CHAPTER PRACTICE

MULTIPLE CHOICE QUESTIONS

1. In ΔABC, if $BC = AB$ and $\angle B = 80°$, then $\angle A$ is equal to
   (a) 80° (b) 40°
   (c) 50° (d) 100°

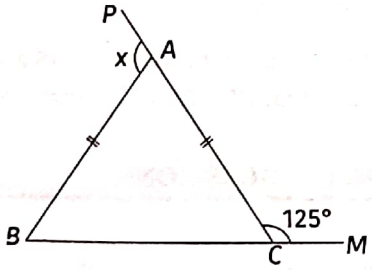
2. In a ΔABC, $AB = 5$ cm, $AC = 5$ cm and $\angle A = 50°$, then $\angle B$ equals
   (a) 35° (b) 65°
   (c) 80° (d) 40°

3. It is given that $\Delta ABC \cong \Delta FDE$ and $AB = 5$ cm, $\angle B = 40°$ and $\angle A = 80°$, then which of the following is true?
   (a) $DF = 5$ cm, $\angle F = 60°$ (b) $DF = 5$ cm, $\angle E = 60°$
   (c) $DE = 5$ cm, $\angle E = 60°$ (d) $DE = 5$ cm, $\angle D = 40°$

4. Which of the following is not a criterion for congruence of triangles?
   (a) SAS (b) ASA
   (c) SSA (d) SSS

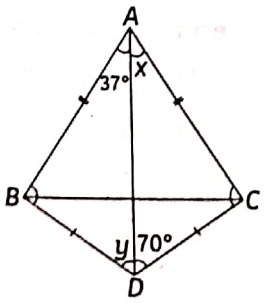
5. In ΔABC and DEF, $AB = FD$ and $\angle A = \angle D$. The two triangles will be congruent by SAS axiom, if
   (a) $BC = EF$ (b) $AC = DE$
   (c) $AC = EF$ (d) $BC = DE$

6. In the given figure, if $AB = AC$, $\angle ACM = 125°$ and $\angle PAB = x$, then the value of x is



   (a) 55° (b) 75°
   (c) 95° (d) 110°

7. In the given figure, x and y are

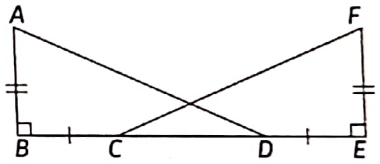


   (a) $x = 70°$, $y = 37°$ (b) $x = 37°$, $y = 70°$
   (c) $x = 35°$, $y = 60°$ (d) $x = 60°$, $y = 37°$

8. In triangle ABC, angle $A = 70°$, and angle $B = 80°$. If $BC = 5$ cm, find the length of side AC to ensure congruence with triangle XYZ, where angle $X = 70°$, angle $Y = 80°$, and $XY = 5$ cm.
   (a) 3 (b) 4
   (c) 5 (d) 12

9. In a triangle ABC, if $\angle A = 40°$, $\angle B = 65°$, and $AB = 7$ cm, and you know that another triangle DEF has the same angles, what can you conclude about the triangles?
   (a) They are similar but not necessarily congruent.
   (b) They are congruent.
   (c) They are neither similar nor congruent.
   (d) More information is needed.

10. In figure $AB \perp BE$ and $EF \perp BE$. If $BC = DE$ and $AB = EF$, then ΔABD is congruent to



   (a) ΔEFC (b) ΔECF
   (c) ΔDEF (d) ΔEFC

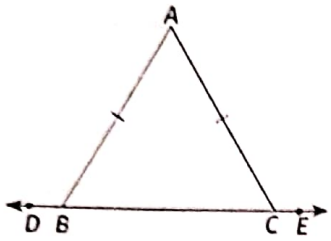
1 MARK QUESTIONS

1. Is SSA a criterion for congruence of triangles?
2. If the altitudes from two vertices of a triangle to the opposite sides are equal, then what type of triangle will be formed?
3. If the corresponding angles of two triangles are equal, then they are always congruent.

