RD Sharma Solutions

Class 7

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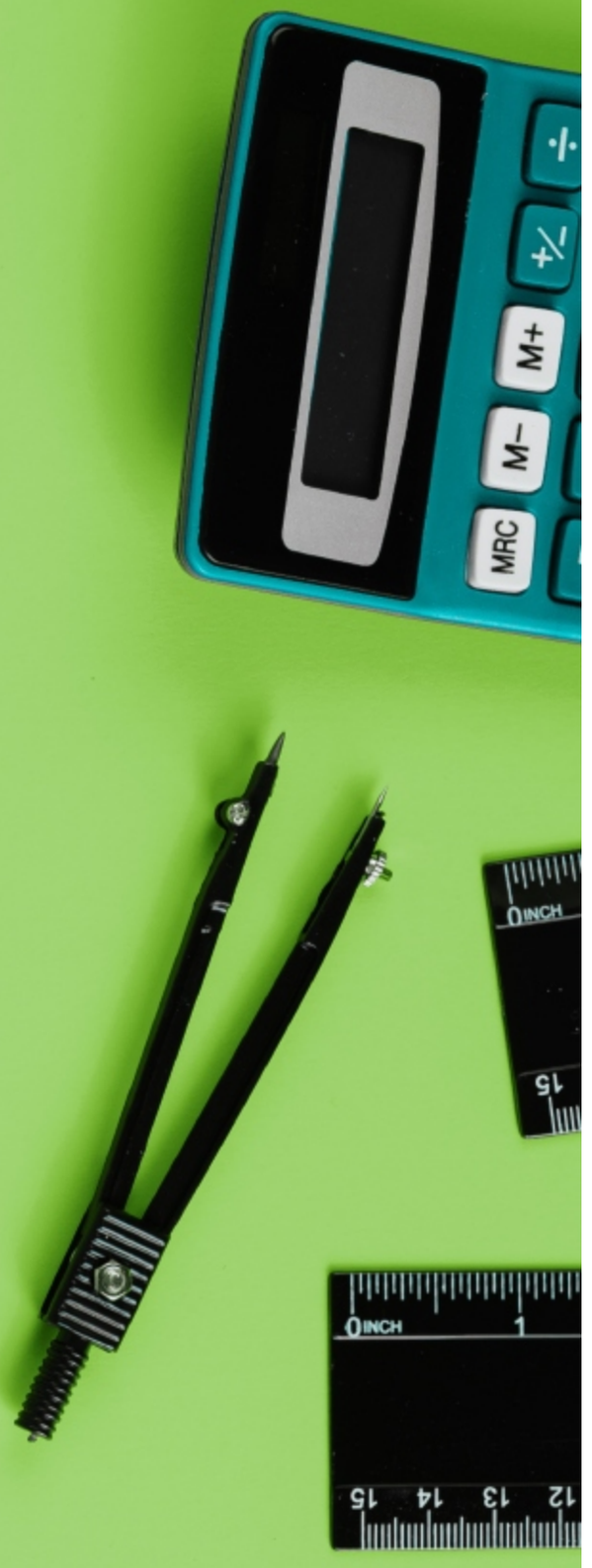


