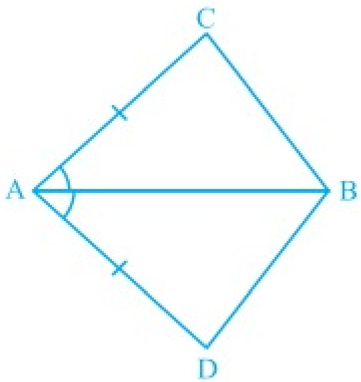
NCERT SOLUTIONS

CLASS - 9th

Class : 9th
Subject : Maths
Chapter : 7
Chapter Name : Triangles

Exercise 7.1

Q1 In quadrilateral ACBD, AC = AD and AB bisects ∠ A (see Fig). Show that Δ ABC ≅ Δ ABD. What can you say about BC and BD?



Answer. In Δ ABC and Δ ABD,
AC = AD (Given)
∠CAB = ∠ DAB (AB bisects ∠A)
AB = AB (Common)
Therefore, Δ ABC ≅ Δ ABD(By SAS congruence rule)
BC = BD (By CPCT)
Therefore, BC and BD are Of equal lengths.

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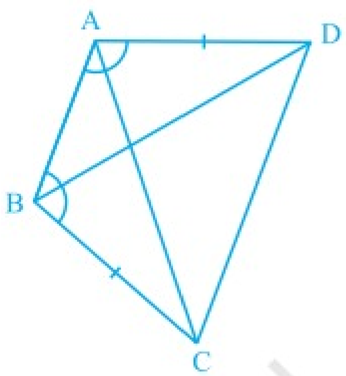
Q2 ABCD is a quadrilateral in which AD = BC and ∠ DAB = ∠ CBA (see Fig). Prove that
(i) Δ ABD ≅ Δ BAC
(ii) BD = AC
(iii) ∠ ABD = ∠ BAC.



Answer. In ∠ABD and ∠BAC,

AD = BC (Given)
∠DAB = ∠CBA(Given)
AB = BA (Common)
$\therefore \triangle ABD = \Delta BAC$(By SAS congruence rule)
$\therefore BD = AC$(ByCPCT)
And, ∠ABD = ∠BAC (By CPCT)

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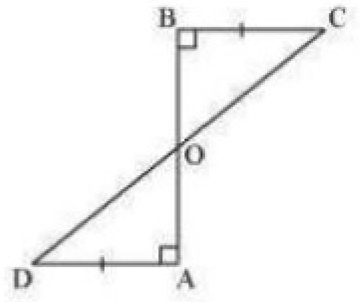
Q3 AD and BC are equal perpendiculars to a line segment AB (see Fig.). Show that CD bisects AB.



Answer. In Δ BOC and Δ AOD,
$\angle BOC = \angle AOD$(Vertically opposite angles)
$\angle CBO = \angle DAO$ (Each 90°)
$BC = AD$(Given)
$\therefore \Delta BOC = \triangle AOD$ (AAS congruence rule)
$\therefore BO = AO$(ByCPCT)
$\Rightarrow$ CD bisects AB

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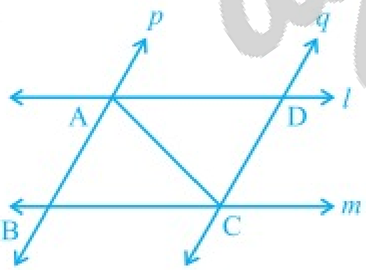
Q4 l and m are two parallel lines intersected by another pair of parallel lines p and q (see Fig). Show that Δ ABC ≅ Δ CDA.



Answer. In Δ ABC and Δ CDA, $\angle BAC = \angle DCA$(Alternate interior angles, as $p \| q$)
$AC = CA$(Common)
$\angle BCA = \angle DAC$(Alternate interior angles, as $l \| m$)
$\triangle ABC = \Delta CDA$($By$ ASA congruence rule)

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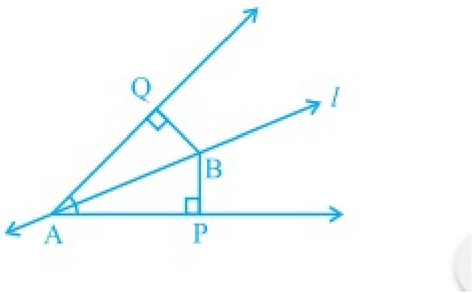
Q5 Line l is the bisector of an angle ∠ A and B is any point on l. BP and BQ are perpendiculars from B to the arms of ∠ A (see Figure). Show that:
(i) Δ APB ≅ Δ AQB

(ii) BP = BQ or B is equidistant from the arms of ∠ A.



Answer. In $\triangle APB$ and $\triangle AQB$.
$\angle APB = \angle AQB\,(Each 90^{\circ})$
$\angle PAB = \angle QAB$(1 is the angle bisector of $\angle A$)
$AB = AB$(Common)
$\therefore \triangle \mathrm{APB} \cong \triangle \mathrm{AQB}$(By AAS congruence rule)
$\therefore \mathrm{BP} = \mathrm{BQ}(\mathrm{By CPCT})$
Or, it can be said that B is equidistant from the arms of ∠ A.

