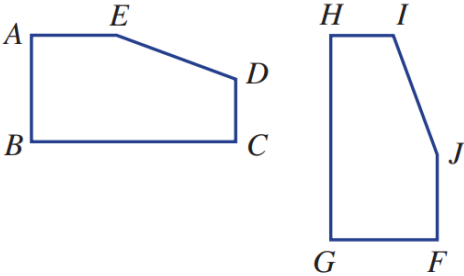
$A-X, D-Y, C-Z, B-W$

2 These two quadrilaterals are congruent.
Name the feature in EFGH that corresponds to these features in ABCD.



a A	b D	c AD
d CD	e $\angle C$	f $\angle A$

3 These two pentagons are congruent. Name the object in pentagon FGHIJ that corresponds to these objects in pentagon ABCDE .



a A	b D	c AE
d CD	e $\angle C$	f $\angle E$

4 In this diagram $\triangle ABC$ has been translated to give the image triangle $\triangle DEF$.

a Is $\triangle DEF$ congruent to $\triangle ABC$?

Yes, rotations are isometric

b Name the vertex on $\triangle DEF$ that corresponds to:

i A ii B iii C

D E F

c Name the side on $\triangle DEF$ that corresponds to:

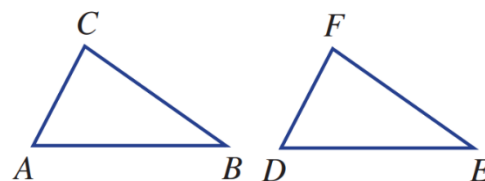
i AB ii BC iii AC

DE EF DF

d Name the angle in $\triangle DEF$ that corresponds to:

i $\angle B$ ii $\angle C$ iii $\angle A$

$\angle E$ $\angle F$ $\angle D$



5 In this diagram $\triangle ABC$ has been reflected to give the image triangle $\triangle DEF$.

a Is $\triangle DEF$ congruent to $\triangle ABC$?

Yes, reflections are isometric

b Name the vertex on $\triangle DEF$ that corresponds to:

i A ii B iii C

D E F

c Name the side on $\triangle DEF$ that corresponds to:

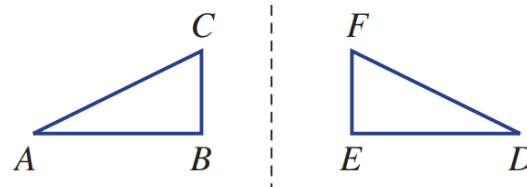
i AB ii BC iii AC

DE EF DF

d Name the angle in $\triangle DEF$ that corresponds to:

i $\angle B$ ii $\angle C$ iii $\angle A$

$\angle E$ $\angle F$ $\angle D$



6 In this diagram $\triangle ABC$ has been rotated to give the image triangle $\triangle DEF$.

a Is $\triangle DEF$ congruent to $\triangle ABC$?

Yes, rotations are isometric

b Name the vertex on $\triangle DEF$ that corresponds to:

i A ii B iii C

D E F

c Name the side on $\triangle DEF$ that corresponds to:

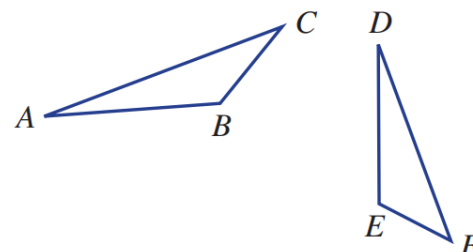
i AB ii BC iii AC

DE EF DF

d Name the angle in $\triangle DEF$ that corresponds to:

i $\angle B$ ii $\angle C$ iii $\angle A$

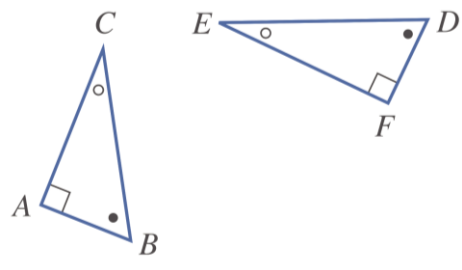
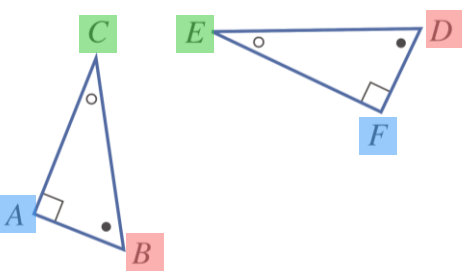
$\angle E$ $\angle F$ $\angle D$



CONGRUENCE STATEMENTS

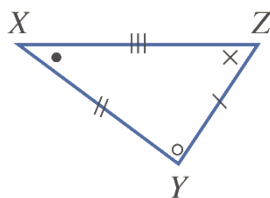
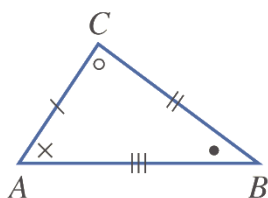
- The symbol $\equiv$ indicates congruence.
- 1. Identify the corresponding vertices.
- 2. Write vertices in corresponding order.

Example Write a congruence statement.

Write a congruence statement  1.  2. $\triangle ABC \equiv \triangle FDE$	How do we know vertex C corresponds with vertex E? The at C is the same as the at E. Why is $\triangle ABC \equiv \triangle DEF$ NOT correct? The vertices are not in order.
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Write a congruence statement for these congruent shapes.

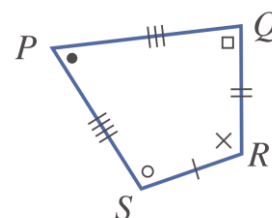
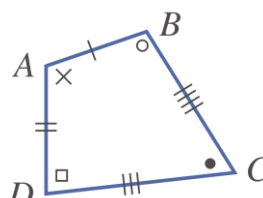
a



$\triangle \dots \equiv \triangle \dots$

$\triangle ABC \equiv \triangle ZXY$

b



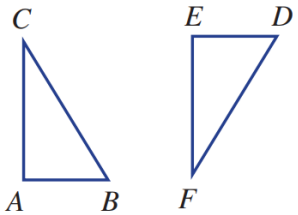
$ABCD \equiv RSPQ$

Key ideas

- If ABC is congruent to triangle STU then we write $\triangle ABC \dots \triangle STU$.
- When writing congruent statements, the vertices must be in order.

