# PM SHRI KENDRIYA VIDYALAYA GACHIBOWLI, GPRA CAMPUS, HYD–32
## PRACTICE PAPER 09 (2024-25)
## CHAPTER 07 TRIANGLES
## (ANSWERS)

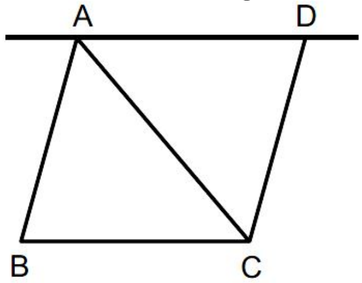
**SUBJECT: MATHEMATICS** **MAX. MARKS : 40**
**CLASS : IX** **DURATION : 1½ hrs**

**General Instructions:**
(i). **All** questions are compulsory.
(ii). This question paper contains 2**0** questions divided into five Sections A, B, C, D and E.
(iii). **Section A** comprises of **10 MCQs** of **1 mark** each. **Section B** comprises of 4 questions of **2 marks** each. **Section C** comprises of 3 questions of **3 marks** each. **Section D** comprises of 1 question of **5 marks** each and **Section E** comprises of 2 Case Study Based Questions of **4 marks** each.
(iv). There is no overall choice.
(v). Use of Calculators is not permitted

## SECTION – A
**Questions 1 to 10 carry 1 mark each.**

**1.** If $\Delta ACB \cong \Delta EDF$, then which of the following equations is/are true?
(I) $AC = ED$
(II) $\angle C = \angle F$
(III) $AB = EF$
(a) Only (I) (b) (I) and (III) (c) (II) and (III) (d) All of these
Ans. (b) (I) and (III)
Since, $\Delta ACB \cong \Delta EDF$.
$\therefore AC = ED$, $CB = DF$ and $AB = EF$
And $\angle A = \angle E$, $\angle C = \angle D$ and $\angle B = \angle F$
Therefore, equations (I) and (III) are true.

**2.** In a triangle (as shown in fig). AB = CD, AD = BC and AC is the angle bisector of ∠A, then which among the following conditions is true for congruence of ΔABC and ΔCDA by SAS rule?

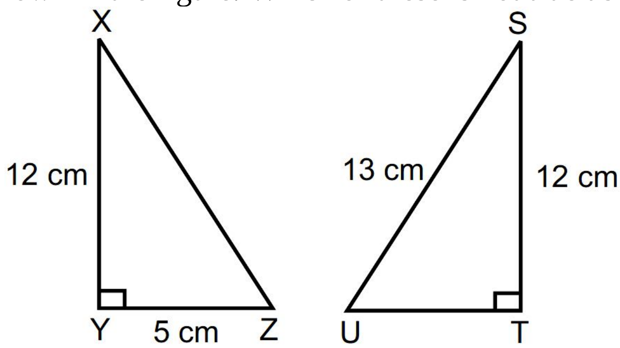



(a) $\angle A = \angle D$ (b) $\angle B = \angle A$ (c) $\angle B = \angle D$ (d) $\angle C = \angle A$
Ans. (c) $\angle B = \angle D$
As In ΔABC and ΔCDA, AB = CD and AD = BC
For SAS Rule, if two sides and the included angle of one triangle are equal to the two sides and the included angle of the other triangle, then triangles are congruent.
Therefore, For $\Delta ABC \cong \Delta CDA$
by SAS, ∠B must be equal to ∠D

**3.** If AB = QR, BC = PR and CA = PQ in ΔABC and ΔPQR, then:
(a) $\Delta ABC \cong \Delta PQR$ (b) $\Delta CBA \cong \Delta PRQ$ (c) $\Delta BAC \cong \Delta RPQ$ (d) $\Delta BCA \cong \Delta PQR$
Ans. (b) $\Delta CBA \cong \Delta PRQ$
According to the question, AB = QR, BC = PR and CA = PQ
Since, AB = QR, BC = PR and CA = PQ
We can say that, A corresponds to Q, B corresponds to R, C corresponds to P.