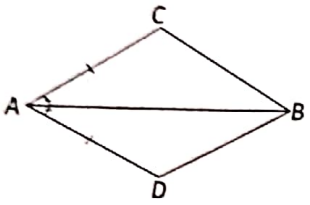
   Is this statement true or false?
4. In an isosceles triangle, prove that the altitude from the vertex bisects the base.
5. In ΔABC and ΔPQR, it is given that $\angle A = \angle R$, $\angle C = \angle P$ and $\angle B = \angle Q$. Find either both triangles are isosceles or congruent.

2 MARKS QUESTIONS

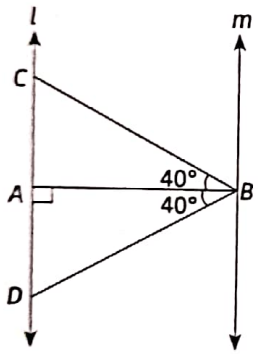
1. In the given figure, if $AB = AC$, then prove that $\angle ABD = \angle ACE$.



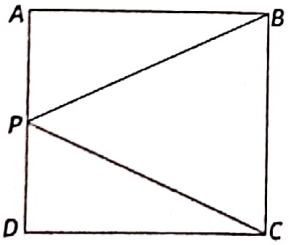
2. In the given figure, if $BC = 2.6$ cm, then find $2BD + \frac{BC}{2}$.



3. In the given figure, if $l \parallel m$, $\angle ABC = \angle ABD = 40°$ and $\angle BAC = \angle BAD = 90°$, then prove that ΔBCD is an isosceles triangle.



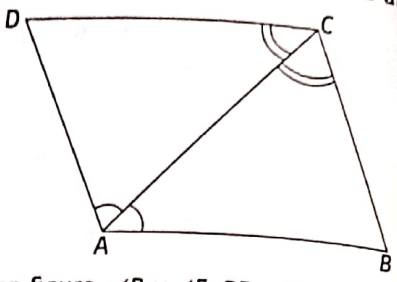
4. In the given figure, $ABCD$ is a square and P is the mid-point of AD. BP and CP are joined.
Prove that $\angle PCB = \angle PBC$.



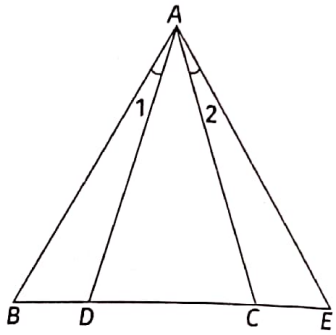
5. M is a point on side BC of a ΔABC such that AM is the bisector of $\angle BAC$. Is it true to say that perimeter of the triangle is greater than $2AM$? Give reason for your answer.

6. Show that if two sides of a triangle are of lengths 5 cm and 1.5 cm, then the length of third side of the triangle cannot be 3.4 cm.

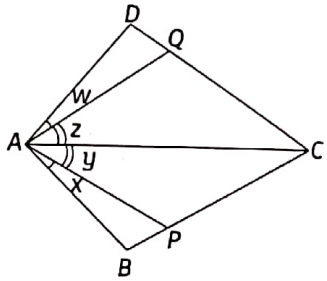
7. In the given figure, the diagonal AC of a quadrilateral $ABCD$ bisects $\angle A$ and $\angle C$. Prove that $AB = AD$ and $CB = CD$.



8. In the given figure, $\angle B = \angle E$, $BD = CE$ and $\angle 1 = \angle 2$. Show that $\Delta ABC \cong \Delta AED$.



9. In the given figure, if $AB = AD$, $\angle x = \angle w$ and $\angle y = \angle z$, then prove that $AP = AQ$.



10. ABC is an isosceles triangle with $AB = AC$. Draw $AP \perp BC$. Show that $\angle B = \angle C$

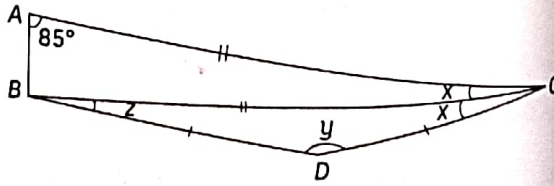
11. CE and BF are perpendiculars to AB and AC respectively in ΔABC such that $BE = CF$. Prove that $\angle B = \angle C$.

