Octahedral classes, kharadi

2nd floor, yashwant plaza, near bank of India,

Class 09 - Mathematics

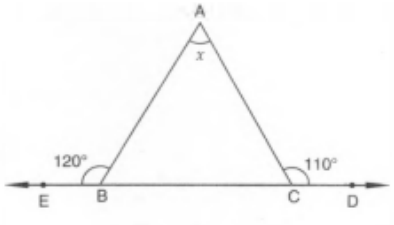
Triangles and Construction

Maximum Marks: 60 **Time Allowed: 2 hours**

Section A

1. Answer the following

a) Compute the value of x in the following figure:

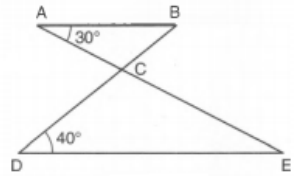


b) If the angles of a triangle are in the ratio 2 : 3 : 4, determine three angles.

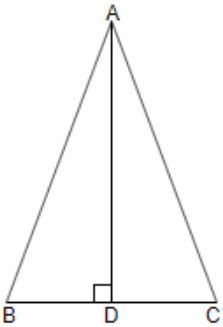
c) The sum of two angles of a triangle is equal to its third angle. Determine the measure of the third angle.

d) The angles of a triangle are $(x - 40)^0$, $(x - 20)^0$ and $(\frac{1}{2}x - 10)^0$. Find the value of x.

e) In a given figure, AB $\parallel$ DE, Find $\angle$ACD.

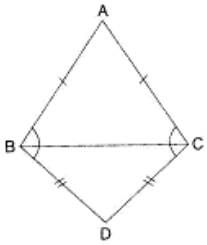


f) In ΔABC, AD is the perpendicular bisector of BC (See figure). Show that ΔABC is an isosceles triangle in which AB = AC.

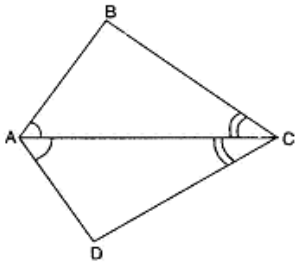


g) Is it possible to construct a triangle with lengths of its sides as 4 cm, 3 cm and 7 cm? Give reason for your answer.

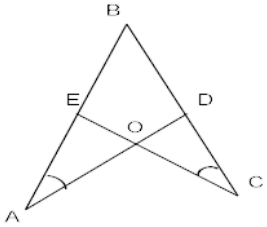
h) ABC and DBC are two isosceles triangles on the same base BC. Show that $\angle$ABD = $\angle$ACD.



i) In figure, diagonals AC of a quadrilateral ABCD bisects the angles A and C. Prove that AB = AD and CB = CD.

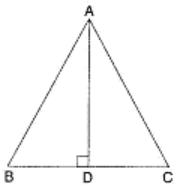


j) In the given figure, $\angle A = \angle C$ and AB =BC. Prove that $\triangle ABD \cong \triangle CBE$.

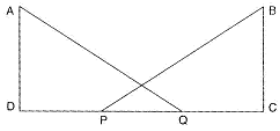


2. Answer the following

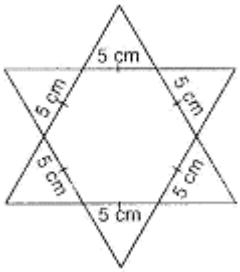
a) $\triangle ABC$, AD is perpendicular bisector of BC. Show that $\triangle ABC$ is an isosceles triangle in which AB = AC.



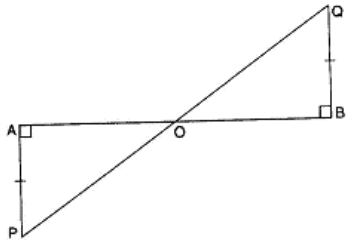
b) In figure, AD $\perp$ CD and BC $\perp$ CD. If AQ = BP and DP = CQ. Prove that $\angle DAQ = \angle CBP$.



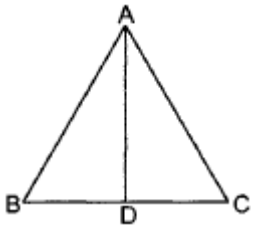
c) Complete the star by filling them with as many equilateral triangles of side 1 cm as you can. Count the number of triangles in each case.



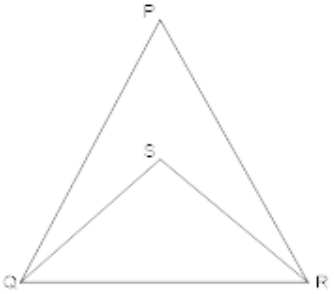
d) In figure, AP and BQ are perpendicular to the line segment AB and AP = BQ. Prove that O is the mid-point of line segments AB and PQ.



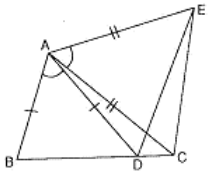
e) AD is a median of the $\triangle ABC$. Is it true that AB + BC + CA > 2AD ? Give reason for your answer.



f) In the given figure, PQ>PR, QS and RS are the bisectors of the ∠Q and ∠R respectively. Prove that SQ>SR.

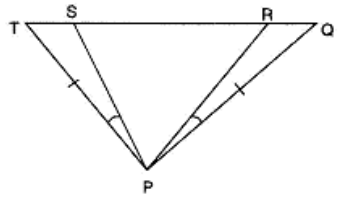


g) In figure, AC = AE, AB = AD and ∠BAD = ∠EAC. Show that BC = DE.