Hence, $\Delta CBA \cong \Delta PRQ$

**4.** Consider the triangles shown in the figure. Which of these is not true about the given triangles?




(a) $\Delta XYZ \cong \Delta STU$ (by SSS congruence rule)
(b) $\Delta XYZ \cong \Delta STU$ (by RHS congruence rule)
(c) $\Delta XYZ \cong \Delta STU$ (by ASA congruence rule)
(d) $\Delta XYZ \cong \Delta STU$ (by SAS congruence rule)
Ans. (c) $\Delta XYZ \cong \Delta STU$ [By ASA congruence rule]
In $\Delta XYZ$, $XZ^2 = XY^2 + YZ^2$
$\Rightarrow XZ^2 = (12)^2 + (5)^2$
$\Rightarrow XZ^2 = 144 + 25 \Rightarrow XZ^2 = 169 \Rightarrow XZ = 13$ cm
Therefore, $\Delta XYZ \cong \Delta STU$ [By SSS congruence rule]
Now, In $\Delta XYZ$ and $\Delta STU$,
$\angle Y = \angle T$ [Right angles]
Hypotenuse XZ = Hypotenuse SU
Hypotenuse XZ = Hypotenuse XU = 13 cm
XY = ST = 12 cm
Therefore, $\Delta XYZ \cong \Delta STU$ [By RHS congruence rule]
Then, YZ = UT = 5 cm [By CPCT]
$\therefore$ XY = ST, YZ = UT and XZ = SU
And $\angle Y = \angle T$
Here, $\Delta XYZ \cong \Delta STU$
By SSS, RHS and SAS congruence rules, but as only one angle is known, ASA congruence rule is not applicable here.

**5.** If $\Delta ABC \cong \Delta PQR$ and $\Delta ABC$ is not congruent to $\Delta RPQ$, then which of the following is not true?
(a) BC= PQ (b) AC = PR (c) QR= BC (d) AB = PQ
Ans. (a) BC = PQ
Given, $\Delta ABC \cong \Delta PQR$
Thus, the corresponding sides are equal
Hence, AB = PQ, BC = QR and AC = PR
Therefore, BC = PQ is not true for the triangles.

**6.** $\Delta LMN$ is an isosceles triangle such the LM = LN and $\angle N = 65^o$. The value of $\angle L$ is:
(a) $\angle L = 55^o$ (b) $\angle L = 45^o$ (c) $\angle L = 50^o$ (d) $\angle L = 65^o$
Ans. (c) $\angle L = 50^o$
$\Delta LMN$ is an isosceles triangle.
LM = LN [Given]
$\angle N = \angle M$ [$\because$ Angles opposite to equal sides are equal]
$\therefore \angle M = 65^o$
$\angle L + \angle M + \angle N = 180^o$ [$\because$ Angle sum property of a triangle]
$\Rightarrow \angle L + 65^o + 65^o = 180^o$
$\Rightarrow \angle L + 130^o = 180^o$
$\Rightarrow \angle L = 180^o - 130^o \Rightarrow \angle L = 50^o$

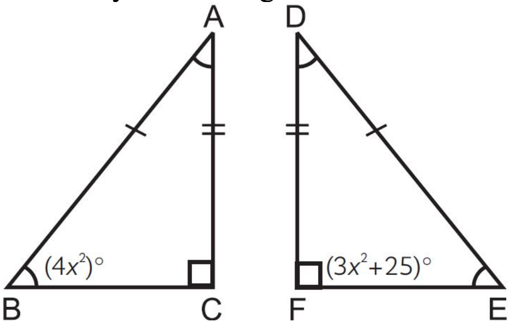
**7.** Ritish wants to prove that $\Delta FGH \cong \Delta JKL$ using SAS rule. He knows that FG = JK and FH= JL. What additional piece of information does he need?

(a) $\angle F = \angle J$ (b) $\angle H = \angle L$ (c) $\angle G = \angle K$ (d) $\angle F = \angle G$

Ans. (a) $\angle F = \angle J$

We know for SAS, if two sides and the included angle of one triangle are equal to the two sides and the included angle of the other triangle, then the triangles are congruent. So, $\angle F = \angle J$

**8.** In the given figure $\Delta ABC \cong \Delta DEF$ by AAA congruence rule. The value of $\angle x$ is:




(a) 75° (b) 105° (c) 125° (d) 5°

Ans. (d) 5°

In $\Delta ABC$ and $\Delta DEF$, $\angle C = \angle F$

AB = DE

$\therefore$ AC = DF

$\Delta ABC \cong \Delta DEF$ [By RHS rule]

$\angle B = \angle E$ [By CPCT]

$\Rightarrow (4x^2)° = (3x^2 + 25)°$

$\Rightarrow x^2 = 25 \Rightarrow x = 5°$

In the following questions 9 and 10, a statement of assertion (A) is followed by a statement of Reason (R). Choose the correct answer out of the following choices.