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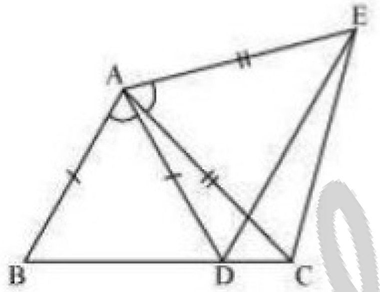
Q6 In Figure, AC = AE, AB = AD and ∠ BAD = ∠ EAC. Show that BC = DE.



Answer. It is given that ∠ BAD = ∠ EAC
∠BAD + ∠DAC = ∠ EAC + ∠DAC
$\angle BAC = \angle DAE$
In ΔBAC and ΔDAE,
$AB = AD(G$ iven)
∠BAC = ∠DAE (Proved above)
AC = AE (Given)
Therefore, ΔBAC ≅ ΔDAE (By SAS congruence rule)
Therefore, BC = DE (By CPCT)

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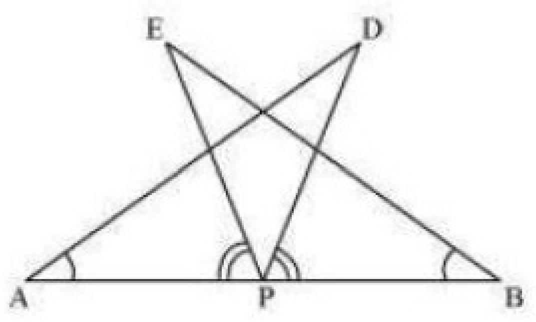
Q7 AB is a line segment and P is its mid-point. D and E are points on the same side of AB such that ∠ BAD = ∠ ABE and ∠ EPA = ∠ DPB (see Figure). Show that
(i) Δ DAP ≅ Δ EBP
(ii) AD = BE



Answer. It is given that ∠EPA = ∠DPB
∠EPA + ∠DPE = ∠DPB + ∠DPE
Therefore, ∠DPA = ∠EPB
In ∠DAP and ∠EBP,
∠DAP = ∠EPB(Given)
AP = BP (P is mid-point of AB)
∠DPA = ∠EPB (From above)
Therefore, Δ DAP ≅ Δ EBP (ASA congruence rule)
Therefore, AD - BE (By CPCT)

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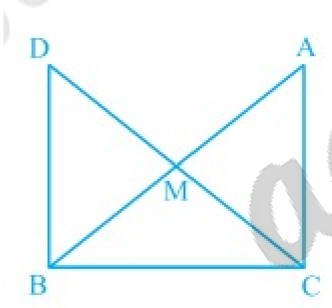
Q8 In right triangle ABC, right angled at C, M is the mid-point of hypotenuse AB. C is joined to M and produced to a point D such that DM = CM. Point D is joined to point B (see Figure). Show that:
(i) Δ AMC ≅ Δ BMD
(ii) ∠ DBC is a right angle.
(iii) Δ DBC ≅ Δ ACB
(iv) CM = 1/2 AB



Answer. (i) In Δ AMC and Δ BMD,
AM = BM (M is the mid-point Of AB)
∠AMC = ∠BMD (Vertically opposite angles)
CM = DM (Given)
Therefore, Δ AMC ≅ Δ BMD (By SAS congruence rule)
Therefore AC = BD (By CPCT)
And, ∠ACM = ∠BDM (By CPCT)
(ii) ∠ACM = ∠BDM
However, ∠ACM and ∠BDM are alternate interior angles.
Since alternate angles are equal,
It can be said that DB II AC
∠DBC + ∠ACB = 180° (Co-interior angles)
∠DBC + 90° = 180°
∠DBC = 90°
(iii) In Δ DBC and Δ ACB,
DB = AC (Already proved)

∠DBC = ∠ACB(Each 90°)
BC = CB (Common)
Therefore, Δ DBC ≅ Δ ACB (SAS congruence rule)
(iv) ΔDBC ≅ ΔACB
AB = DC (By CPCT)
AB = 2 CM
$\therefore CM = \frac{1}{2}AB$

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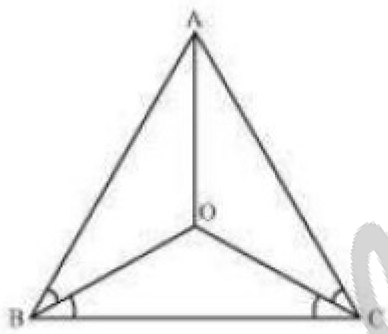
Exercise 7.2

Q1. In an isosceles triangle ABC, with AB = AC, the bisectors of ∠ B and ∠ C intersect each other at O. Join A to O. Show that :
(i) OB = OC
(ii) AO bisects ∠ A

Answer.



(i) It is given that in triangle ABC, AB = AC
∠ACB = ∠ABC (Angles opposite to equal sides Of a triangle are equal)
$\frac{1}{2}\angle ACB = \frac{1}{2}\angle ABC$
∠OCB =∠OBC
Therefore, OB = OC (Sides opposite to equal angles of a triangle are also equal)
(ii) In ΔOAB and ΔOAC,
AO = AO(Common)
AB = AC (Given)
OB = OC (Proved above)
Therefore, ΔOAB ≅ ΔOAC (By SSS congruence rule)
∠BAO = ∠CAO (CPCT)
Therefore, AO bisects ∠A.

