Question:1

State the correspondence between the vertices, sides and angles of the following pairs of congruent triangles.

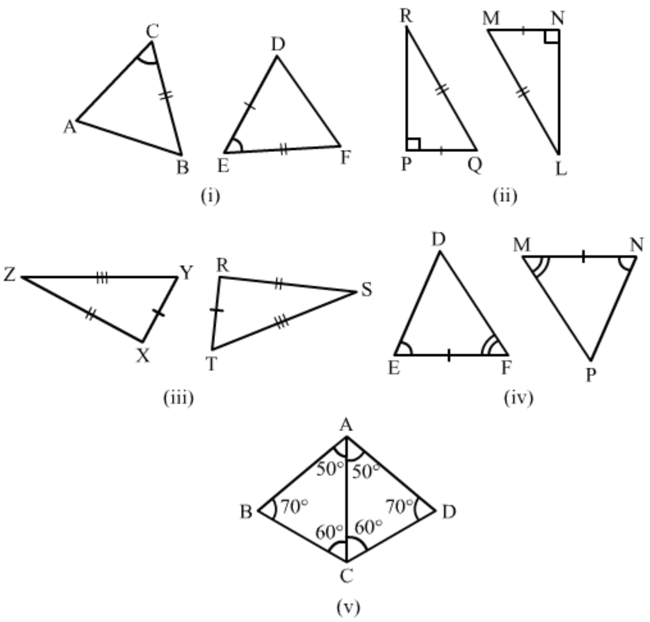
i $\Delta ABC \cong \Delta EFD$
ii $\Delta CAB \cong \Delta QRP$
iii $\Delta XZY \cong \Delta QPR$
iv $\Delta MPN \cong \Delta SQR$

Solution:

We have to state the correspondence between the vertices, sides and angles of the following pairs of congruent triangles. (i) $\triangle ABC \cong \triangle EFD$

Question:2

Given below are pairs of congruent triangles. State the property of congruence and name the congruent triangles in each case.

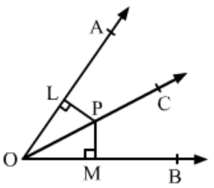


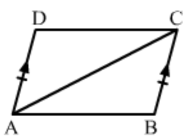
Solution:

(i) $\triangle ACB \cong \triangle DEF$(SAS congruence property)(ii) $\triangle RPQ \cong \triangle LNM$(RHS congruence property)(iii) $\triangle YXZ \cong \triangle TRS$(SSS congruence proper

Question:3

In Fig. $PL \perp OA$ and $PM \perp OB$ such that $PL = PM$. Is $\Delta PLO \cong \Delta PMO$?
Give reasons in support of your answer.





Solution:

Given : $PL \perp OA$ $PM \perp OB$ $PL = PM$ To prove : $\triangle PLO \cong \triangle PMO$ Proof : In $\triangle PLO$ and $\triangle PMO$: $\angle PLO = \angle PMO$ $(90^\circ$ each$)$ $PO = PO$

Question:4

In Fig. $AD = BC$ and $AD \parallel BC$. Is $AB = DC$? Give reasons in support of your answer.

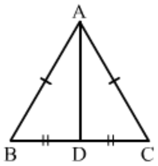
Figure

Solution:

Given : $AD = BC$ $AD \parallel BC$ We have to show that $AB = DC$. Proof : $AD \parallel BC$ $\therefore \angle BCA = \angle DAC$ (alternate angles) In $\triangle ABC$ and $\triangle$ (

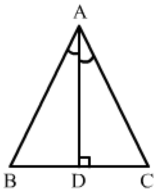
Question:5

In the adjoining figure, $AB = AC$ and $BD = DC$. Prove that $\Delta ADB \cong \Delta ADC$ and hence show that
i $\angle ADB = \angle ADC = 90°$
ii $\angle BAD = \angle CAD$.