3 MARKS QUESTIONS

1. In right angled ΔABC right angle at B, such that $\angle BCA = 2\angle CAB$, show that hypotenuse $AC = 2BC$.

2. Bisectors of the angles B and C of an isosceles triangle with
$AB = AC$ intersect each other at O. BO is produced to a point M. Prove that $\angle MOC = \angle ABC$.

3. In the given figure, $\angle BAC = 85°$, $CA = CB$ and $BD = CD$. Find the measures of $\angle x$, $\angle y$ and $\angle z$.

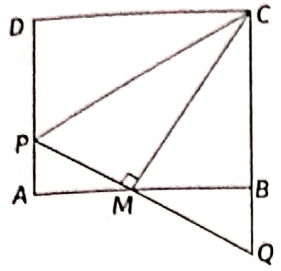


4. In $\triangle ABC$, $AB = AC$ and $\angle B = \frac{2}{5}$th of $\angle A$. Find the measure of $\angle A$.

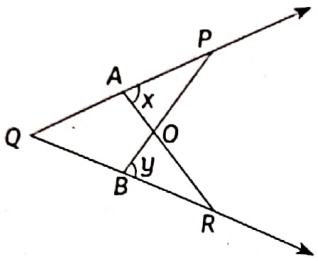
5. Prove that angles opposite to equal sides of a triangle are equal.

6. In the given figure, $ABCD$ is a square. M is the mid-point of AB and $PQ \perp CM$ and meets AD at P and CB introduced at Q. Prove that

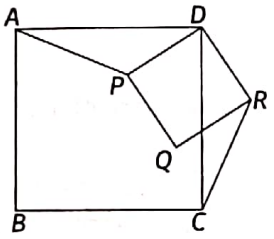
(i) $\triangle PAM \cong \triangle QBM$ (ii) $CP = CQ$



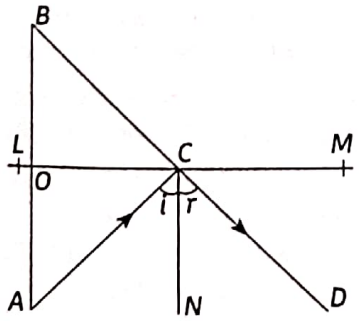
7. In the given figure, $PQ = QR$ and $\angle x = \angle y$. Prove that $AR = PB$.



8. If P is any point in the square $ABCD$ and $DPQR$ is another, square, then prove that $AP = CR$.



9. The image of an object placed at a point A before a plane mirror LM is seen at the point B by an observer at D as shown in figure. Prove that the image is as far behind the mirror as the object is in front of the mirror.



10. ABC is a triangle in which $\angle B = 2\angle C$. D is a point on BC such that AD bisects $\angle BAC$ and $AB = CD$. Prove that $\angle BAC = 72°$.

5 MARKS QUESTIONS

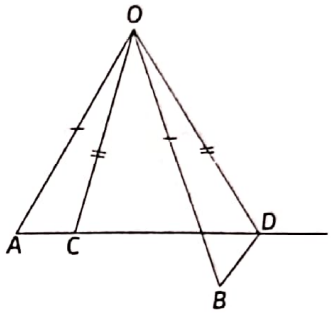
1. Two lines l and m intersect at the point O and P is a point on a line n passing through the point O such that P is equidistant from l and m. Prove that n is the bisector of the angle formed by l and m.

2. O is a point in the interior of a square $ABCD$ such that OAB is an equilateral triangle. Show that $\triangle COD$ is an isosceles triangle.

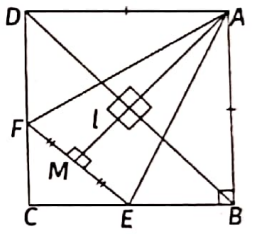
3. If ABC is a right angled triangle such that $AB = AC$ and bisector of angle C intersects the side AB at D, then prove that $AC + AD = BC$.