1 Write a congruence statement for these shapes.
Remember that the matching vertices should be in the same order.

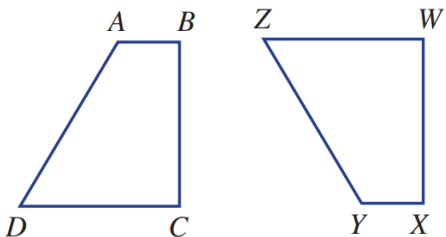
a



$\Delta \dots\dots \equiv \Delta \dots\dots$

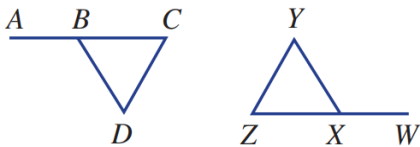
$\Delta ABC \equiv \Delta EDF$

b



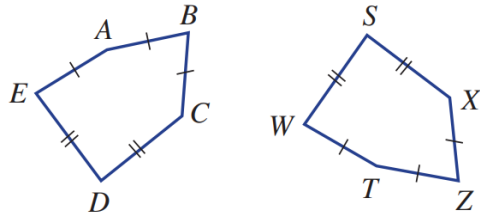
$ABCD \equiv YXWZ$

c



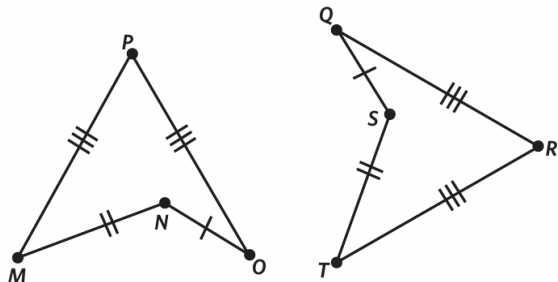
$ABCD \equiv WXZY$

d



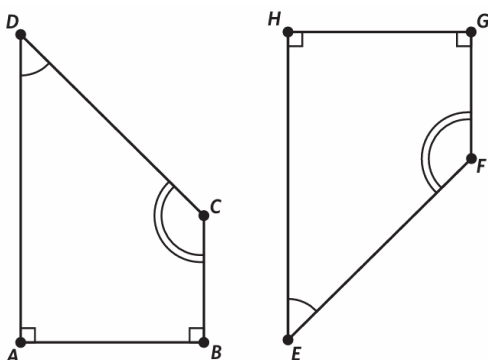
$ABCDE \equiv TZXSZ$

e



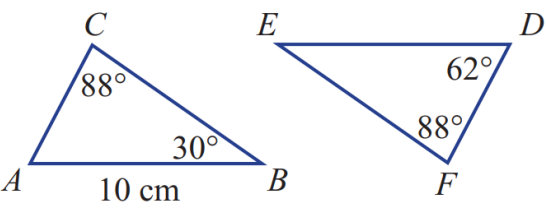
$MNOP \equiv TSQR$

f



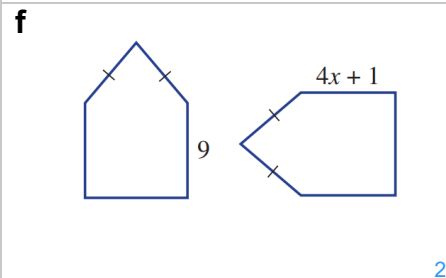
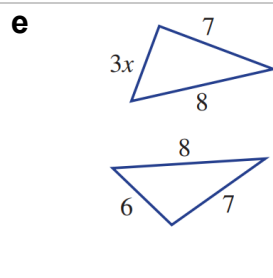
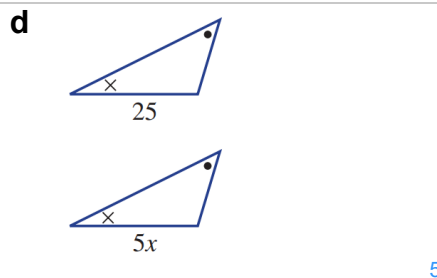
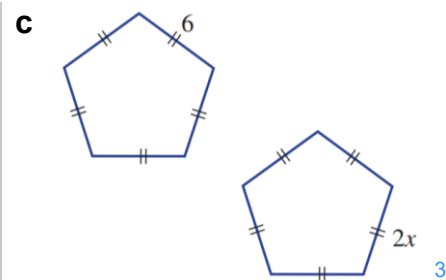
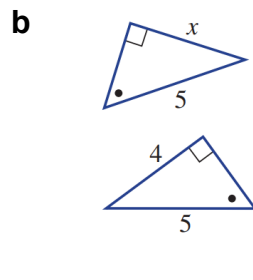
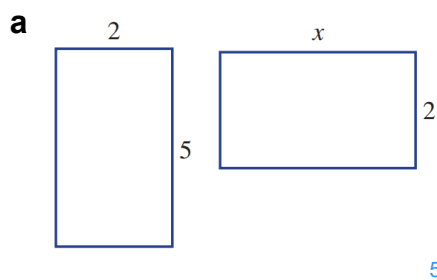
$ABCD \equiv HGFE$