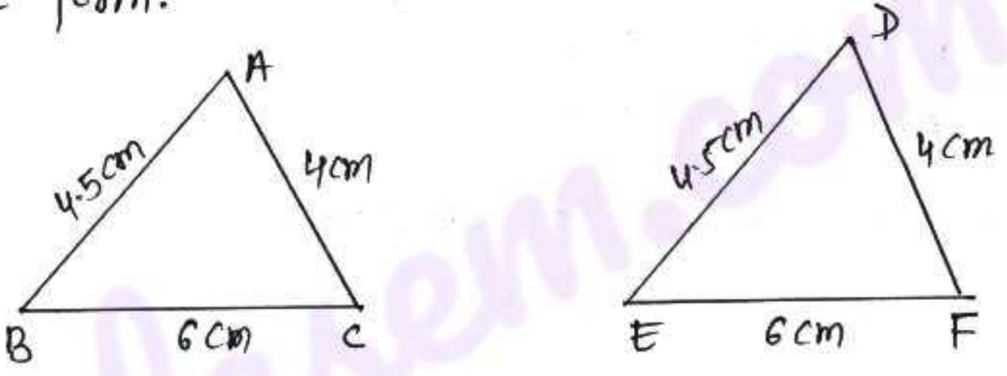
Chapter - 16

Congruence

Exercise 16.2

Q.1 In the following pairs of triangles (fig 12 to fig 15) the lengths of the sides. By applying SSS condition, determine which are congruent. State the result in symbolic form.

(i)



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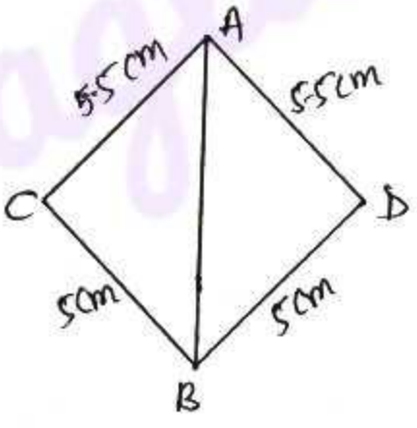

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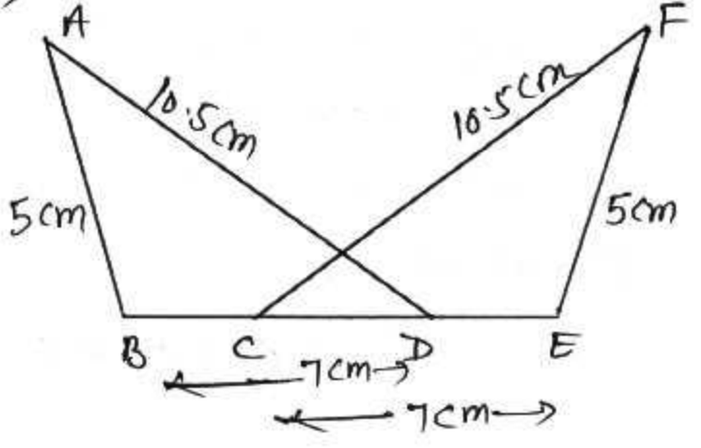

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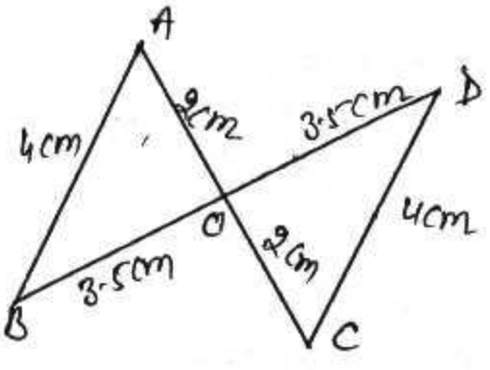

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Solution: (i) In $\triangle ABC$ and $\triangle DEF$

$AB = DE = 4.5\,cm$
$BC = EF = 6\,cm$
$AC = DF = 4\,cm$

Therefore By SSS congruence criteria
$\triangle ABC \cong \triangle DEF$

(ii) In $\triangle ABC$ and $\triangle ABD$

$AC = AD = 5.5\,cm$
$BC = BD = 5\,cm$
$AB = AB = 6\,cm$

$\therefore$ By SSS Congruence Criteria
$\triangle ACB \cong \triangle ADB$

(iii) In $\triangle ABD$ and $\triangle FEC$

$AB = FE = 5\,cm$
$AD = FC = 10.5\,cm$
$BD = CE = 7\,cm$

Therefore By SSS Congruence criteria,
$\triangle ABD \cong \triangle FEC$

(iv) In $\triangle AOB$ and $\triangle COD$, we have

$OA = OC = 2\,cm$
$OB = OD = 3.5\,cm$
$AB = CD = 4\,cm$

By SSS criterion, $\triangle AOB \cong \triangle COD$.