4. A point O is taken inside an equilateral four sided figure $ABCD$ such that its distance from the angular points D and B are equal. Show that AO and OC are in one and the same straight line.

5. In the given figure, $OA = OB$, $OC = OD$ and $\angle AOB = \angle COD$. Prove that $AC = BD$.



6. In the given figure, $ABCD$ is a square and EF is parallel to diagonal BD and $EM = FM$.

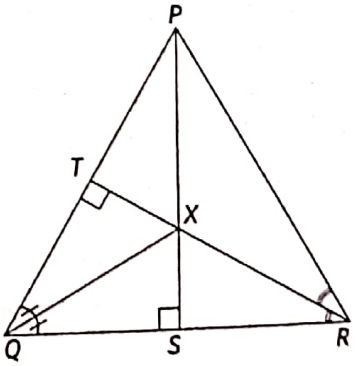


Prove that

(i) $DF \cong BE$ (ii) AM bisects $\angle BAD$.

7. Line segment joining the mid-points M and N of parallel sides AB and DC, respectively of a trapezium $ABCD$ is perpendicular to both the sides AB and DC. Prove that $AD = BC$.

8. In the given figure, QX and RX are the bisectors of $\angle PQR$ and $\angle PRQ$ respectively of ΔPQR. If $XS \perp QR$ and $XT \perp PQ$, then prove that $\Delta XTQ \cong \Delta XSQ$ and PX bisects $\angle P$.



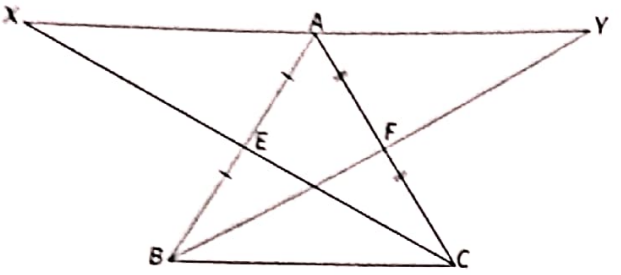
HOTS QUESTIONS

1. E and F are the mid-points of the sides AB and AC, respectively of ΔABC. CE and BF are produced to X and Y respectively, so that EX = CE and FY = BF. AX and AY are joined.

   Prove that

   (i) $\Delta AEX \cong \Delta BEC$ and $\Delta AFY \cong \Delta CFB$.

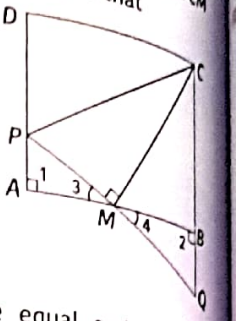
   (ii) XAY is a straight line.



2. ABCD is a square. M is the mid-point of AB and PQ ⊥ CM meets AD at P and CB produced at Q. Prove that

   (i) PA = BQ

   (ii) CP = AB + PA



3. In ΔABC, the sides AB, AC are equal and the base BC is produced to any point D. From D, DE is drawn perpendicular to BA produced and DF perpendicular to AC produced. Prove that BD bisects $\angle EDF$.

4. Bisectors of the angles B and C of an isosceles ΔABC with AB = AC intersect each other at O. Show that external angle adjacent to $\angle ABC$ is equal to $\angle BOC$.

CASE BASED QUESTIONS

Read the following and answer any four questions from 1 (I-V)

Case 1: Congruent triangles, which have identical angles and sides, find broad applications in mathematics. They are instrumental in calculating heights and distances, such as measuring flagpole heights using right triangles and angle of elevation. Congruent triangles also serve as the foundation for creating geometric patterns and artistic tessellations, ensuring symmetry and balance. In the realm of rigid transformations, congruency guarantees that shapes maintain their properties through translations, rotations, and reflections, a vital concept for mathematicians and computer scientists.