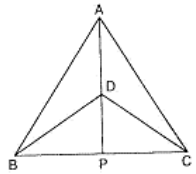


h) In two right triangles, one side and an acute angle of one triangle are equal to one side and the corresponding acute angle of the other triangle. Prove that the two triangles are congruent.

i) In figure, PQ = PT and ∠TPS = ∠QPR. Prove that triangle PRS is isosceles.

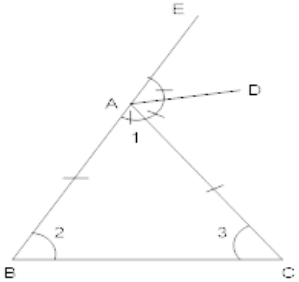


j) ΔABC and ΔDBC are two isosceles triangles on the same base BC and vertices A and D are on the same side of BC. If AD is extended to intersect BC at P, show that : ΔABD $\cong$ ΔACD

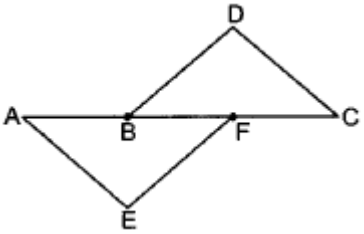


3. Answer the following

a) △ABC is an isosceles triangle with AB = AC. AD bisects the exterior ∠A. prove that AD || BC.

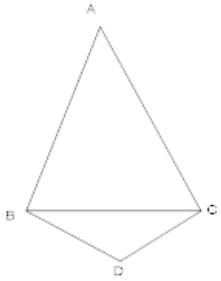


b) In given figure, it is given that AB = CF, EF = BD and ∠AFE = ∠CBD. Prove that △AFE ≅ △CBD.



c) In the external bisector of the vertical angle of a triangle is parallel to its base, then prove that the triangle is isosceles.

d) In the given figure, ABC and DBC are two triangles on the same base BC such that AB = AC and DB = DC. Prove that ∠ABD = ∠ACD,

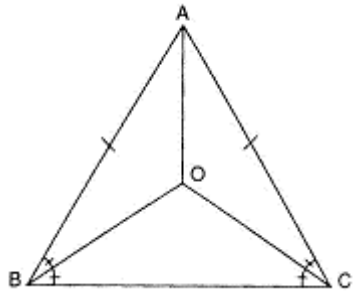


e) A triangle ABC is right-angled at A. AL is drawn perpendicular to BC. Prove that ∠BAL= ∠ACB.

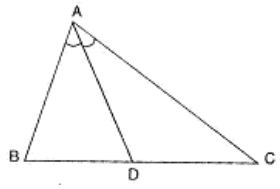
f) Prove that in a triangle, other than an equilateral triangle, angle opposite the longest side is greater than $\frac{2}{3}$ of a right angle.

g) If two isosceles triangles have a common base, the line joining their vertices bisects the common base at right angles, Prove.

h) 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 OB = OC and AO bisects ∠A.



i) AD is the bisector of ∠A of △ABC, where D lies on BC. Prove that AB > BD and AC > CD.



j) AD is an altitude of an isosceles triangle ABC in which AB = AC. Show that

i. AD bisects BC

ii. AD bisects ∠A.

4. Answer the following

a) ABCD is a quadrilateral in which AB = AD, BC = DC and diagonals intersect at point E. Prove that

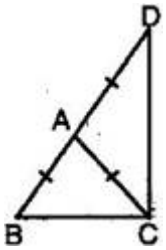
i. AC bisects each of the angles A and C.

ii. BE = ED

iii. ∠ABC = ∠ADC. Is AE = EC ?

b) ABCD is quadrilateral such that AB = AD and CB = CD. Prove that AC is the perpendicular bisector of BD.

c) Δ ABC is an isosceles triangle in which AB = AC. Side BA is produced to D such that AD = AB(See figure). Show that ∠ BCD is a right angle.



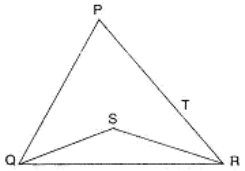
d) If the bisector of an angle of a triangle bisects the opposite side, prove that the triangle is isosceles.

e) ABC is a right angled triangle, right angled at A & with AB = AC. Bisector of ∠ A meets BC at D. Prove that BC = 2 AD.

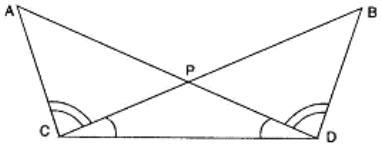
f) O is a point in the interior of a square ABCD such that OAB is an equilateral triangle. Show that Δ OCD is an isosceles triangle.

g) BD and CE are the bisectors of ∠B and ∠C of an isosceles triangle ABC with AB = AC. Prove that BD = CE.

h) In the figure, PQR is a triangle and S is any point in its interior, Show that SQ + SR < PQ + PR



i) In figure, ∠BCD = ∠ADC and ∠ACB = ∠BDA. Prove that AD = BC and ∠A = ∠B.



j) ΔABC and ΔDBC are two triangles on the same base BC such that A and D lie on the opposite sides of BC, AB = AC and DB = DC. Show that AD is the perpendicular bisector of BC.

5. Answer the following

a) Construct a triangle ABC with perimeter 10 cm and each base angle is of 45^o.

b) Construct an equilateral triangle whose each side is 4.5cm.

c) Construct perpendicular bisector of line segment of side 6.5 cm.

d) Construct an angle of 75^o at O.

e) Construct a triangle ABC in which BC = 5 cm, $\angle B = 60^\circ$ and AC + AB = 7.5 cm.

f) A triangle PQR given that QR = 3cm, $\angle PQR = 45^\circ$ and QP – PR = 2 cm.

g) A right triangle when one side is 3.5 cm and sum of other sides and the hypotenuse is 5.5 cm.

h) Construct a square of side 3 cm.