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Q.2 In fig 16, $AD = DC$ and $AB = BC$

(i) Is $\triangle ABD \cong \triangle CBD$?

(ii) State the three parts of matching pairs you have used to answer (i)

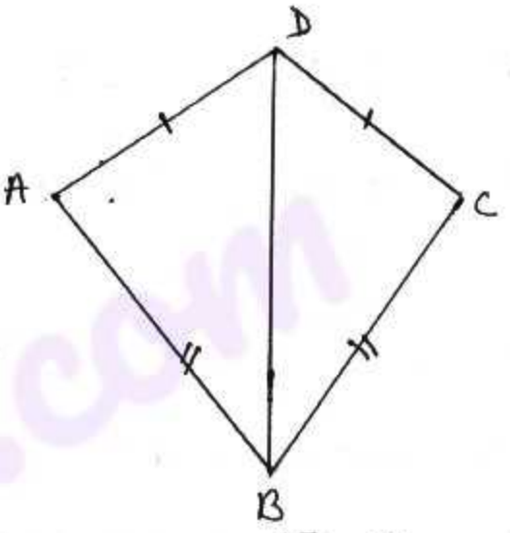


Fig. 16

Solution: we are given that

$AD = DC$, $AB = BC$

(i) In $\triangle ABD$ and $\triangle CBD$

$AD = DC$ {given}

$AB = BC$

$BC = BC$ (common side)

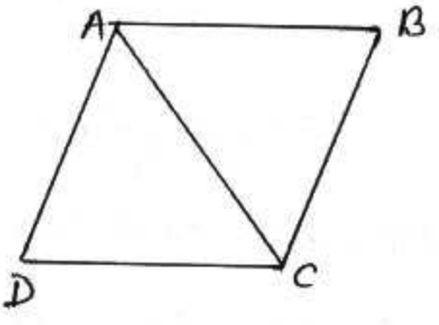
By SSS criteria, $\triangle ABD \cong \triangle CBD$

Q.3 In fig. 17, $AB = DC$ and $BC = AD$

(i) Is $\triangle ABC \cong \triangle CDA$?

(ii) what congruent condition have you used ?

(iii) you have used some fact not given in the question. what is that ?



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Solution : (i) In ΔABC and ΔCDA

$AB = DC$

$BC = AD$

and $AC = CA$ (common side)

By SSS criteria of congruence

$\Delta ABC \cong \Delta CDA$

(ii) Side-Side-Side congruence criteria

(iii) yes, we have used the fact $AC = CA$

Q.4 If $\Delta PQR \cong \Delta EFD$

(i) which side of ΔPQR equals ED ?

(ii) which angle of ΔPQR equals $\angle E$?

Solution : (i) $PR = ED$ ($\because$ corresponding sides of congruent triangles are equal)

(ii) $\angle P = \angle E$ ($\because$ corresponding angles of congruent triangles are equal)

Q.5 Triangle ABC and PQR are both isosceles with $AB = AC$ and $PQ = PR$ respectively. If also, $AB = PQ$ and $BC = QR$, are the two triangles congruent? Which condition do you use?

If $\angle B = 50°$, what is the measure of $\angle R$?