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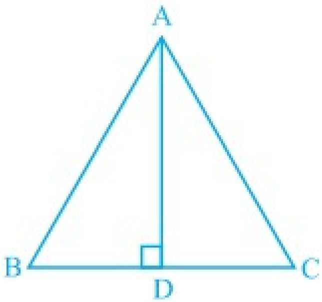
Q2 In Δ ABC, AD is the perpendicular bisector of BC (see Fig). Show that Δ ABC is an isosceles triangle in which AB = AC.



Answer. In ΔADC and ΔADB,
AD = AD (Common)
∠ADC = ∠ADB (Each 90°)
CD = BD (AD is the perpendicular bisector of BC)
Therefore, ΔADC ≅ ΔADB (By SAS congruence rule)
AB = AC (By CPCT)
Therefore, ABC is an isosceles triangle in which AB = AC

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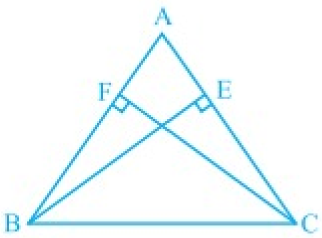
Q3 ABC is an isosceles triangle in which altitudes BE and CF are drawn to equal sides AC and AB respectively (see Fig). Show that these altitudes are equal.



Answer. In ΔAEB and ΔAFC,
∠AEB and ∠AFC (Each 90°)
∠A = ∠A (Common angle)
AB = AC (Given)
Therefore, ΔAEB ≅ ΔAFC (By AAS congruence rule)
BE = CF (By CPCT)

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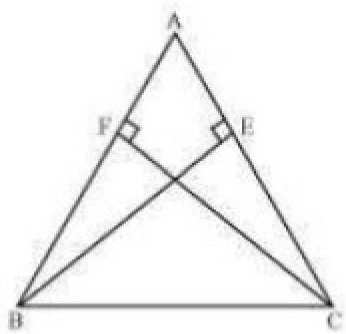
Q4 ABC is a triangle in which altitudes BE and CF to sides AC and AB are equal (see Fig). Show that
(i) Δ ABE ≅ Δ ACF
(ii) AB = AC, i.e., ABC is an isosceles triangle.



Answer. (i) Δ ABE and Δ ACF,

$\angle ABE$ and $\angle ACF$ $(Each 90^{\circ})$

$\angle A = \angle A($ Common angle $)$

$BE = CF(G$ iven $)$

Therefore, Δ ABE ≅ Δ ACF(By AAS congruence rule)
(ii) It has already been proved that
Δ ABE ≅ Δ ACF
Therefore, AB = AC(By CPCT)

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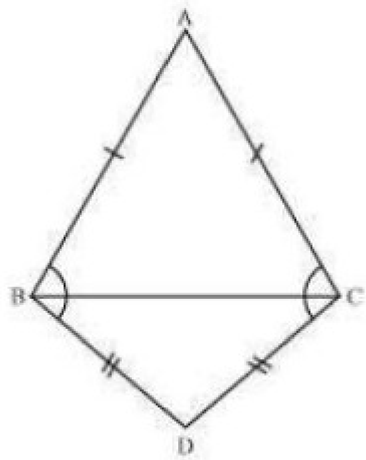
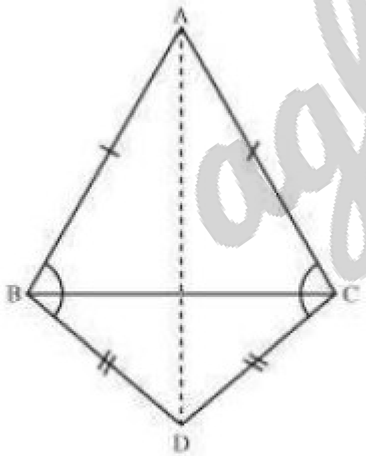
Q5 ABC and DBC are two isosceles triangles on the same base BC (see Fig. 7.33). Show that ∠ ABD = ∠ ACD



Answer.



Let us join AD.
In ΔABD and ΔACD,
AB = AC (Given)
BD = CD (Given)
AD = AD (Common side)
Therefore, ΔABD ≅ ΔACD (By SSS congruence rule)
∠ABD = ∠ACD (By CPCT)

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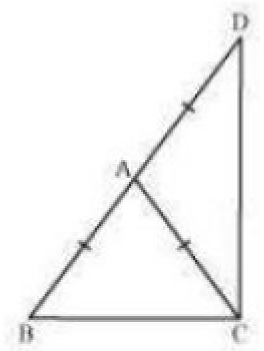
Q6 ΔABC is an isosceles triangle in which AB = AC.Side BA is produced to D such that AD = AB (see Fig). Show that ∠ BCD is a right angle.