(a) Both A and R are true and R is the correct explanation of A.
(b) Both A and R are true but R is not the correct explanation of A.
(c) A is true but R is false.
(d) A is false but R is true.

**9.** **Assertion (A):** In $\Delta ABC$ and $\Delta PQR$, AB = PQ, AC = PR and $\angle BAC = \angle QPR$, $\Delta ABC \cong \Delta PQR$.

**Reason (R):** Both the triangles are congruent by SSS congruence.

Ans. (c) A is true but R is false.

In $\Delta ABC$ and $\Delta PQR$,

AB = PQ (given)

AC = PR (given)

$\angle BAC = \angle QPR$

$\therefore \Delta ABC \cong \Delta PQR$ (By SAS Rule)

$\therefore$ Assertion is true.

In case of reason (R): The reason is false as the triangles are congruent by SAS and not SSS.

**10.** **Assertion (A):** Each angle of an equilateral triangle is 60°.

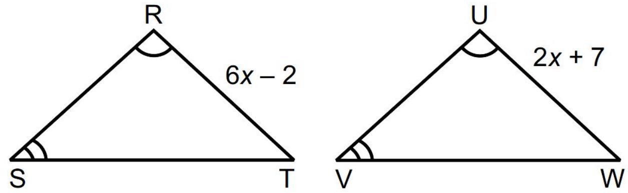
**Reason (R):** Angles opposite to equal sides of a triangle are equal.

Ans. (a) Both A and R are true and R is the correct explanation of A.

## SECTION – B

**Questions 11 to 14 carry 2 marks each.**

**11.** In $\Delta RST$, $RT = 6x - 2$. In $\Delta UVW$, $UW = 2x + 7$, $\angle R = \angle U$, and $\angle S = \angle V$. What must be the value of x in order to prove that $\Delta RST \cong \Delta UVW$?




Ans. Given that $\angle S = \angle V$ and $\angle R = \angle U$

$\angle T = \angle W$ (by Angle sum property of triangle)

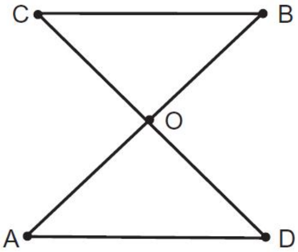
For $\Delta RST \cong \Delta UVW$, $RT = UW$ using either ASA or AAS congruence rule

$\Rightarrow 6x - 2 = 2x + 7$

$\Rightarrow 6x - 2x = 9$

$\Rightarrow 4x = 9 \Rightarrow x = 9/4 \Rightarrow x = 2.25$

**12.** In the given figure two lines AB and CD intersect each other at the point O such that BC || AD and BC = DA. Show that O is the midpoint of both the line-segment AB and CD.




Ans. BC || AD [Given]

Therefore $\angle CBO = \angle DAO$ [Alternate interior angles]

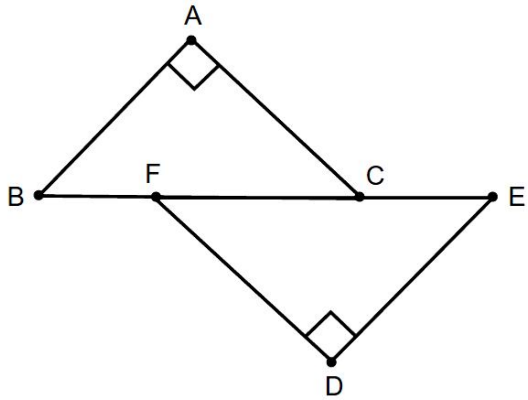
And $\angle BCO = \angle ADO$ [Alternate interior angles]

Also, BC = DA [Given]

So, $\Delta BOC \cong \Delta AOD$ [ASA congruence rule]

Therefore, OB = OA and OC = OD, i.e., O is the mid-point of both AB and CD.

