Grade VII

Lesson : 6 The Triangle and its properties

Objective Type Questions

I. Multiple choice questions

1. In a triangle ABC $\angle A + \angle B + \angle C =$

a) 360^0 b) 90^0 c) 180^0 d) 60^0

2. Least number if possible acute angles in a triangle is:

a) 0 b) 1 c) 2 d) 3

3. Angles of a triangle are in the ratio 1:2:3. The smallest angle is :

a) 15^0 b) 90^0 c) 60^0 c) 30^0

4. How many altitudes can a triangle have.

a) one b) two c) three d) four

5. The exterior angle of a triangle is 120^0 and one of its interior opposite angle is 70^0. Find the measure of its other interior opposite angle?

6. The angles of a triangle are in the ratio 2:3:5. What is the largest angle of the triangle ?

a) 54^0 b) 36^0 c) 90^0 d) 100^0

7. Δ ABC is right-angled at C. If AC = 5cm and BC = 12 cm, what is the length of AB?

a) 7 cm b) 17 cm c) 13 cm d) 20 cm

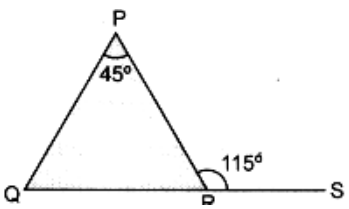
8. What is the perimeter of the rectangle whose length is 40 cm and a diagonal is 41 cm?

a) 164 cm b) 162 cm c) 81cm d) 98 cm

9. Δ ABC $\cong \Delta$ DEF, If AB = 7cm, what is the length of DE?

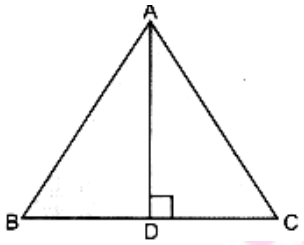
a) 14 cm b) 16 cm c) 7cm d) 18 cm

10. In Fig. side QR of a Δ PQR has been produced to the point S. If $\angle$ PRS = 115 and $\angle$P= 45, then $\angle$Q is equal to,



a) 70^0 b) 105^0 c) 51^0 d) 80^0

11. In an equilateral triangle ABC, AD is an altitude. Then $4AD^2$ is equal to:



a) $2BD^2$ b) BC^2 c) $3AB^2$ d) $2CD^2$

12. Which of the following cannot be the sides of a triangle?

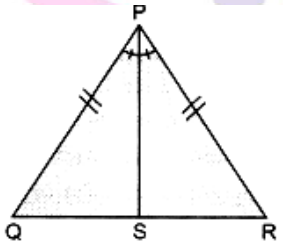
a) 3cm, 4cm, 5cm b) 2cm, 4cm, 6cm

c) 2.5cm, 3.5cm, 4.5cm d) 2.3cm, 6.4cm, 5. 2cm

13. Which one of the following is not a criterion for congruence of two triangles?

a) ASA b) SSA c) SAS d) SSS

14. Ps is the bisector of $\angle P$ and PQ = PR. Then ΔPRS and Δ PQS are congruent by the criterion :



a) AAA b) SAS c) ASA d) both (b) and (c)

15. The sides of a triangle have lengths (in cm) 10, 6.5 and a, where a is a whole number. The minimum value that a can take is:

a) 6 b) 5 c) 3 d) 4

16. Triangle DEF is a right triangle with $\angle E = 900$. What type of angle are $\angle D$ and $\angle F$?

a) They are equal angles

b) They form a pair of adjacent angles.

c) They are complementary angles

d) They are supplementary angles.

17. PQ = PS. The value of x is.

a) 35 b) 45 c) 55 d) 70

18. In a right-angled triangle, the angles other than the right angle are :

a) Obtuse b) right c) acute d) straight

19. In an isosceles triangle, one angle is 70^0. The other two angels are of :

(i) 55^0 and 55^0 (ii) 70^0 and 40^0 (iii) any measure

In the given option(s) which of the above statement (s) are true?

a) i only b) (ii) only c) iii only d) i and ii

20. In a triangle , one angle is of 90^0 then :

(i) The other two angles are of 45 o each

(ii) In remaining two angles, one angle is 90 and other is 45

(iii) Remaining two angles are complementary n

In the given option (s) which is true?