Solution:
Given : $AB = AC,\ BD = DC$ To prove : $\triangle ADB \cong \triangle ADC$ Proof : (i) $In\ \triangle ADB$ and $\triangle ADC : AB = AC$ (given) $\mathrm{BD} = \mathrm{DC}$ (given) $\mathrm{DA} = \mathrm{DA}$

Question:6
In the adjoining figure, *ABC* is a triangle in which *AD* is the bisector of $\angle A$. If $AD \perp BC$, show that ΔABC is isosceles.



Solution:
Given : AD is a bisector of $\angle A. => \angle DAB = \angle DAC$ ...(1) $AD \perp BC => \angle BDA = \angle CDA$ (90° each) To prove : $\triangle ABC$ is isosceles. Proof :

Question:7
In the adjoining figure, *AB* = *AD* and *CB* = *CD*.
Prove that $\Delta ABC \cong \Delta ADC$.

Figure
Solution:
Given : $AB = AD$ $CB = CD$ To prove : $\triangle ABC \cong \triangle ADC$ Proof : In $\triangle ABC$ and $\triangle ADC : AB = AD$ (given) $\mathrm{BC} = \mathrm{DC}$ (given) $\mathrm{AC} =$

Question:8
In the given figure, $PA \perp AB$, $QB \perp AB$ and *PA* = *QB*.
Prove that $\Delta OAP \cong \Delta OBQ$.
Is OA = OB?

Figure
Solution:
Given : $PA \perp AB$ $QB \perp AB$ $PA = QB$ To prove : $\triangle OAP \cong \triangle OBQ$ Find whether $OA = OB$. Proof : In $\triangle OAP$ and $\triangle OBQ : \angle P$

Question:9
In the given figure, triangles *ABC* and *DCB* are right-angled at *A* and *D* respectively and *AC* = *DB*. Prove that $\Delta ABC \cong \Delta DCB$.

Figure
Solution:
Given : Triangles $ABC\ and\ DCB$ are right angled at A and D, respectively. $AC = DB$ To prove : $\triangle ABC \cong \triangle DCB$ In $\triangle ABC$ and $\triangle DCB : \angle CA$

Question:10
In the adjoining figure, ΔABC is an isosceles triangle in which *AB* = *AC*. If *E* and *F* be the midpoints of *AC* and *AB* respectively, prove that *BE* = *CF*.

Figure
Solution:
$Given : \triangle ABC$ is an isosceles triangle in which $AB = AC$. E and F are midpoints of AC and AB, respectively. To prove : $BE = CF$ Proof : E and

Question:11
In the adjoining figure, *P* and *Q* are two points on equal sides *AB* and *AC* of an isosceles triangle *ABC* such that *AP* = *AQ*.
Prove that *BQ* = *CP*.

Figure
Solution:
Given : $AB = AC$ $\triangle ABC$ is an isosceles triangle. $AP = AQ$ To prove : $BQ = CP$ Proof : $AB = AC$ (given) $AP = AQ$ (given) $AB - AP = AC - AQ$

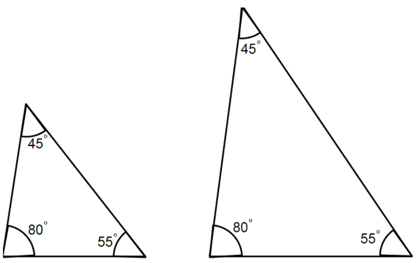
Question:12
In the given figure, Δ*ABC* is an isosceles triangle in which *AB* = *AC*. If *AB* and *AC* are produced to *D* and *E* respectively such that *BD* = *CE*.
Prove that *BE* = *CD*.