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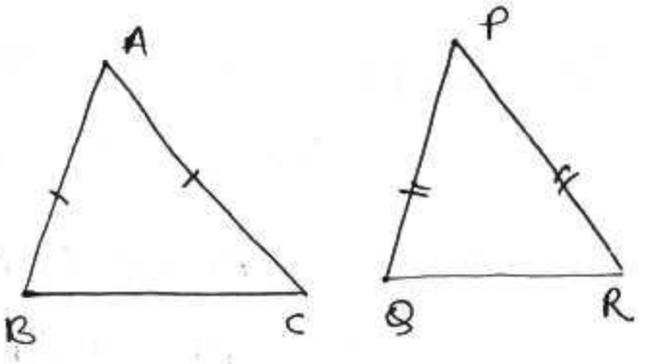
Solution :



In $\triangle ABC$ and $\triangle PQR$

$\because$ $AB = AC$, $PQ = PR$

also $AB = PQ$, $BC = QR$

$\Rightarrow$ $AC = PR$

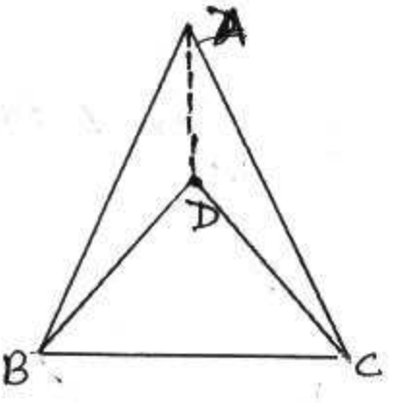
By SSS $\triangle ABC \cong \triangle PQR$

Now $\angle ABC = \angle PQR$ (By corresponding parts of congruent triangles)

$\Rightarrow$ $\angle PRQ = \angle PQR = \angle ABC$

$= 50^\circ$

Q.6 ABC and DBC are both isosceles triangles on a common base BC such that A and D lie on the same side of BC. Are triangles ADB and ADC are congruent? which condition do you use? If $\angle BAC = 40^\circ$ and $\angle BDC = 100^\circ$ then find $\angle ADB$.



Solution : $\because$ ABC and ADB are isosceles triangle.

$\therefore$ $AB = AC$

$BD = CD$

$AD = DA$ (common side)

By SSS $\triangle ADB \cong \triangle ADC$

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$\because$ ΔABC is an isosceles triangle.

$\angle ABC = \angle BCA$

$\because$ $\angle ABC + \angle BAC + \angle ACB = 180^\circ$

$\Rightarrow$ $\angle ABC + \angle ACB + 40^\circ = 180^\circ$

$\Rightarrow$ $\angle ABC + \angle ACB = 140^\circ$

$\Rightarrow$ $2\angle ABC = 140$

$\Rightarrow$ $\angle ABC = \frac{140}{2} = 70^\circ$

also ΔDBC is an isosceles triangle.

$\angle DBC = \angle DCB$

$\because$ $\angle DBC + \angle DCB + \angle BDC = 180^\circ$

$\Rightarrow$ $\angle DBC + \angle DCB + 100^\circ = 180^\circ$

$\Rightarrow$ $\angle DBC + \angle DCB = 80^\circ$

$\Rightarrow$ $\angle DBC = \frac{80}{2} = 40^\circ$

<u>Now</u> $\angle ABD = 70^\circ - 40^\circ = 30^\circ$

also $\angle BAD = \frac{40}{2} = 20^\circ$

$\therefore$ In ΔABD

$\angle ABD + \angle BAD + \angle ADB = 180^\circ$

$= 30^\circ + 20^\circ + \angle ADB = 180^\circ$

$\Rightarrow \angle ADB = 180 - 50^\circ = 130^\circ$

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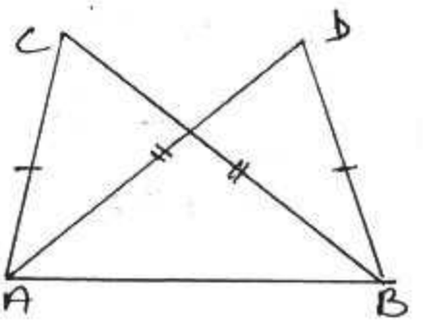
Q.7 ΔABC and ΔABD are on a common base AB, and $AC = BD$ and $BC = AD$ as shown in fig 18. Which of the following statement is true?