**13.** In figure $BA \perp AC$, $DE \perp DF$. Such that BA = DE and BF = EC. Show that $\Delta ABC \cong \Delta DEF$.




Ans. According to the question, $BA \perp AC$, $DE \perp DF$

Such that BA = DE and BF = EC.

In, $\Delta ABC$ and $\Delta DEF$

BA = ED [Given]

BF = EC [Given]

$\angle A = \angle D$ [Both 90°]

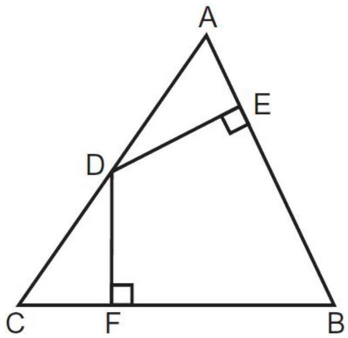
Now, BF = EC [Given]

$\Rightarrow BF + FC = EC + FC$

$\Rightarrow BC = EF$

$\therefore \Delta ABC \cong \Delta DEF$ [By RHS Congruence Rule]

**14.** In $\Delta ABC$, D is a point on side AC such that DE = DF and AD = CD and $DE \perp AB$ at E and DF $\perp$ CB at F, then prove that AB = BC.

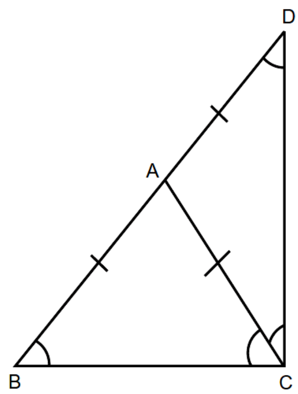



Ans. In $\Delta AED$ and $\Delta CFD$,
AD = CD
DE = DF
$\Delta AED \cong \Delta CFD$ [By RHS congruence rule]
$\angle A = \angle C$
$\therefore$ AB = BC [Sides opposite to equal angles are equal]

## SECTION – C

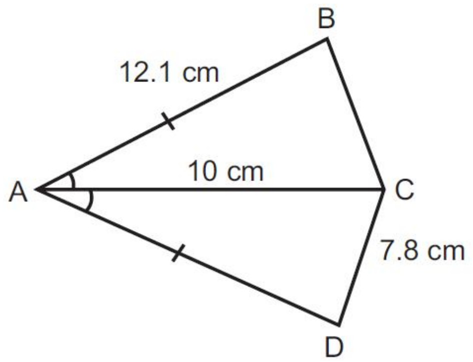
**Questions 15 to 17 carry 3 marks each.**

**15.** $\Delta ABC$ is an isosceles triangle in which AB = AC. Side BA is produced to D such that AD = AB. Show that $\angle BCD$ is a right angle.



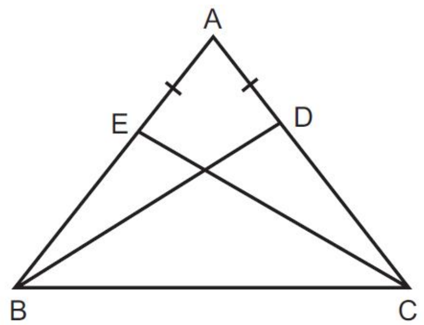

Ans. In $\Delta ABC$, AB = AC
Also, AD = AB
i.e., AC = AB = AD
In $\Delta ABC$, AB = AC
$\Rightarrow \angle ACB = \angle ABC = \angle 1$ … (i) [Angles opposite to equal sides are equal]
In $\Delta ACD$, AC = AD [As AC = AB]
$\angle ADC = \angle ACD = \angle 2$ … (ii) [Angle opposite to equal sides are equal]
In $\Delta BCD$, $\angle DBC + \angle BCD + \angle BDC = 180^o$ ...(iii) [Angle sum property of triangle]
$\Rightarrow \angle 1 + \angle 1 + \angle 2 + \angle 2 = 180^o$
$\Rightarrow 2(\angle 1 + \angle 2) = 180^o$
$\Rightarrow \angle 1 + \angle 2 = 90^o \Rightarrow \angle BCD = 90^o$

**16.** Find the perimeter of the quadrilateral ABCD (as shown in the figure), if $\angle CAB = \angle CAD$ and also AB = AD.