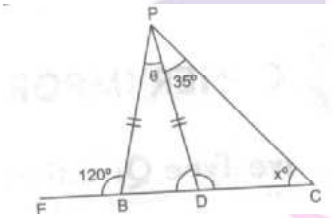
a) (i) only b) ii) only c) (iii) only (iv) (i) and (ii)

21. Lengths of sides of triangle are 3 cm , 4cm and 5cm. The triangle is .

a) Obtuse angles triangle b) Acute-angled triangle

c) Right-angled triangle d) An isosceles right triangle.

22. PB = PD. The value of x is :



a) 85^0 b) 90^0 c) 25^0 d) 35^0

23. In ΔPQR

a) PQ-QR> PR b) PQ = QR< PR C) $PQ - QR < PR$ d) $PQ + PR < QR$

24. In ΔABC

a) AB + BC> AC b) AB + BC< AC C) $AB + AC < BC$ d) $AC + BC < AB$

25. The triangle ABC formed by AB = 5 cm, BC = 8 cm, AC = 4 CM is :

a) an isosceles triangle only b) a scalene triangle only

c) an isosceles right triangle d) scalene as well as a right triangle

26.Two trees 7 m and 4m high stand upright on a ground. If their bases (roots) are 4 m apart, then the distance between their tops is :

a) 3 m b) 5 m c) 4 m d) 11m

27. If in an isosceles triangle, each of the base angles is 40^0 Then the triangle is :

a) Right – angled triangle b) Acute angled triangle

c) Acute angled triangle d) Isosceles right-angled triangle

28. If two angles of a triangle are 60^0 each, then the triangle is :

a) Isosceles but not equilateral b) Scalene c) Equilateral d) Right – angled

29. The perimeter of the rectangle whose length is 60 cm and a diagonal is 61 cm is :

a) 120 cm b) 122 cm c) 71 cm d) 142 cm

30. In ΔPQR, if $PQ = QR$ and $\angle Q = 100^0$, then $\angle R$ is equal to :

a) 40^0 b) 80^0 c) 120^0 d) 50^0

31. Which of the following statement is not correct ?

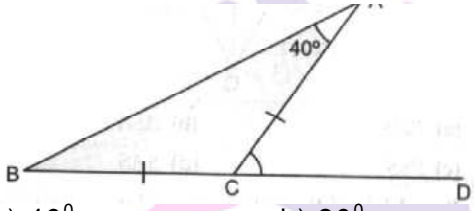
a) The sum of any two sides of a triangle is greater than the third side

b) A triangle can have all its angles acute

c) A right – angled triangle cannot be equilateral

d) Difference of any two sides of a triangle is greater than the third side.

32. BC = CA and $\angle A = 40^0$ Then $\angle ACD$ *is* equal to :

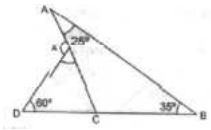


a) 40^0 b) 80^0 c) 120^0 d) 60^0

33. The length of two sides of a triangle are 7 cm and 9cm . The length of the third side may lie between :

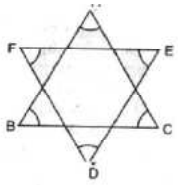
a) 1 cm and 10 cm b) 2cm and 8 cm c) 3cm and 16 cm d) 1cm and 16 cm

34. The value of x is :



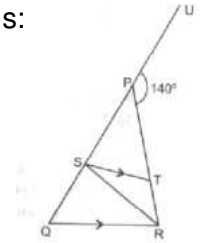
a)75^0 b) 90^0 c) 120^0 d)60^0

35. The value of $\angle A + \angle B + \angle C + \angle D + \angle E + \angle F$ is :



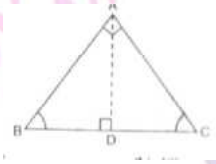
a) 190^0 b) 540^0 c) 360^0 d) 180^0

36. PR, RS = RQ and ST ∥ QR. If the exterior angle RPU is 140^0, then the measure of TSR is:



a) 55^0 b) 40^0 c) 50^0 d) 45^0

37. $\angle BAC = 90^0$, AD $\perp$ BC and $\angle BAD = 50^0$ then, $\angle ACD$ is :