Answer. In ΔABC,
$\mathrm{AB}=\mathrm{AC}(\text{ Given})$
$\therefore \angle \mathrm{ACB}=\angle \mathrm{ABC}$ (Angles opposite to equal sides of a triangle are also equal)
In ΔACD,
$\mathrm{AC}=\mathrm{AD}(\text{ Given})$
$\therefore \angle \mathrm{ADC}=\angle \mathrm{ACD}$ (Angles opposite to equal sides of a triangle are also equal)
In ΔBCD,
∠ABC + ∠BCD + ∠ADC = 1800 (Angle sum property of a triangle)
∠ACB + ∠ACB +∠ACD + ∠ACD = 180°
2(∠ACB + ∠ACD) = 180°
2(∠BCD) = 180°
Therefore, ∠BCD = 90°

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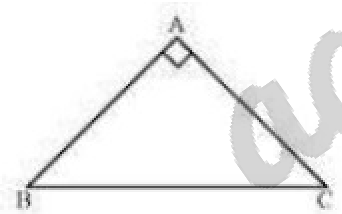
Q7 ABC is a right angled triangle in which ∠ A = 90° and AB = AC. Find ∠ B and ∠ C.

Answer.



It is given that
$\therefore \angle C=\angle B($ Angles opposite to equal sides are also equal$)$
In ΔABC .
AB = AC $\angle A+\angle B+\angle C=180^{\circ}$ (Angle sum property of a triangle)
$90^{\circ}+\angle B+\angle C=180^{\circ}$
$90^{\circ}+\angle B+\angle B=180^{\circ}$
$2\angle B=90^{\circ}$
$\angle B=45^{\circ}$
$\therefore \angle B=\angle C=45^{\circ}$

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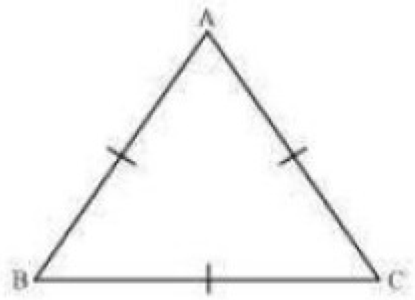
Q8 Show that the angles of an equilateral triangle are 60° each.

Answer.



Let us consider that ABC is an equilateral triangle.
Therefore, AB = BC + AC
AB = AC
Therefore, ∠C = ∠B (Angles opposite to equal sides of a triangle are equal)
Also,
AB = AC
∠B = ∠A (Angles opposite to equal sides of a triangle are equal)
Therefore, we obtain
∠A = ∠B = ∠C
In $\triangle ABC$,

$\angle A+\angle B+\angle C=180^{\circ}$

$\angle A+\angle A+\angle A=180^{\circ}$

$\angle A=180^{\circ}$

$\angle A=60^{\circ}$

$\therefore \angle A=\angle B=\angle C=60^{\circ}$

Hence, in a equilateral triangle, all interior angles are of measure 60°.

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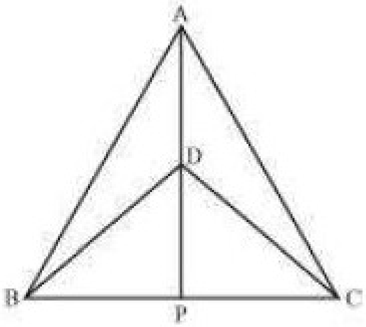
Exercise 7.3

Q1 Δ ABC and Δ DBC are two isosceles triangles on the same base BC and vertices A and D are on the same side of BC (see Figure). If AD is extended to intersect BC at P, show that
(i) Δ ABD ≅ Δ ACD
(ii) Δ ABP≅ Δ ACP
(iii) AP bisects ∠ A as well as ∠ D.
(iv) AP is the perpendicular bisector of BC



Answer. (i) In $\triangle ABD$ and $\triangle ACD$,

$AB = AC(G \text{ wen })$
$BD = CD(\text{ Given })$
$AD = AD$ (Common)
$\triangle ABD \cong \triangle ACD(By$ SSS congruence rule)
$\angle BAD = \angle CAD(ByCPCT)$
$\angle BAP = \angle CAP$ ….(1)
(ii) In $\triangle$ABP and $\triangle$ACP,
$AB = AC(\text{ Given })$
$\angle BAP = \angle CAP[\text{ From equation } (1)]$
$AP = AP(\text{ Common })$
$\therefore \triangle \mathrm{ABP} \cong \triangle \mathrm{ACP}$ (By SAS congruence rule)
$\therefore BP = CP(ByCPCT)$ ….(2)
(iii) From equation (1),
$\angle BAP = \angle CAP$
Hence, AP bisects $\angle A$,
In ΔBDP and ΔCDP
$\mathrm{BD} = \mathrm{CD}(\text{ Given })$
$\mathrm{DP} = \mathrm{DP}(\text{ Common })$
$\mathrm{BP} = \mathrm{CP}[\text{ From equation } (2)]$
$\therefore \triangle BDP \cong \Delta CDP$ (By SSS congruence rule)
$\triangle \angle BDP = \angle CDP(ByCPCT)$ …(3)
Hence, AP bisects $\angle$D
(iv) $\triangle BDP \cong \Delta CDP$
$\therefore \angle BPD = \angle CPD(ByCPCT)$ ….(4)
$\angle BPD + \angle CPD = 180^{\circ}(\text{ Linear pair angles})$
$\angle BPD + \angle BPD = 180^{\circ}$
$2\angle 8PD = 180^{\circ}[\text{ From Equation } (4)]$
$\angle BPD = 90^{\circ} \quad \ldots(5)$
FRom equations (2) and (5), it can be said that AP is the perpendicular bisector of BC.