Ans. Since AB = AD [Given]
∴ AD = 12.1 cm [AB = 12.1cm]
Now, In ΔABC and ΔADC
AB = AD [Given]
∠BAC = ∠DAC [Given]
AC = AC [Given]
∴ ΔABC ≅ ΔADC [By SAS congruence rule]
Hence BC = DC [By CPCT]
BC = 7.8 cm
Now, we have to calculate the perimeter of quadrilateral.
Perimeter = AB + BC + CD + AD = 12.1 + 7.8 + 7.8 + 12.1 = 39.8 cm

**17.** ABC is an isosceles triangle with AB = AC and BD and CE are its two medians. Show that BD = CE.

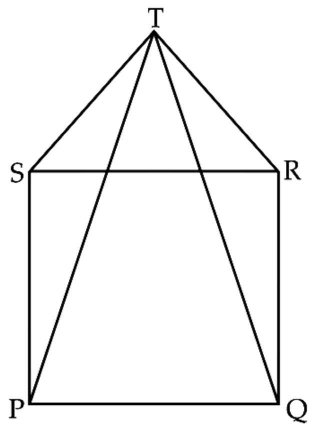



Ans. Given: AB = AC
Also, BD and CE are two medians
∴ E is the mid-point of AB
D is the mid-point of AC
Hence ½ AB = ½ AC
⇒ BE = CD
In ΔBEC and ΔCDB
BE = DC [Given]
∠EBC = ∠DCB [Angles opposite to equal sides are equal]
BC = BC [Common]
Hence, ΔBEC ≅ ΔCDB [By SAS congruence rule]
BD = CE [By CPCT]

## SECTION – D

**Questions 18 carry 5 marks.**

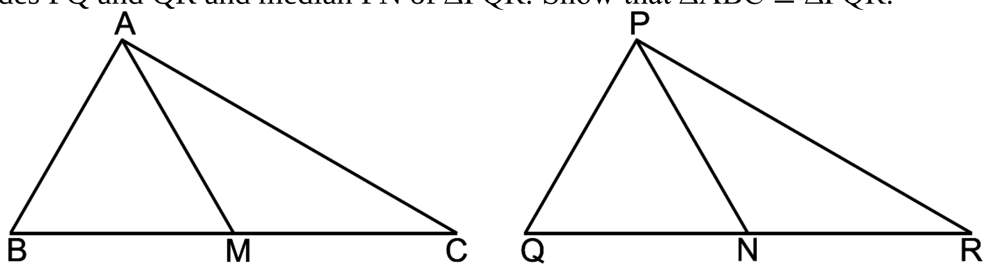
**18.** In figure, PQRS is a square and SRT is an equilateral triangle. Prove that :




(i) PT = QT (ii) ∠TQR = 15°
Ans. PQRS is a square. (Given)
(i) SRT is an equilateral triangle. (Given)
∴ ∠PSR = 90°, ∠TSR = 60°
⇒ ∠PSR + ∠TSR = 150°.
Similarly, ∠QRT = 150°
In ΔPST and ΔQRT, we have PS = QR
∠PST = ∠QRT = 150°
and ST = RT
By SAS, ΔPST ≅ ΔQRT
⇒ PT = QT (CPCT)
Hence Proved.
(ii) In ΔTQR, QR = RT (Square and equilateral triangle on same base)
or, ∠TQR = ∠QTR = x
∴ x + x + ∠QRT = 180°
⇒ 2x + 150° = 180°
⇒ 2x = 30°
∴ x = 15°.
⇒ ∠TQR = 15°.

**OR**

In the below figure, two sides AB and BC and median AM of one triangle ABC are respectively equal to sides PQ and QR and median PN of ΔPQR. Show that ΔABC ≅ ΔPQR.