I. What is the primary characteristic of congruent triangles?

(a) Equal angles
(b) Equal corresponding sides
(c) Equal areas
(d) Equal perimeters

II. How is congruency applied in calculating the height of a flagpole?

(a) By measuring the shadow of the flagpole
(b) By calculating the flag's area
(c) By determining the flag's perimeter
(d) By counting the number of flags

III. In which field is congruency used to create artistic patterns and tessellations?

(a) Medicine (b) Mathematics
(c) Engineering (d) Architecture

IV. How do mathematicians and computer scientists use congruency in rigid transformations?

(a) To change shapes into new forms
(b) To distort shapes
(c) To ensure shapes remain unchanged during transformations
(d) To combine shapes

V. What is the main advantage of using congruent triangles in geometric patterns?

(a) Creating asymmetrical designs
(b) Achieving perfect balance and symmetry
(c) Making designs complex and confusing
(d) Reducing the need for mathematical principles

Read the following and answer any four questions from 2 (I-V)

Case 2: In a park, there are two triangular flower beds. Flower bed ABC has sides AB = 8 cm, BC = 6 cm, and CA = 10 cm. Flower bed PQR has sides PQ = 8 cm, QR = 10 cm, and RP = 6 cm.

I. Using the given information, can we conclude that flower bed ABC is congruent to flower bed PQR? Why or why not?

a) Yes, because all three sides of ABC are equal to the corresponding sides of PQR.
(b) Yes, because all three angles of ABC are equal to the corresponding angles of PQR.
(c) No, because the sides and angles of ABC and PQR are not equal.
(d) Yes, because ABC and PQR are both triangular flower beds.

II. If angle $A = 40°$ and angle $B = 60°$ in flower bed ABC, what is the measure of angle C?

(a) 40° (b) 60°
(c) 80° (d) 100°

III. In flower bed ABC, a new side AD is added such that $AD = 8$ cm. Now, can we conclude that triangle ABD is congruent to triangle PQR? Why or why not?

(a) Yes, because all three sides of ABD are equal to the corresponding sides of PQR.

(b) Yes, because all three angles of ABD are equal to the corresponding angles of PQR.

(c) No, because the sides and angles of ABD and PQR are not equal.

(d) Yes, because both triangles have a side of 8 cm.

IV. If angle $P = 50°$ and angle $Q = 70°$ in flower bed PQR, what is the measure of angle R?

(a) 50° (b) 70°
(c) 90° (d) 110°

V. Suppose flower bed ABC is shifted to a new location within the park without changing its shape or size. In this new location, is flower bed ABC congruent to its original position? Why or why not?

(a) Yes, because the shape and size of ABC remain the same.
(b) No, because the location of ABC has changed.
(c) Yes, because the park remains the same.
(d) No, because the other flower bed PQR is not shifted.

Read the following and answer any four questions from 3 (I-V)

Case 3: In a forest, a big tree got broken due to heavy rain and wind. Due to this rain the big branches AB and AC with lengths 5m fell down on the ground. Branch AC makes an angle of 30° with the main tree AP. The distance of Point B from P is 4 m. You can observe that ΔABP is congruent to ΔACP.

I. ΔACP and ΔABP are congruent by which criteria?

(a) SSS (b) SAS
(c) ASA (d) RHS

II. What is the length of CP?

(a) 4 m (b) 5m
(c) 3m (d) 10 m

III. What is the value of $\angle BAP$?

(a) 40° (b) 50°
(c) 30° (d) 60°

IV. What is the value of $\angle APB$?

(a) 40° (b) 50°
(c) 60 (d) 90°

V. What is the height of the remaining tree?

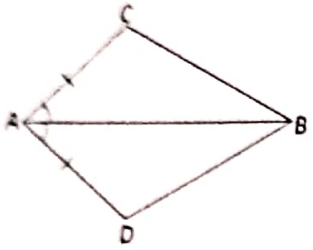
(a) 4m (b) 5m
(c) 3m (d) 10m

❑❑❑

EXAM PRACTICE

NCERT QUESTIONS

1. In a quadrilateral ABCD, AC = AD and AB bisects ∠A (see figure). Show that △ABC ≅ △ABD. What can you say about BC and BD?