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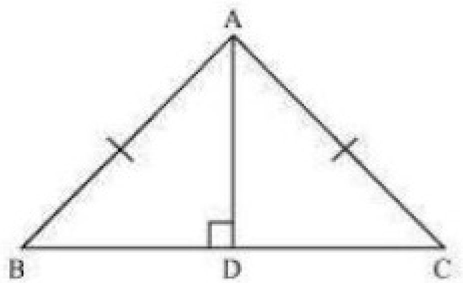
Q2 AD is an altitude of an isosceles triangle ABC in which AB = AC. Show that
(i) AD bisects BC
(ii) AD bisects ∠ A.

Answer.



(i) In ΔBAD and $\triangle CAD$,
$\angle \mathrm{ADB} = \angle \mathrm{ADC}$ (Each 90° as AD is an altitude)
$AB = AC(G \text{ iven })$
$AD = AD(\text{ Common })$
$\therefore \triangle BAD \cong \triangle CAD$ (By RHS Congruence rule)
$\triangle BD = CD$ (By CPCT)

Hence, AD bisects BC.
(ii) Also, by CPCT,
$\angle BAD = \angle CAD$
Hence, AD bisects $\angle$A

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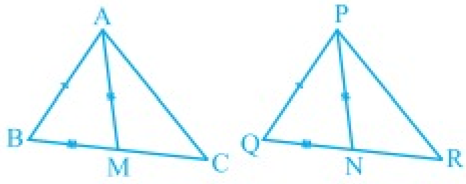
Q3 Two sides AB and BC and median AM of one triangle ABC are respectively equal to sides PQ and QR and median PN of Δ PQR (see Figure). Show that:
(i) Δ ABM ≅ Δ PQN
(ii) Δ ABC ≅ Δ PQR



Answer. (i) In $\triangle ABC$, AM is the median to BC.
$\therefore \mathrm{BM} = \frac{1}{2}\mathrm{BC}$
In ΔPQR, PN is the median to QR.
$\therefore QN = \frac{1}{2}QR$
However, BC = QR
$\therefore \frac{1}{2}BC = \frac{1}{2}QR$
$\therefore \mathrm{BM} = \mathrm{QN} \quad \ldots(1)$
In $\triangle ABM$ and ΔPQN,
AB = PQ(Given)
$\mathrm{BM} = \mathrm{QN}[\text{ From Equation (1)}]$
$\mathrm{AM} = \mathrm{PN}(\text{ Given })$
$\mathrm{ABM} \cong \Delta\mathrm{PQN}$ (By SSS congruence rule $\ldots(2)$
$\angle\mathrm{ABM} = \angle\mathrm{PQN}(\mathrm{ByCPCT})$
$\angle\mathrm{ABC} = \angle\mathrm{PQR}$
(iii) In $\triangle ABC$ and ΔPQR,
$\mathrm{AB} = \mathrm{PQ}(\text{ Given })$
$\angle\mathrm{ABC} = \angle\mathrm{PQR}[\text{From Equation (2)}]$
$\mathrm{BC} = \mathrm{QR}(\text{ Given })$
$\therefore \triangle ABC \cong \Delta PQR$ (By SAS congruence rule)

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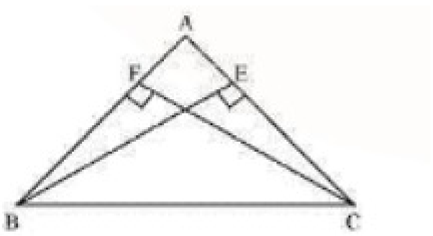
Q4 BE and CF are two equal altitudes of a triangle ABC. Using RHS congruence rule, prove that the triangle ABC is isosceles.

Answer.



In $\triangle BEC$ and ΔCFB ,
$\angle BEC = \angle CFB\,(Each 90^\circ)$
$\mathrm{BC} = \mathrm{CB}(\mathrm{Common})$
$\mathrm{BE} = \mathrm{CF}(\mathrm{Given})$
$\therefore \triangle BEC \cong \Delta CFB$ (By RHS congruency)
$\therefore \angle BCE = \angle CBF (By CPCT)$
$\therefore AB = AC$ (Sides opposite to equal angles of a triangle are equal)
Hence, $\triangle \mathrm{ABC}$ is isosceles.

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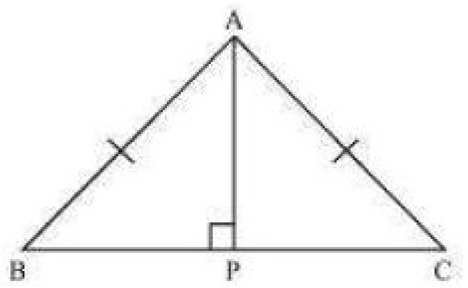
Q5 ABC is an isosceles triangle with AB = AC. Draw AP ⊥ BC to show that ∠ B = ∠ C.

Answer.



