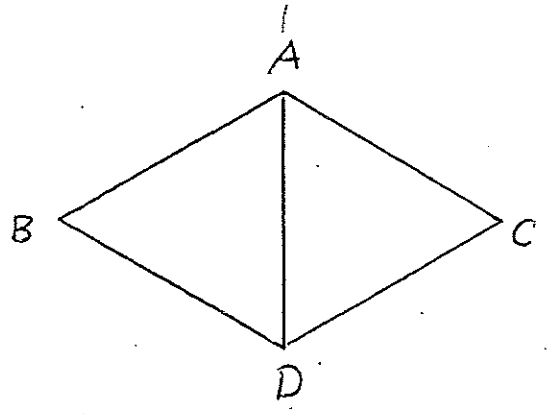
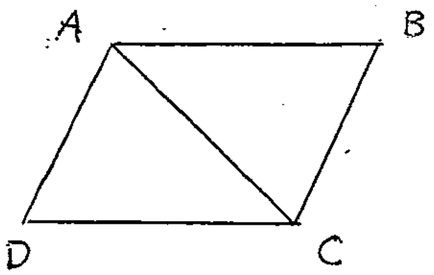
# CONGRUENT TRIANGLES

1. 

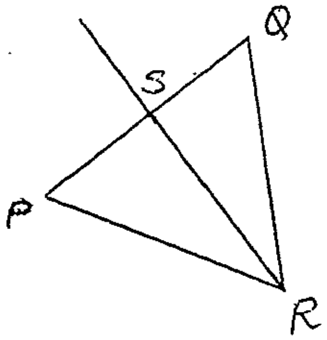


$AB = AC$, $AD$ bisects $\angle BAC$. Prove $\triangle ABD \equiv \triangle ACD$ and hence $DB = DC$.

2. 

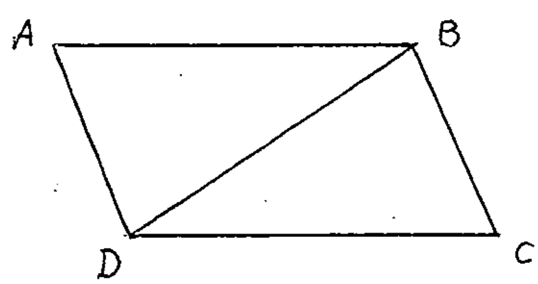


$AB \parallel DC$. $\angle B = \angle D$. Prove $\triangle ABC \equiv \triangle CDA$ and $AD = BC$.

3. 

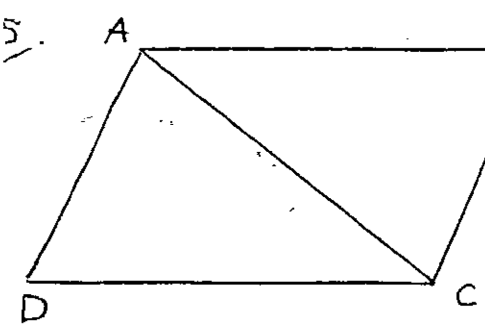


$RS$ is the right bisector of $PQ$
Prove $\triangle PSR \equiv \triangle QSR$ and $PR = RQ$

4. 



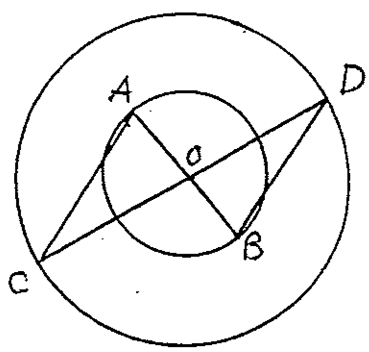
$AB = DC$, $AD = BC$. Prove $\triangle ADB \equiv \triangle CBD$ and $AB \parallel DC$, $AD \parallel BC$.

5. 



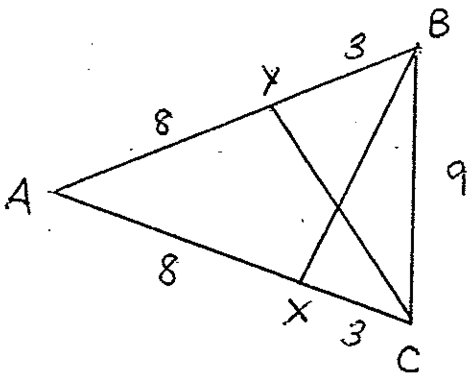
$AB \parallel DC$ and $AB = DC$. Prove $\triangle ADC \equiv \triangle CBA$ and $AD \parallel BC$, $AD = BC$.

6.



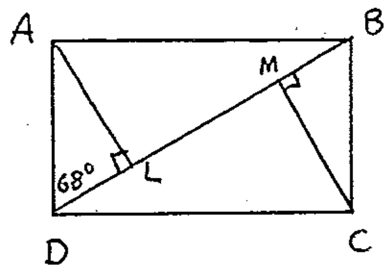

O is the centre of both circles.
Prove $\Delta AOC \equiv \Delta BOD$ and hence $AC \parallel BD$.

7.



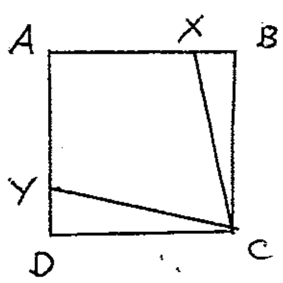

Name two congruent triangles in the figure. Prove them congruent. Set out a proof that $BX = CY$.

8.