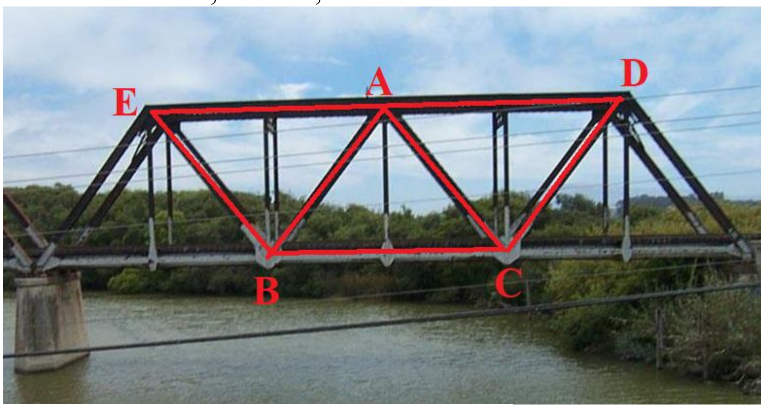



Ans. In ΔABC and ΔPQR,
BC = QR (Given)
⇒ ½ BC = ½ QR
⇒ BM = QN
In triangles ABM and PQN, we have
AB = PQ (Given)
BM = QN (Proved above)
AM = PN (Given)
∴ ΔABM ≅ ΔPQN (By SSS congruence criterion)
⇒ ∠B = ∠Q (By CPCT)
Now, in triangles ABC and PQR, we have
AB = PQ (Given)
∠B = ∠Q (Proved above)

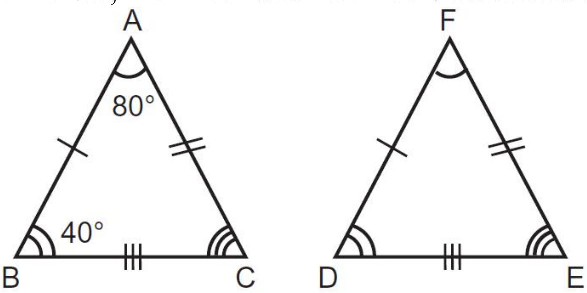
BC = QR (Given)
∴ ΔABC ≅ ΔPQR (By SAS congruence criterion)

## SECTION – E (Case Study Based Questions)
**Questions 19 to 20 carry 4 marks each.**

**19.** Truss bridges are formed with a structure of connected elements that form triangular structures to make up the bridge. Trusses are the triangles that connect to the top and bottom cord and two end posts. You can see that there are some triangular shapes are shown in the picture given alongside and these are represented as ΔABC, ΔCAD, and ΔBEA.

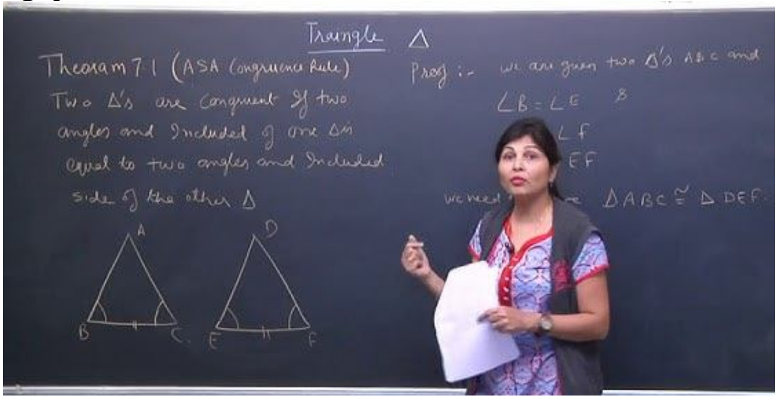



(a) If AB = CD and AD = CB, then prove ΔABC ≅ ΔCDA
(b) If AB = 7.5 m, AC = 4.5 m and BC = 5 m. Find the perimeter of ΔACD, if ΔABC ≅ ΔCDA by SSS congruence rule.
(c) If ΔABC ≅ ΔFDE, AB = 5 cm, ∠B = 40° and ∠A = 80°. Then find the length of DF and ∠E.