a) 50^0 b) 40^0 c) 70^0 d) 60^0

38. If one angle of a triangle is equal to the sum of the other two angles, the triangle is :

a) obtuse b) acute c) right d) equilateral

39. If the exterior angle of a triangle is 130^0 and its interior opposite angles are equal then measure of each interior opposite angle is :

a) 55^0 b) 65^0 c) 50^0 d) 60^0

40. If one of the angles of a triangle is 1100, then the angle between the bisector of the other two angles is :

a) 70^0 b) 110^0 c) 35^0 d) 145^0

41. In ΔABC, AD is the bisector of $\angle A$ meeting BC at D, CF $\perp$ AB and E is the mid-point of AC, Then median of the triangle is :

a) AD b) BE c) FC d) DE

42. Which of the following triplets cannot be the angles of a triangle?

a) $67^0, 51^0, 62^0$ b) $70^0, 83^0, 27^0$

c) $90^0, 70^0, 20^0$ d) $40^0, 132^0, 18^0$

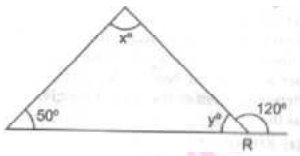
43. Which of the following can be the length of the third side of a triangle whose two sides measure 18 cm and 14 cm?

a) 4cm b) 3cm c) 5 cm d) 32 cm

44. If we join a vertex to a point on opposite side which divides that side in the ration 1:1 then what is the special name of that line segment?

a) Median b) Angle bisector c) Altitude d) Hypotenuse

45. The measures of x and y in Fig. Are respectively:



a) 30^0, 60^0 b) 40^0, 40^0 c) 70^0, 70^0 d) 70^0, 60^0

46. If length of two sides of a triangle are 6 cm and 10 cm then the length of the third side can be :

a) 3cm b) 4cm c) 2cm d) 6 cm

47. In a right-angled triangle ABC, If angle B = 90^0 BC = 3cm and AC = 5 cm, then length of side AB is :

a) 3cm b) 4cm c) 5cm d) 6 cm

48. In a right-angled triangle, ABC, if $\angle B = 900$, then which of the following is true?

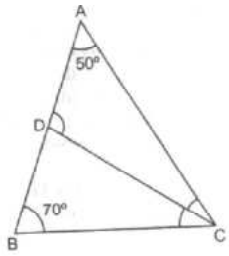
a) $AB^2 = BC^2 + AC^2$ b) $AC^2 = AB^2 + BC^2$

c) AB = BC +AC d) AC = AB + BC

49. In $\triangle ABC$, $\angle A = 100^0$, AD bisects $\angle A$ = and AD⊥ BC. Then $\angle B$ is equal to:

a) 80^0 b) 20^0 c) 40^0 d) 30^0

50. In $\triangle ABC$, $\angle A = 50^0$, $\angle B = 70^0$ and bisector of $\angle C$ meets AB at D, measure of $\angle ADC$.

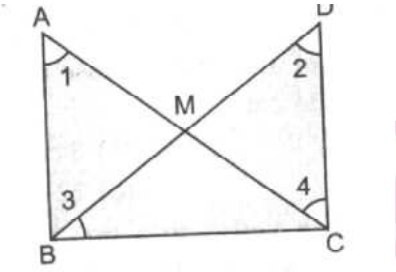


a) 50^0 b) 100^0 c) 30^0 d) 70^0

51. If for $\triangle ABC$ and $\triangle DEF$, the correspondence CAB ↔ EDF gives a congruence, then which of the following is not true?

a) AC = DE b) AB = EF c) $\angle A = \angle D$ d) $\angle C = \angle E$

52. M is the mid – points of both AC and BD, Then



a) $\angle 1 = \angle 2$ b) $\angle 1 = \angle 4$ c) $\angle 2 = \angle 4$ d) $\angle 1 = \angle 3$

