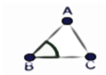
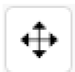
Investigation on congruency of triangles

Two triangles are congruent if they are identical in size and shape. This means that, the corresponding sides and angles of the two congruent triangles are equal.

Whenever two triangles are congruent, we can state the following: $\Delta ABC \equiv \Delta FGD$

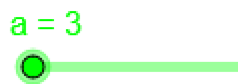
Note: An included angle in a triangle is formed by two sides of a triangle.

 Angle $\hat{B}$ is included between sides BC and AB. Angle__ is included between sides ___and__

 use to move the diagrams

 use to drag labels (eg length and angles)

 use to measure length



Slider a

 use to measure angles

Slider b

 Use to get the original triangles

Activity 1i.

a. Use the applet "Discover SSS" to complete the table below:

Triangle	**Slider a = 3 and b = 4.5**					
ΔABC (Green)	AB = 3	AC= 4.5	BC= 4.36	$\hat{A}$=	$\hat{B}=$	$\hat{C}=$
ΔFGD (Blue)	DF = 3	DG = 4.5	FG = 4.36	$\hat{D}=$	$\hat{F}=$	$\hat{G}=$
	Set Slider a = 3.8 and b = 5					
ΔABC (Green)	AB = 3.8	BC = 5.01	AC = 5	$\hat{A}$=	$\hat{B}$=	$\hat{C}$=
ΔFGD (Blue)	DF = 3.8	FG = 5.01	DG = 5	$\hat{D}$=	$\hat{F}$=	$\hat{G}$=
	Set Slider a = 4.6 and b = 5.5					
ΔABC (Green)	AB = 4.6	BC = 5.68	AC = 5.5	$\hat{A}$=	$\hat{B}$=	$\hat{C}$=
ΔFGD (Blue)	DF = 4.6	FG = 5.68	DG = 5.5	$\hat{D}$=	$\hat{F}$=	$\hat{G}$=

b. Using the measurements in the table above and the applet, fill in the gaps:

AB _______ DF; AB is opposite angle ______ and DF is opposite angle_______; and $\hat{C}$____$\hat{G}$_

BC _______FG; BC is opposite angle _______ and FG is opposite angle _____and $\hat{A}$_______$\hat{D}$

AC _______DG; AC is opposite angle______ and DG is opposite angle _______ ; and $\hat{B}$______$\hat{F}$

c. What can you say about the corresponding angles in each case?____

d. What can you conclude about ΔABC and ΔFGD in each case?____

e. If the corresponding sides of two triangles are ______; then the triangles are ___________. This is written as ._______

Activity 1ii.

a. Use applet “Does AAA work” to complete the table below:

Triangle	**Slider a =2 and b = 3.5**					
ΔABC	AB =	BC=	AC=	$\hat{A}$=	$\hat{B}$=	$\hat{C}$=
ΔFGD	DF =	FG =	DG =	$\hat{D}$=	$\hat{F}$=	$\hat{G}$=
	Slider a = 3 and b = 4					
ΔABC	AB =	BC=	AC=	$\hat{A}$=	$\hat{B}$=	$\hat{C}$=
ΔFGD	DF =	FG =	DG =	$\hat{D}$=	$\hat{F}$=	$\hat{G}$=

b. Using the measurements in the table above, complete the gaps

$\hat{C}$________$\hat{G}$_ but AB ____________________ DF

$\hat{A}$_______$\hat{D}$ but BC _____________________FG

$\hat{B}$_____$\hat{F}$ but AC ____________________DG and

c. What can you conclude about ΔABC and ΔFGD in each case?___________________________

d. In two triangles, three corresponding angles may be equal but ____________________________

Activity 2i

a. Use applet “Discover SAS” to complete the table below:

Triangle	**Slider a = 3.5 and α = 45°**					
ΔABC (Green)	AB = 3.5	BC=	AC=4.87	$\hat{A}$= **45**°	$\hat{B}$=	$\hat{C}$=
ΔPQR (Pink)	PQ = 3.5	QR =	PR = 4.87	$\hat{P}$=**45**°	$\hat{Q}$=	$\hat{R}$=
	Set Slider a = 4.5 and α = 60°					
ΔABC (Green)	AB = 4.5	BC=	AC=6.26	$\hat{A}$= **60**°	$\hat{B}$=	$\hat{C}$=
Δ PQR (Pink)	PQ = 4.5	QR =	PR = 6.26	$\hat{P}$= **60**°	$\hat{Q}$=	$\hat{R}$=
	Set Slider a = 5.5 and α = 75°					
ΔABC (Green)	AB =	BC=	AC=	$\hat{A}$=	$\hat{B}$=	$\hat{C}$=
Δ PQR (Pink)	PQ =	QR =	PR =	$\hat{P}$=	$\hat{Q}$=	$\hat{R}$=

b. What can you conclude about the corresponding sides and angles of ΔABC and ΔPQR in each case.