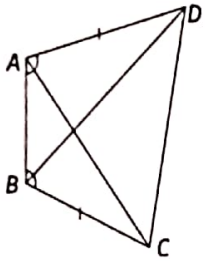


2. ABCD is a quadrilateral in which AD = BC and ∠DAB = ∠CBA (see figure). Prove that

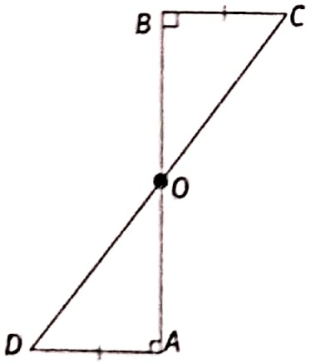
(i) △ABD ≅ △BAC

(ii) BD = AC

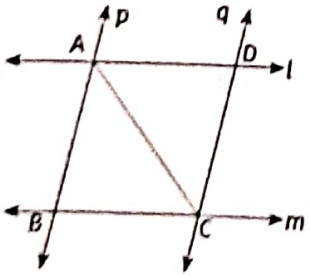
(iii) ∠ABD = ∠BAC



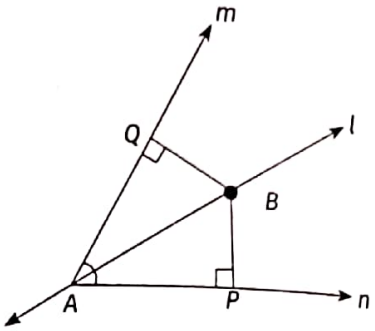
3. AD and BC are equal perpendiculars to a line segment AB (see figure). Show that CD bisects AB.



4. l and m are two parallel lines intersected by another pair of parallel lines p and q (see figure). Show that △ABC ≅ △CDA.



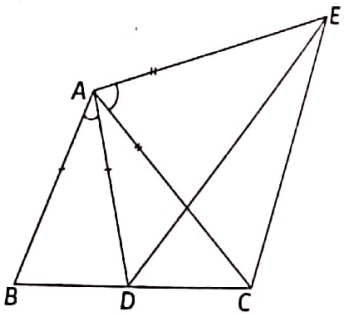
5. Line l is the bisector of ∠A and B is any point on l. BP and BQ are perpendiculars from B to the arms of ∠A (see figure). Show that



(i) △APB ≅ △AQB

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

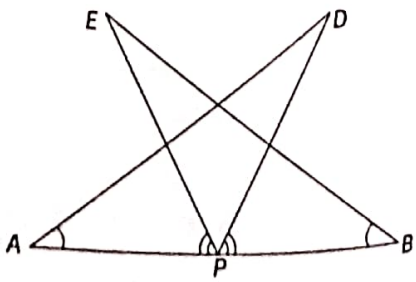
6. In the given figure, AC = AE, AB = AD and ∠BAD = ∠EAC. Show that BC ≅ DE.



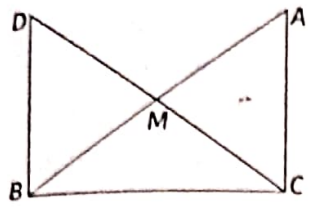
7. AB is a line segment and P is its mid-point. D and E are points on the same side of AB, such that ∠BAD = ∠ABE and ∠EPA = ∠DPB (see figure). Show that

(i) △DAP ≅ △EBP

(ii) AD = BE



8. In right triangle ΔABC, 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) $\Delta AMC \cong \Delta BMD$

(ii) $\angle DBC$ is a right angle.