2 These triangles are congruent.

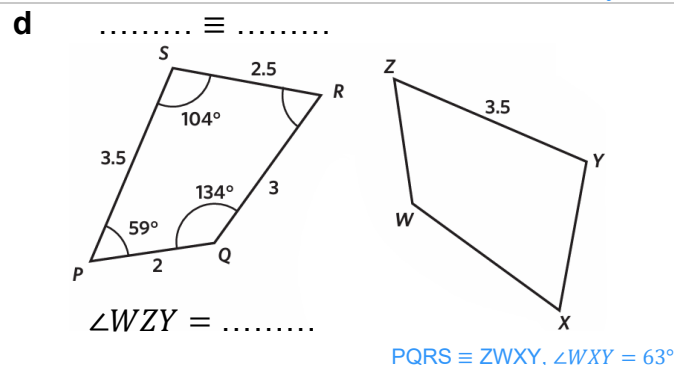
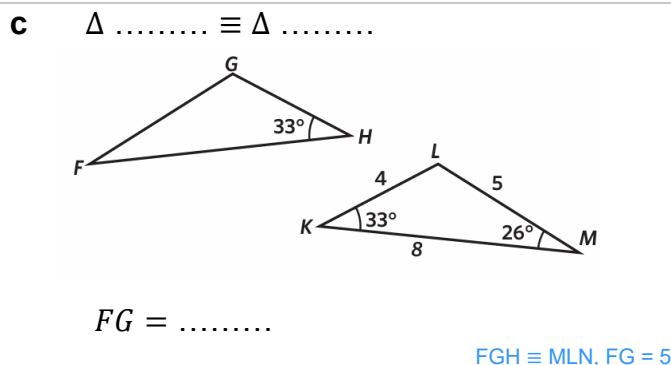
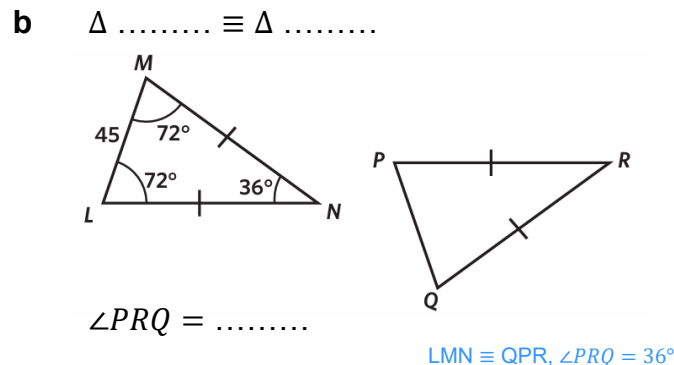
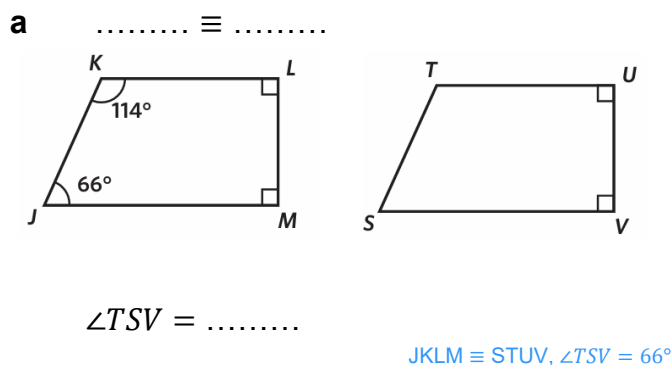


- a Write a congruence statement:
 $\Delta \dots\dots \equiv \Delta \dots\dots$
- $\Delta ABC \equiv \Delta DEF$
- b Which side on ΔDEF corresponds to side AB?
ED
- c What is the length AB?
10
- d What is the length DE?
10
- e Which angle on ΔABC corresponds to $\angle E$?
 $\angle B$
- f What is the size of $\angle B$?
62°
- g What is the size of $\angle E$?
30°

3 These pairs of figures are congruent. Find the value of the pronumeral in each case.



4 For each shape, write the congruence statement then find the size of the missing angle or side.



5 Find the value of the pronumerals in these diagrams that include congruent triangles.