____

c. If, in two triangles, two pairs of corresponding sides are _______________and the corresponding pair of included angles are ____________. Then the two triangles are _____________. This is written as _____________.

Activity 2ii

a. Use applet "Does SSA work" to complete the table below:

Triangle						
ΔPQS	PQ =	QS=	PS=	$\hat{P}$=	$P\hat{Q}S$=	$P\hat{S}Q$=
ΔPQR	PQ =	QR =	PR =	$\hat{P}$=	$P\hat{Q}R$=	$P\hat{R}Q$=

b. What sides and angles are equal in both triangles?____

____

c. Are the triangles congruent?

d. What can you conclude if, in two triangles, two pairs of corresponding sides are equal but the pair of corresponding equal angles are non-included angles:______________________________________.

Activity 3

a. Use applet "SAA" to complete the table below:

Triangle	**Slider a = 5 ; α = 45° and γ = 30°**					
ΔABC (Green)	AB = 5	BC=	AC=	$\hat{A}$= **45°**	$\hat{B}$= **30°**	$\hat{C}$=
ΔPQR (Pink)	PQ = 5	QR =	PR =	$\hat{P}$=**45°**	$\hat{Q}$= **30°**	$\hat{R}$=
	Slider a = 6 ; α = 50° and γ = 35°					
ΔABC (Green)	AB = 6	BC=	AC=	$\hat{A}$= **50°**	$\hat{B}$= **35°**	$\hat{C}$=
Δ PQR (Pink)	PQ = 6	QR =	PR =	$\hat{P}$= **50°**	$\hat{Q}$= **35°**	$\hat{R}$=
	Slider a = 7 ; α = 55° and γ = 40°					
ΔABC (Green)	AB = 7	BC=	AC=	$\hat{A}$= **55°**	$\hat{B}$= **40°**	$\hat{C}$=
Δ PQR (Pink)	PQ = 7	QR =	PR =	$\hat{P}$= **55°**	$\hat{Q}$= **40°**	$\hat{R}$=

b. What can you conclude about the corresponding sides and angles of the triangles?

____

c. What can you conclude about ΔABC and ΔPQR in each case.________________________________

d. If, in two triangles, one pair of corresponding sides are ________________ and two pairs of corresponding angles are ______________________, then the triangles are __________________.This is written as ____________.

Activity 4

a. Use applet "RHS" to complete the table below:

Triangle	**Slider a = 3,5 ; b = 4**					
ΔABC (Green)	AB = 3.5	BC = 4	AC =	$\hat{A}$= **90°**	$\hat{B}$=	$\hat{C}$=
ΔPQR (Pink)	PQ = 3.5	QR = 4	PR =	$\hat{P}$=**90°**	$\hat{Q}$=	$\hat{R}$=
	Slider a = 4 ; b = 5					
ΔABC (Green)	AB = 4	BC= 5	AC=	$\hat{A}$= **90°**	$\hat{B}$=	$\hat{C}$=
Δ PQR (Pink)	PQ = 4	QR = 5	PR =	$\hat{P}$= **90°**	$\hat{Q}$=	$\hat{R}$=
	Slider a = 4.5 ; b = 6					
ΔABC (Green)	AB = 4.5	BC= 6	AC=	$\hat{A}$= **90°**	$\hat{B}$=	$\hat{C}$=
Δ PQR (Pink)	PQ = 4.5	QR = 6	PR =	$\hat{P}$= **90°**	$\hat{Q}$=	$\hat{R}$=

b. What can you conclude about the corresponding sides and angles of the triangles?

____

c. What can you conclude about ΔABC and ΔPQR in each case.__________________________________

d. If, in two right-angled triangles, the hypotenuse of each triangle is equal and a pair of corresponding sides are ________________, then the triangles are __________________. This is written as _______