(I) $\Delta ABC \cong \Delta ABD$

(II) $\Delta ABC \cong \Delta ADB$

(III) $\Delta ABC \cong \Delta BAD$



Solution: In ΔABC and ΔABD; we have.

$AC = BD$
$BC = AD$ {given}
$AB = BA$ (common side)

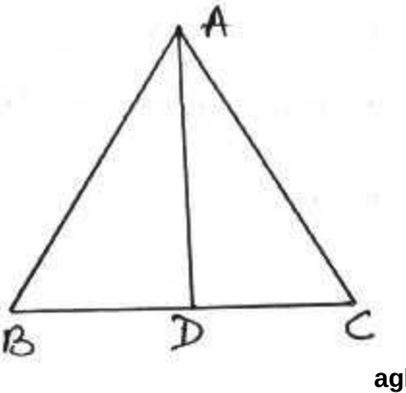
By SSS Δ $\Delta ABC \cong \Delta BAD$

hence statement (III) is true.

Q.8 In fig. 19, ΔABC is isosceles with $AB = AC$, D is the mid point of base BC.

(i) Is $\Delta ADB \cong \Delta ADC$

(ii) State the three pairs of matching parts you use to arrive at your answer.



Solution: $\because$ $AB = AC$

$\Rightarrow \angle ABC = \angle ACB$

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(i) Yes, $\triangle ADB \cong \triangle ADC$

(ii) $AB = AC$

$\angle ABC = \angle ACB$

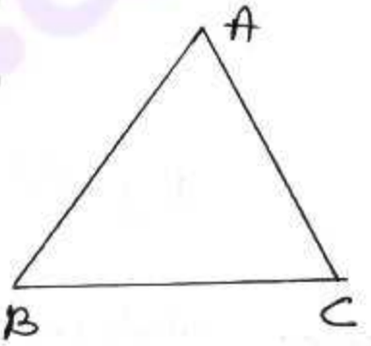
$BD = CD$ ($\because$ D is a mid point)

By SSS criteria

$\triangle ADB \cong \triangle ADC$

Q.9 In fig. 20, $\triangle ABC$ is isosceles with $AB = AC$. State if $\triangle ABC \cong \triangle ACB$. If yes, state three relations that you use to arrive at your answer

Solution:



In $\triangle ABC$, $\because AB = AC$

$\Rightarrow \angle ABC = \angle ACB$

{Angles opposite to equal sides are also equal}

So, $\triangle ABC \cong \triangle ACB$

Q.10 Triangles ABC and $\triangle DBC$ have side BC common $AB = BD$, $AC = CD$. Are the two triangles congruent? State in symbolic form, which congruence condition do you use? Does $\angle ABD$ equal $\angle ACD$? Why or why not.

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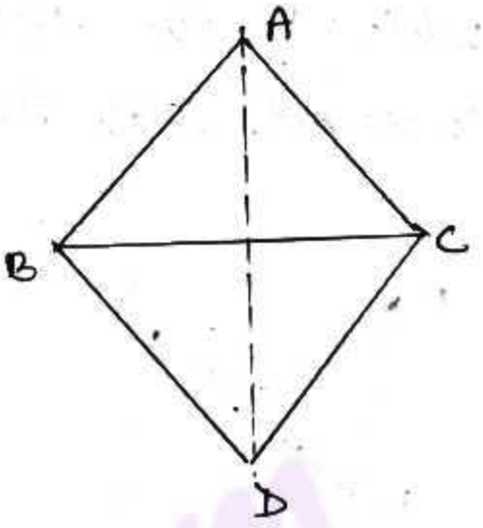
Solution:



In $\triangle ABC$ & $\triangle DBC$

$AB = BD$ {given}
$AC = CD$
$BC = CB$ (common)

By SSS $\triangle ABC \cong \triangle DBC$

$\therefore$ Yes $\triangle ABC$ and $\triangle DBC$ are congruent by SSS criteria.

Yes; $\angle ABD = \angle ACD$,

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