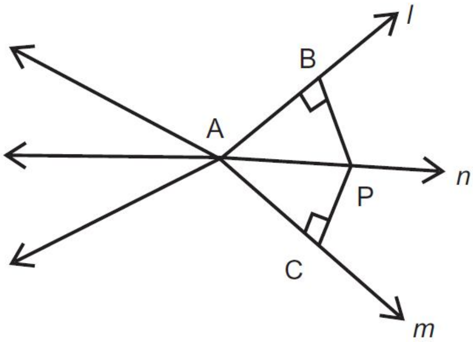



Ans. Ans. (a) In ΔABC and ΔCDA,
AB = CD [Given]
AD = CB [Given]
AC = CA [common]
So by SSS congruence rule, ΔABC ≅ ΔCDA
(b) Given that ΔABC ≅ ΔCDA [By SSS congruence rule]
So, Perimeter of ΔABC = Perimeter of ΔCDA
( 7.5 m + 4.5 m + 5 m) = Perimeter of ΔCDA
The required perimeter of ΔCDA = 17 m.
(c) Given, ΔABC ≅ ΔFDE and AB = 5cm,
∠B = 40°
∠A = 80°
Since, ΔFDE ≅ ΔABC
DF = AB [By CPCT]
DF = 5cm
and ∠E = ∠C
⇒ ∠E = ∠C = 180°– (∠A + ∠B) [By Angle Sum Property of a DABC]
⇒ ∠E = 180°– (80° + 40°) ⇒ ∠E = 60°
Hence, DF = 5cm, ∠E = 60°

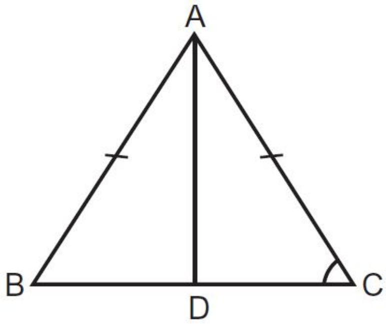
**20.** To check the understanding of the students of the class about IX the triangles, the Mathematics teacher write some questions on the blackboard and ask the students to read them carefully and answer the following question.




(a) In figure, P is a point equidistant from the lines l and m intersecting at point A, then find ∠BAP.

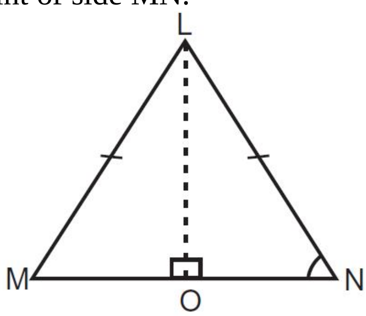



(b) In ΔABC, if AB = AC and BD = DC (see figure), then find ∠ADC.




**OR**

(b) ΔLMN is an isosceles triangle, where LM = LN and LO, is an angle bisector of ∠MLN, Prove that point 'O' is the mid-point of side MN.




Ans. Ans. (a) Let us consider ΔPAB and ΔPAC (as shown in figure).
Here, we have PB = PC [Perpendicular distance]
∠PBA = ∠PCA [Each 90°]
PA = PA [Common]
ΔPAB ≅ ΔPAC [By RHS congruence rule]
So, ∠BAP = ∠CAP [By CPCT]
(b) We have, AB = AC, BD = CD and AD = AD
∴ ΔABD = ΔACD [By SSS congruence rule]

$\angle ADB = \angle ADC$ [By CPCT]
Since, BDC is a straight line.
$\therefore \angle ADB + \angle ADC = 180°$ [By SSS congruence rule]
$\Rightarrow 2\angle ADC = 180°$
$\Rightarrow \angle ADC = 90°$

**OR**

(b) Given: $LM = LN$ and $\angle MLO = \angle NLO$
Since $\Delta LMN$ is an isosceles triangle and $LM = LN$
$\therefore \angle M = \angle N$ ...(i)
LO is an angle bisector of $\angle MLN$
$\angle MLO = \angle NLO$ ...(ii)
In $\Delta MLO$ and $\Delta NLO$, $\angle M = \angle N$
i.e., $\angle OML = \angle ONL$
$LM = LN$
$\angle MLO = \angle NLO$
$\therefore \Delta\ MLO \cong \Delta\ NLO$ [By ASA congruence rule]
$\therefore OM = ON$ [By CPCT]