Figure
Solution:
$\text{Given}: ABC \text{ is an isosceles triangle. } AB = AC BD = CE \text{ To prove}: BE = CD \text{ Proof}: AB + BD = AC + CE \quad (As,\ AB = AC,\ BD = CE) => AD =$

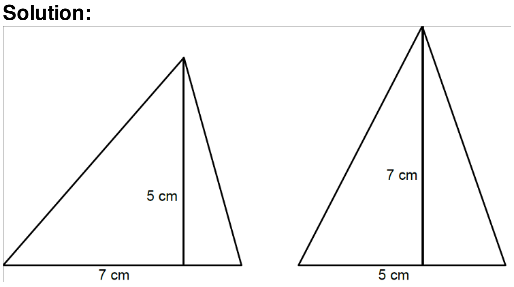
Question:13
In the adjoining figure, Δ*ABC* is an isosceles triangle in which *AB* = *AC*. Also, *D* is a point such that *BD* = *CD*.
Prove that *AD* bisects ∠*A* and ∠*D*

Figure
Solution:
.
$\text{Given}: \triangle ABC \text{ is an isosceles triangle. } AB = AC BD = CD \text{ To prove}: AD \text{ bisects } \angle A \text{ and } \angle D. \text{ Proof}: \text{Consider } \triangle ABD \text{ and } \triangle ACD: AB = AC$ (

Question:14
If two triangles have their corresponding angles equal, are they always congruent? If not, draw two triangles which are not congruent but which have their corresponding angles equal.
Solution:
No, its not necessary. If the corresponding angles of two triangles are equal, then they may or may not be congruent.
They may have proportional sides as shown in the following figure:



Question:15
Are two triangles congruent if two sides and an angle of one triangle are respectively equal to two sides and an angle of the other? If not then under what conditions will they be congruent?
Solution:
No, two triangles are not congruent if their two corresponding sides and one angle are equal. They will be congruent only if the said angle is the included angle between the sides.

Question:16
Draw Δ*ABC* and Δ*PQR* such that they are equal in area but not congruent.
Solution:


Both triangles have equal area due to the the same product of height and base. But they are not congruent.

Question:17
Fill in the blanks:

i Two lines segments are congruent if they have ....
ii Two angles are congruent if they have ....
iii Two squares are congruent if they have ....
iv Two circles are congruent if they have ....
v Two rectangles are congruent if they have ....

vi Two triangles are congruent if they have ....
Solution:
i the same length

ii the same measure

$iii$the same side length

iv the same radius

v the same length and the same breadth

vi equal parts

Question:18
Which of the following statements are true and which of them are false?

i All squares are congruent.
ii If two squares have equal areas, they are congruent.
iii If two figures have equal areas, they are congruent.
iv If two triangles are equal in area, they are congruent.
v If two sides and one angle of a triangle are equal to the corresponding two sides and angle of another triangle, the triangle are congruent.
vi If two angles and any side of a triangle are equal to the corresponding angles and the side of another triangle then the triangles are congruent.
vii If three angles of a triangle are equal to the corresponding angles of another triangle then the triangles are congruent.
$viii$ If the hypotenuse and an acute angle of a right triangle are equal to the hypotenuse and the corresponding acute angle of another right triangle then the triangle are congruent.
ix If the hypotenuse of a right triangle is equal to the hypotenuse of another right triangle then the triangles are congruent.
x If two triangles are congruent then their corresponding sides and their corresponding angles are congruent.
Solution:
i False
This is because they can be equal only if they have equal sides.

ii True
This is because if squares have equal areas, then their sides must be of equal length.

iii False
For example, if a triangle and a square have equal area, they cannot be congruent.

iv False
For example, an isosceles triangle and an equilateral triangle having equal area cannot be congruent.

v False
They can be congruent if two sides and the included angle of a triangle are equal to the corresponding two sides and the included corresponding angle of another triangle.

vi True
This is because of the AAS criterion of congruency.

vii False
Their sides are not necessarily equal.

$viii$ True
This is because of the AAS criterion of congruency.

ix False
This is because two right triangles are congruent if the hypotenuse and one side of the first triangle are respectively equal to the hypotenuse and the corresponding side of the second triangle.

x True