In $\triangle APB$ and $\triangle APC$,
$\angle APB = \angle APC\,(Each 90^\circ)$
$AB = AC(Given)$
$AP = AP(Common)$
$\therefore \triangle APB \cong \triangle APC$ (Using RHS congruence rule)
$\therefore \angle B = \angle C$ (By using CPCT)

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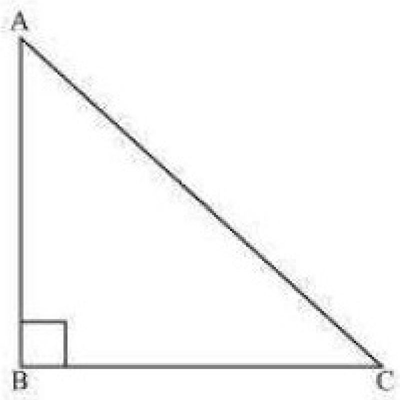
Exercise 7.4

Q1 Show that in a right angled triangle, the hypotenuse is the longest side.

Answer.



Let us consider a right-angled triangle ABC, right-angled at B.
In $\triangle ABC$,

$\angle A+\angle B+\angle C=180^{\circ}$ (Angle sum property of a triangle)
$\angle A+90^{\circ}+\angle C=180^{\circ}$
$\angle A+\angle C=90^{\circ}$
Hence, the other two angles have to be acute(i.e., less than 90°).
$\angle B$ is the largest angle in $\triangle ABC$.
$\angle B>\angle A$ and $\angle B>\angle C$
$AC>BC$ and $AC>AB$
[In any triangle, the side opposite to the larger (greater) angle is longer.]
Therefore, AC is the largest side in ΔABC
However, AC is the hypotenuse of △ABC. Therefore, hypotenuse is the longest side in a right-angled triangle.

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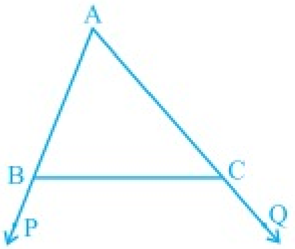
Q2 In Figure, sides AB and AC of Δ ABC are extended to points P and Q respectively. Also, ∠ PBC < ∠ QCB. Show that AC > AB.



Answer. In the given figure,
$\angle ABC+\angle PBC=180^{\circ}($ Linear pair$)$
$\angle ABC=180^{\circ}-\angle PBC \quad \ldots(1)$
Also,
$\angle ACB+\angle QCB=180^{\circ}$
$\angle ACB=180^{\circ}-\angle QCB$ ...(2)
As $\angle PBC<\angle QCB$
$180^{\circ}-\angle PBC>180^{\circ}-\angle QCB$
$\angle ABC>\angle ACB[$ From Equations (1) and (2)$]$
$AC>AB($ Side opposite to the larger angle is larger.$)$
Hence proved AC > AB

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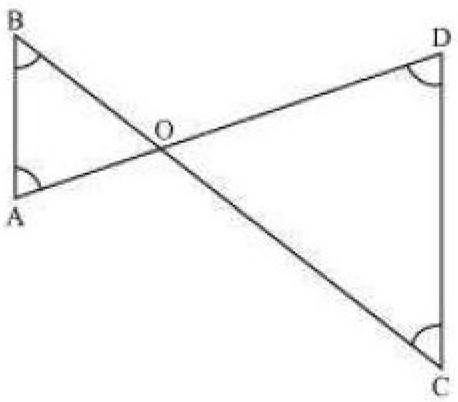
Q3 In Figure, ∠ B < ∠ A and ∠ C < ∠ D. Show that AD < BC.



Answer. In △AOB

$\angle B < \angle A$

$AO < BO$(Side opposite to smaller angle is smaller) $\ldots(1)$

In ΔCOD ,

$\angle C < \angle D$

$\mathrm{OD} < \mathrm{OC}$(Side opposite to smaller angle is smaller) $\ldots(2)$

On adding Equations (1) and (2), we obtain

$\mathrm{AO} + \mathrm{OD} < \mathrm{BO} + \mathrm{OC}$

$\mathrm{AD} < \mathrm{BC}$, proved

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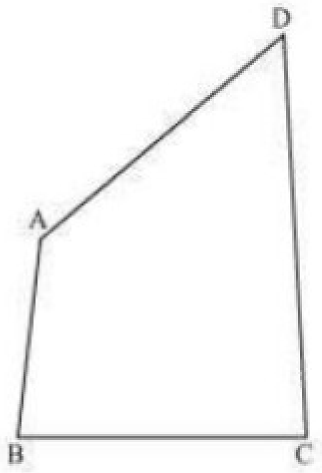
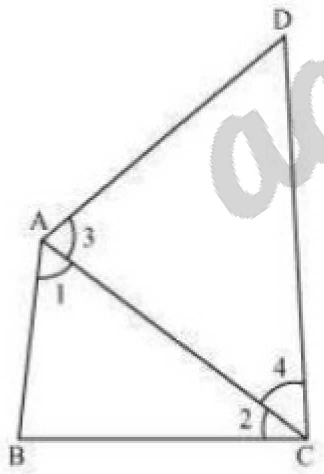
Q4 AB and CD are respectively the smallest and longest sides of a quadrilateral ABCD (see Figure). Show that ∠ A > ∠ C and ∠ B > ∠ D.



Answer.



Let us join AC.