ABCD is a rectangle (ie. opposite sides equal and parallel)
Find $\angle MBC$ with reasons.
If $AL \perp BD$ and $CM \perp BD$ show $AL = MC$

9.




ABCD is a square.
CX is made equal to CY.
Prove that $AX = AY$.

10. The point P is equidistant from the points A, B.
Prove that if M is the midpoint of AB then $PM \perp AB$

Terence ?

1. To prove $\triangle ABD \equiv \triangle ACD$

$AB = AC$ (given)

$AD$ is common

$\angle BAD = \angle CAD$ (bisection of angle)

$\therefore \triangle ABD \equiv \triangle ACD$ (S.A.S)

$\therefore DB = DC$ (matching sides of congruent triangles

2. To prove $\triangle ABC \equiv \triangle CDA$

$AC$ is common

$\angle B = \angle D$ (given)

$\angle BAD = \angle DCA$ (alternate angles)

$\therefore \triangle ABC \equiv \triangle CDA$ (A.A.S)

$\therefore AD = BC$ (matching sides of congruent triangles)

3. To prove $\triangle PSR \equiv \triangle QSR$

$PS = QS$ (given)

$RS$ is common

$\angle PSR = \angle QSR$ (right angle bisector)

$\therefore \triangle PSR \equiv \triangle QSR$ (S.A.S)

$\therefore PR = RQ$ (matching sides of congruent triangles)

4. To prove $\triangle ADB \equiv \triangle CBD$

$AB = DC$ (given)

$AD = BC$ (given)

$BD$ is common

$\therefore \triangle ADB \equiv \triangle CBD$ (S.S.S)

$\therefore \angle ADB = \angle CBD$ (matching angles of congruent triangles)

This means $\angle ADB$ and $\angle CBD$ are alternate

$\therefore AB \parallel DC$

$\angle ABD = \angle CDB$ (matching angles of congruent triangles)

This means $\angle ABD$ and $\angle CDB$ are alternate

$\therefore AD \parallel BC$

5. To prove $\triangle ADC \equiv \triangle CBA$

$DC = AB$ (given)

$\angle DCA = \angle ACB$ (alternate angles)

$AC$ is common ✓

$\therefore \triangle ADC \equiv \triangle CBA$ (S·A·S)

$\therefore AD = BC$ (matching sides of congruent triangles)

$\angle CAD = \angle ACB$ (matching angles of congruent triangles)

This means $\angle CAD$ and $\angle ACB$ are alternate

$\therefore AB \parallel BC$

6. To prove $\triangle AOC \equiv \triangle BOD$

$AO = BO$ ✓ (radius of a circle)

$CO = DO$ ✓ (radius of a circle)

$\angle AOC = \angle BOD$ (vertically opposite angles)

$\therefore \triangle AOC \equiv \triangle BOD$ (S·A·S)

$\therefore \angle OCA = \angle ODB$ (matching angles of congruent triangles)

This means $\angle OCA$ and $\angle ODB$ are ~~congruent~~ alternate

$\therefore AC \parallel BD$ ✓

7. Congruent Triangles: $\triangle AYC$ and $\triangle AXB$ ✓

To prove $\triangle AYC \equiv \triangle AXB$

$AY = AX$ ✓ (given)

$AB = AC$ ✓ (given)

$\angle XAY$ is common ✓

$\therefore \triangle AYC \equiv \triangle AXB$ (S·A·S) ✓

$\therefore BX = CY$ (matching sides of congruent triangles)

8. $\angle MBC = 68^\circ$ (alternate angles)

Aim : To show $AL = MC$

Proof : In $\Delta$'s $MBC$ and $LDA$

$\angle MBC = \angle DAL$ (above)

$\angle CMB = \angle ALD$ (given)

$DA = BC$ (opposite sides of a rectangle)

$\therefore \Delta MBC \equiv \Delta LDA$ (A.A.S)

$\therefore$ ~~AL~~ $MC = AL$ (matching sides of congruent triangle

9. Aim : To prove $AX = AY$

~~Proff~~ : In $\Delta$'s $CBX$ and $CDY$

$\angle CBX = \angle CDY$ (angles of a square)

$CX = CY$ (given)

$CB = CD$ (sides of a square)

$\therefore \Delta CBX \equiv \Delta CDY$ (R.H.S)

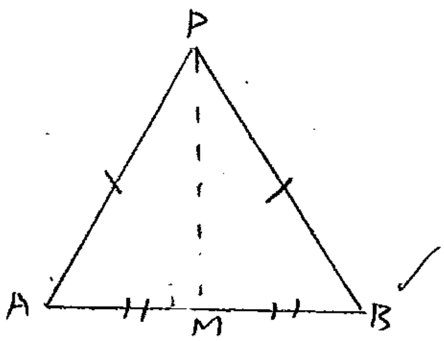
$\therefore BX = DY$ (matching sides of congruent triangles)

But $AB = AD$ (properties of a square)

$\therefore AB - BX = AD - DY$

$\therefore AX = AY$

10.




Aim : To find if $PM \perp AB$

Proof : In $\Delta$'s $PMA$ and $PMB$

$PM$ is common

$PA = PB$ (given)

$MA = MB$ (given)

$\therefore \Delta PMA \equiv \Delta PMB$ (S.S.S)

$\therefore \angle PMA = \angle PMB$ (matching angles of congruent triangle

$\angle PMA + \angle PMB = 180^\circ$ (angles sum of line

$2 \times \angle PMA = 180^\circ$

$\angle PMA = 90^\circ \quad \therefore PM \perp AB$