(iii) $\Delta DBC \cong \Delta ACB$

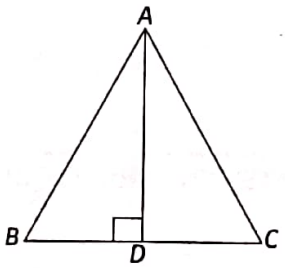
(iv) $CM = \frac{1}{2} AB$

9. In an isosceles ΔABC with $AB = AC$, the bisectors of $\angle B$ and $\angle C$ intersect each other at O. Join A to O. Show that

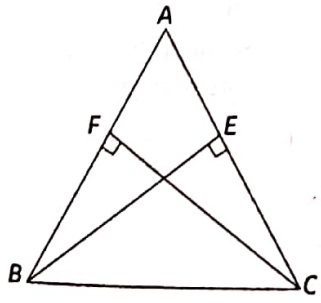
(i) $OB = OC$

(ii) OA bisects $\angle A$.

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



11. ΔABC is an isosceles triangle in which altitudes BE and CF are drawn to equal sides AC and AB, respectively (see figure). Show that these altitudes are equal.

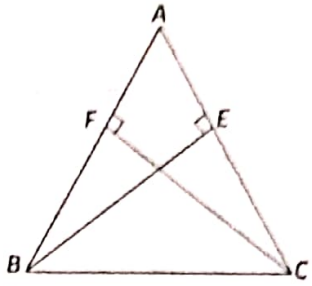


12. ABC is a triangle in which altitudes BE and CF to sides AC and AB are equal (see figure).

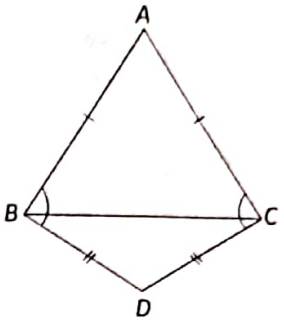
Show that

(i) $\Delta ABE \cong \Delta ACF$

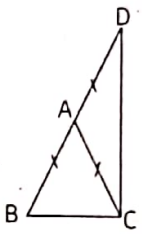
(ii) $AB = AC$, i.e., ΔABC is an isosceles triangle.



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



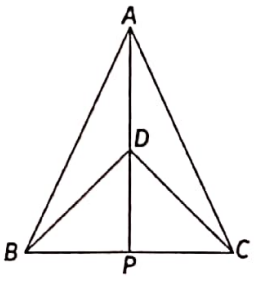
14. ΔABC is an isosceles triangle in which $AB = AC$. Side BA is produced to D such that $AD = AB$ (see figure). Show that $\angle BCD$ is a right angle.



15. ΔABC is a right angled triangle in which $\angle A = 90°$ and $AB = AC$. Find $\angle B$ and $\angle C$.

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

17. ΔABC and ΔDBC 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) $\Delta ABD \cong \Delta ACD$

(ii) $\Delta ABP \cong \Delta ACP$

(iii) AP bisects $\angle A$ as well as $\angle D$.

(iv) AP is the perpendicular bisector of BC.

18. AD is an altitude of an isosceles $\triangle ABC$ in which $AB = AC$.

Show that

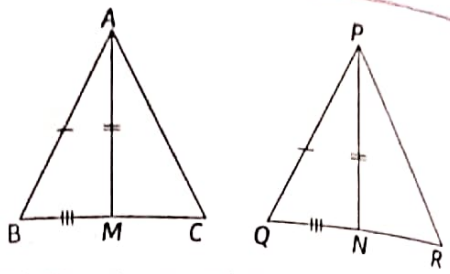
(i) AD bisects BC.

(ii) AD bisects $\angle A$.

19. Two sides AB, BC and median AM of $\triangle ABC$ are respectively equal to sides PQ, QR and median PN of $\triangle PQR$. Show that

(i) $\triangle ABM \cong \triangle PQN$

(ii) $\triangle ABC \cong \triangle PQR$



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

21. $\triangle ABC$ is an isosceles triangle with $AB = AC$.

Draw $AP \perp BC$ to show that $\angle B = \angle C$.

COMPETENCY QUESTIONS
(FOR FOUNDATION, NTSE, OLYMPIAD QUESTIONS)

SECTION A MULTIPLE CHOICE QUESTIONS

DIRECTIONS: This section contains multiple choice questions. Each question has 4 choices (a), (b), (c) and (d) out of which only one is correct.