In $\triangle$ABC

AB < BC (AB is the smallest side of quadrilateral ABCD)

$\angle 2 < \angle 1$ (Angle opposite to the smaller side is smaller)...(1)

In $\triangle ADC$

$AD < CD$ (CD is the largest side of quadrilateral ABCD)

$\angle 4 < \angle 3$(Angle opposite to the smaller side i smaller)...(2)

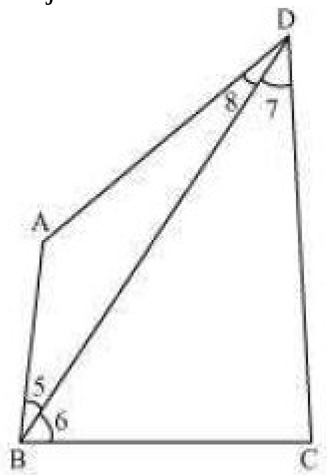
On adding equations(1) and (2),we obtain

$\angle 2+\angle 4<\angle 1+\angle 3$

$\angle C<\angle A$

$\angle A>\angle C$

Let us join BD.



In $\triangle ABD$

$AB<AD$(AB is the smallest side of quadriateral ABCD)

$\angle 8<\angle 5$ (Angle opposite to the smaller side is smaller)...(3)

In ΔBDC

BC < CD(CD is the largest side of quadriateral ABCD)

$\angle 7<\angle 6$(Angle opposite to the smaller side is smaller)...(4)

On adding equations (3) and (4),we obtain

$\angle 8+\angle 7<\angle 5+\angle 6$

$\angle D<\angle B$

$\angle B>\angle D$(Hence, proved)

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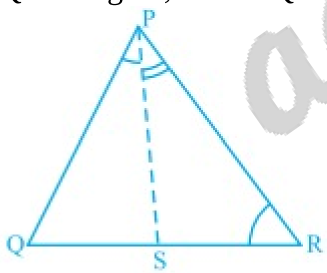
Q5 In Figure, PR > PQ and PS bisects ∠ QPR. Prove that ∠ PSR > ∠ PSQ.



Answer. As $PR>PQ$

$\angle PQR>\angle PRQ$(Angle opposite to larger side is larger) ...(1)

PS is the bisector of $\angle QPR$.

$\angle QPS=\angle RPS \quad \ldots(2)$

$\angle PSR$ is the exterior angle of ΔPQS

$\angle PSR=\angle PQR+\angle QPS \quad -(3)$

$\angle PSQ$ is the exterior angle of ΔPRS . $\quad \ldots(4)$

$\angle PSQ=\angle PRQ+\angle RPS$

Adding Equations (1) and (2), we obtain

$\angle PQR+\angle QPS>\angle PRQ+\angle RPS$

$\angle$PSR > $\angle$PSQ[Using the values of Equations (3) and (4)]

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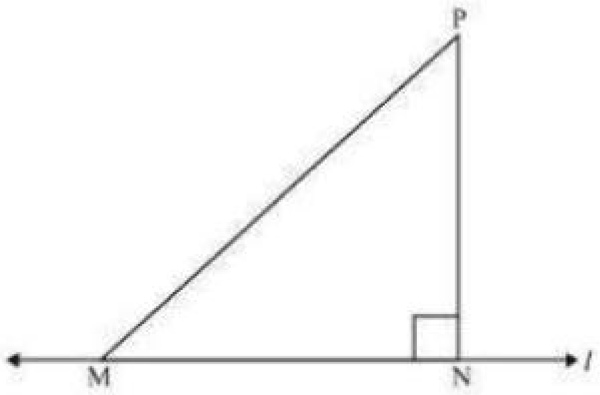
Q6 Show that of all line segments drawn from a given point not on it, the perpendicular line segment is the shortest.

Answer.



Let us take a line l and from point P (i.e., not on line l), draw two line segments PN and PM. Let PN be perpendicular to line L and PM is drawn at some other angle.
In $\triangle$PNM
$\angle N = 90^\circ$
$\angle P + \angle N + \angle M = 180^\circ$(Angle sum property of a triangle)
$\angle P + \angle M = 90^\circ$
Clearly, $\angle M$ is an acute angle
$\angle M < AN$
$PN < PM$(side opposite to the smaller angle is smaller)
Similarly, by drawing different line segments from P to l, it can be proved that PN is smaller in comparison to them.
Therefore, it can be observed that of all line segments drawn from a given point not on it, the perpendicular line segment is the shortest.

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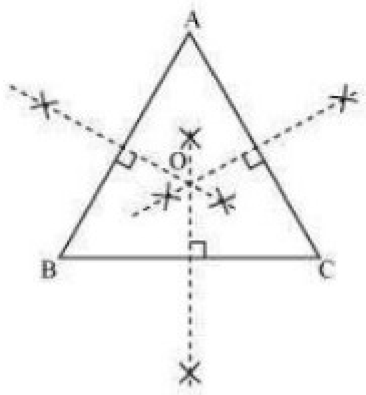
Exercise 7.5

Q1 ABC is a triangle. Locate a point in the interior of Δ ABC which is equidistant from all the vertices of Δ ABC.

Answer. Circumference of a triangle is always equidistant from all the vertices of that triangle. Circumference is the point where perpendicular bisectors of all the sides of the triangle meet together.



In $\triangle ABC$, we can find the circumference by drawing the perpendicular bisectors of sides AB, BC, AND CA of this triangle. O is the point where these bisectors are meeting together. Therefore, O is the point which is equidistant from all the vertices of $\triangle ABC$.