53. If D is the mid-point of the side BC in $\triangle ABC$ where AB = AC, then $\angle ADC$ is :

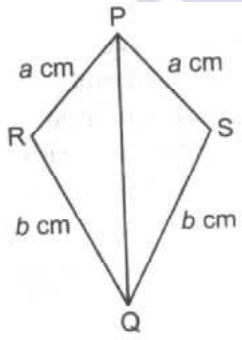
a) 60^0 b) 45^0 c) 120^0 d) 90^0

54. Two triangles are congruent, if two angels and the side included between them in one of the triangles are equal to the two angles and the side included between them of the other triangle. This is known as the :

a) RHS congruence criterion b) ASA congruence criterion

c) SAS congruence criterion d) AAA congruence criterion

55. By which congruency criterion, the two triangles are congruent ?



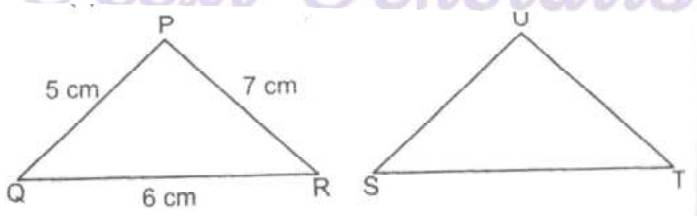
a) RHS b) ASA c) SSS d) SAS

56. By which of the following criterion two triangles cannot be proved congruent ?

a) AAA b) SSS c) SAS d) SAS

57. ΔPQR is congruent to ΔSTU, then what is the length of TU?

a) 5 cm b) 6cm c) 7 cm d) cannot be determined



58. If ΔABC and ΔDBC are on the same base BC, AB =DC and AC = DB, then which of the following gives a congruence relationship ?

a) ΔABC and Δ DBC b) ΔABC and Δ CBD

c) ΔABC and Δ DCB d) ΔABC and Δ BCD

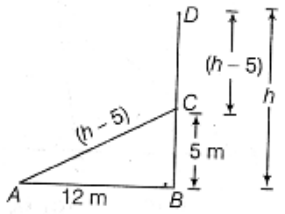
1.c	2.c	3.d	4.c	5.b	6.c	7.c	8.d	9.c	10.a
11.c	121.b	13.b	14.b	15.d	16.c	17.b	18.c	19.d	20.c
21.c	22.c	23.c	24.a	25.b	26.b	27.c	28.c	29.d	30.a
31.d	32.b	33.b	34.c	35.c	36.b	37.a	38.c	39.b	40.d
41.b	42.d	43.d	44.b	45.d	46.d	47.b	48.b	49.c	50.b
51.b	52.b	53.3b	54.b	55.c	56.a	57.b	58. b		

II. Multiple choice questions

1. In a ΔABC , if $\angle A = 60^0$ and $\angle B = 30^0$, then the exterior angle formed by producing BC is equal to.

a) 180^0 b) 99^0 c) 90^0 d) 105^0

2. The top of a broken tree touches the ground at a distance of 12 m from its base. If the tree is broken at a height of 5m from the ground, then the actual height of the tree is.



a) 25 m b) 13 m c) 18 m d) 17 m

1. c	2. c

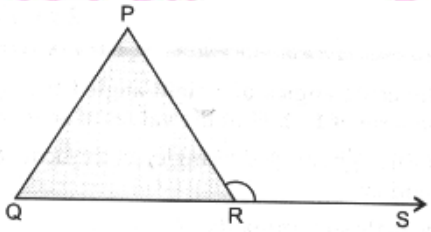
Hints / Solutions

I. Fill in the Blanks

1. The line segment joining a vertex of a triangle to the mid-point of its opposite side is called its _____.

2. A triangle is said to be _____ If each of its sides has the same length.

3. $\angle PRS = \angle QPR + \angle$ _____.



4. Let ABC and DEF be two triangles in which AB = DE, BC = FD and CA = EF. The two triangles are congruent under the correspondence ABC ↔ _____.