1. In a isosceles triangle $AB = AC$ and BA is produced to D, such that $AB = AD$ then $\angle BCD$ is

(a) 70° (b) 90°
(c) 60° (d) 45°

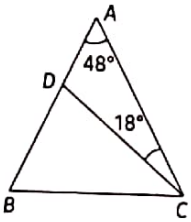
2. In $\triangle ABC$, $BD \perp AC$ and $CE \perp AB$. If BD and CE intersect at O, then $\angle BOC$ =

(a) $\angle A$ (b) $90° + \angle A$
(c) $180° + \angle A$ (d) $180° - \angle A$

3. If the three altitudes of a triangle are equal then triangle is

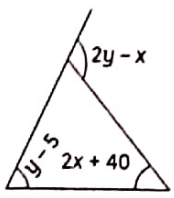
(a) isosceles
(b) equilateral
(c) right angled
(d) none

4. In the given figure., $AB = AC$, $\angle A = 48°$ and $\angle ACD = 18°$. BC equal to –



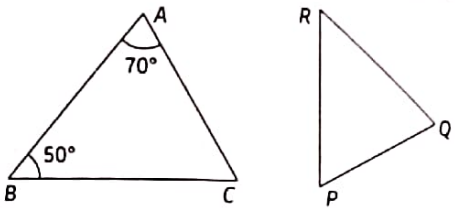
(a) AC
(b) CD
(c) BD
(d) AB

5. In figure. value of y, if $x = 5°$ is –



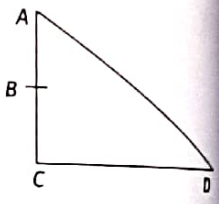
(a) 50° (b) 60°
(c) 65° (d) 45°

6. In the adjoining Fig., $\Delta ABC \sim \Delta QPR$. Then $\angle R$ is



(a) 60° (b) 50°
(c) 70° (d) 80°

7. In a right triangle shown below, $AB + AD = BC + CD$, if $AB = x$, $BC = h$ and $CD = d$, then x equal.



(a) $\frac{hd}{2h+d}$

(b) $d - h$

(c) $h + d$

(d) $\frac{1}{2}h$

SECTION B STATEMENT BASED QUESTIONS

8. Consider the following statements:

(i) A triangle whose sides are equal, is called a scalene triangle.

(ii) A triangle, each of whose angle is less than 90°, is called an acute triangle.

(iii) If all sides of a polygon are different, it is called a regular polygon.

(iv) A triangle with one of its angles greater than 90°, is known as an obtuse triangle.

Which of the statements given above is/are incorrect?

(a) (i) and (ii)
(b) (i) and (iii)
(c) (i) and (iv)
(d) All above

9. Consider the following statements :

(i) The difference of any two sides of a tringle is less than the third side.

(ii) A triangle cannot have two obtuse angles.

(iii) A triangle cannot have an obtuse angle and a right angle.

Which of the statement is/are correct?

(a) Both (i) and (ii) (b) Both (ii) and (iii)

(c) Both (i) and (iii) (d) All above

10. Consider the following statements :

(i) Two triangles having same area are congruent.

(ii) If two sides and one angle of a triangle are equal to the corresponding two sides and the angle of another triangle, then the two triangles are congruent.

(iii) If the hypotenuse of one right triangle is equal to the hypotenuse of another triangle, then the triangles are congruent.

Which of the statement(s) given above is/are incorrect?

(a) (i) and (ii) (b) Neither (i) nor (ii)

(c) (ii) and (iii) (d) All of the above

11. Consider the following statements :

(i) Sides of triangle are 3 cm, 4 cm, 6 cm

(ii) Sides of triangle are 4 cm, 5 cm, 6 cm

(iii) Sides of triangle are 7 cm, 24 cm, 25 cm

(iv) Sides of triangle are 5 cm, 12 cm, 14 cm.

Which of these is right triangle ?

(a) (i) (b) (ii)

(c) (iii) (d) (iv)

SECTION C FEATURE BASED QUESTIONS

12. Each angle of an equilateral triangle is

(a) 60° (b) 45°

(c) 90° (d) 30°

❑❑❑