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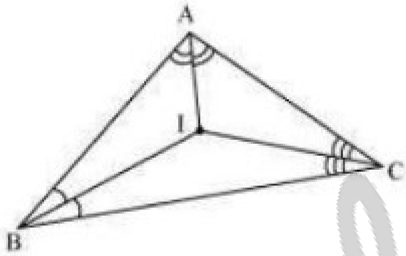
Q2 In a triangle locate a point in its interior which is equidistant from all the sides of the triangle.

Answer. The point which is equidistant from all the sides of a triangle is called the incentre of the triangle. Incentre of a triangle is the intersection point of the angle bisectors of the interior angles of that triangle.



Here, in $\triangle ABC$, we can find the incentre of this triangle by drawing the angle bisectors of the interior angles of this triangle. I is the point where these angle bisectors are intersecting each other. Therefore, I is the point equidistant from all the sides of $\triangle ABC$

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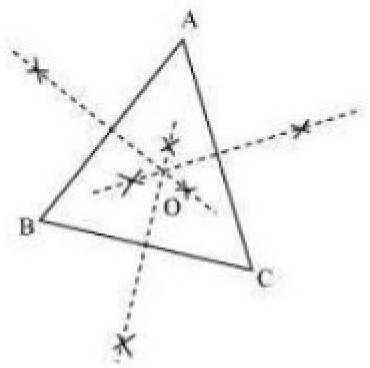
Q3 In a huge park, people are concentrated at three points (see Figure):
A : where there are different slides and swings for children,
B : near which a man-made lake is situated,
C : which is near to a large parking and exit. Where should an ice cream parlour be set up so that maximum number of persons can approach it?
(Hint : The parlour should be equidistant from A, B and C)

Answer. Maximum number of persons can approach the ice-cream parlour if it is equidistant from A, B and C from a triangle. In a triangle, the circumcentre is the only point that is equidistant from its vertices. So, the ice-cream parlour should be set up at the circumcentre O of $\triangle ABC$



In this situation, maximum number of persons can approach it. We can find circumcentre O of this triangle by drawing perpendicular bisectors of the ised of this triangle.

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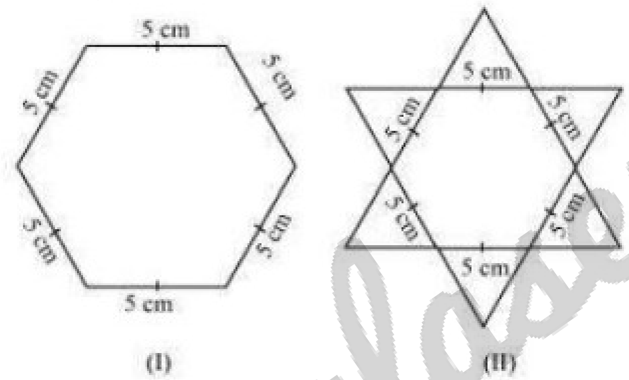
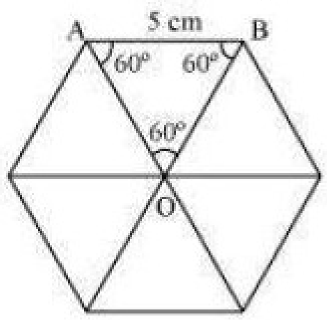
Q4 . Complete the hexagonal and star shaped Rangolies [see Figure (i) and (ii)] by filling them with as many equilateral triangles of side 1 cm as you can. Count the number of triangles in each case. Which has more triangles?



Answer. It can be observed that hexagonal-shaped rangoli has 6 equilateral triangles in it.



$\text{Area of } \Delta OAB = \frac{\sqrt{3}}{4}(\text{ side })^2 = \frac{\sqrt{3}}{4}(5)^2$

$= \frac{\sqrt{3}}{4}(25) = \frac{25\sqrt{3}}{4}\text{cm}^2$

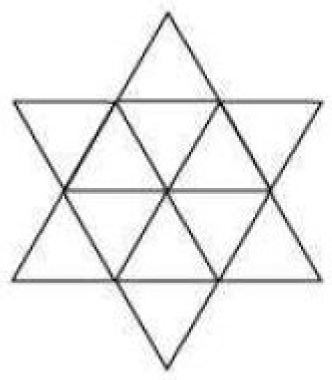
Area of hexagonal-shaped rangoli $= 6 \times \frac{25\sqrt{3}}{4} = \frac{75\sqrt{3}}{2}\text{cm}^2$

Area of equilateral triangle having its sides as 1 cm $= \frac{\sqrt{3}}{4}(1)^2 = \frac{\sqrt{3}}{4}\text{cm}^2$

Number of equilateral triangles of 1 cm side that can be filled In this hexagonal-shaped rangoli

$= \frac{\frac{75\sqrt{3}}{2}}{\frac{\sqrt{3}}{4}} = 150$

Star-shaped rangoli has 12 equilateral triangles of side 5 cm in it.



Area of star-shaped rangoli = $12 \times \frac{\sqrt{3}}{4} \times (5)^2 = 75\sqrt{3}$

Number of equilateral triangles of 1 cm side that can be filled in this star-shaped rangoli = $\frac{75\sqrt{3}}{\frac{\sqrt{3}}{4}} = 300$

Therefore, star-shaped rangoli has more equilateral triangles in it.

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