5. The _____ triangle always has altitude outside itself.

6. The sum of an exterior angle of a triangle and its adjacent angle is always _____.

7. The longest side of a right angled triangle is called its _____.

8. Measures of each of the angles of an equilateral triangle is _____.

9. In an isosceles triangle, two angles are always _____.

10. In an isosceles triangle, angles opposite to equal sides are _____.

11. If one angle of a triangle is equal to the sum of other two, then the measure of that angle is _____.

12. Every triangle has atleast _____ acute angle (s).

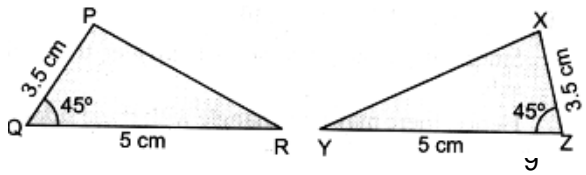
13. Two line segments are congruent, if they are of _____ lengths.

14. Two angles are said to be _____, if they have equal measures.

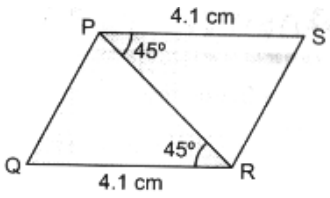
15. Two rectangles are congruent, if they have same _____ and _____.

16. Two squares are congruent, if they have same _____.

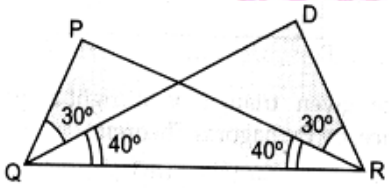
17. $\Delta PQR \cong \Delta$ _____.



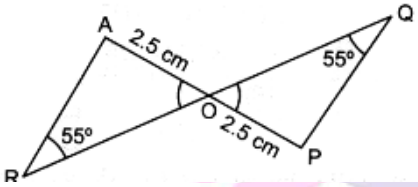
18. Δ PQR ≅ Δ _____.



19. Δ _____ ≅ Δ PQR



20. Δ ARO ≅ Δ _____.

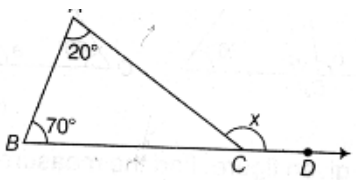


ANSWERS

1. Median	2. Equilateral	3.PQR	4.EDF	5.Obtuse
6. Supplementary	7. Hypotenuse	8. 60^0	9.Equal/ acute(any one)	10. Equal
11. 90^0	12.Two	13.Equal/ same	14.Equal/ coiners	15.Length, breadth
16.Side	17. XYZ	18.RSP	19.DRQ	20. PQO

II. Fill in the Blanks

1. In the following figure, value of x is_____.



$\because x = 20^0 + 70^0 = 90^0$

Sum of interior opposite angles is equal to the exterior angle.

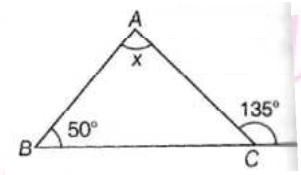
2. Median is also called _____ in an equilateral triangle

Median is also called attitude in an equilateral triangle

3. Every triangle has at most _____ obtuse angles.

Every triangle has at most one obtuse angles

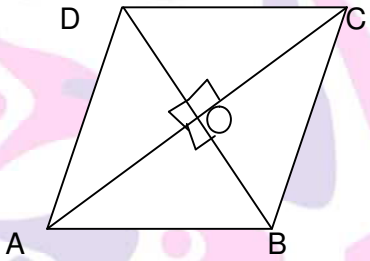
4. In the adjacent figure, the value of x is _____.



Since the sum of interior opposite angles is equal to exterior angle

$x + 50^0 = 135^0 \Rightarrow x = 135^0 - 50^0 = 85^0$.

5. In the adjacent figure, the diagonals of ABCD are AC= 16 cm, BD = 30 cm, then perimeter of the rhombus is equal to _____.

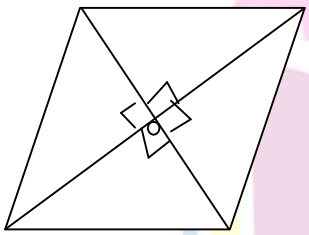


In the given figure,

AC=16 cm, BD =30 cm, DO = 15 cm, OB = 15 cm

AO = 8 cm, OC = 8 cm

[∵ diagonals intersect each other at point O, where O is mid-point of AC and BD]



In Δ DOC, by using Pythagoras property of right angled triangle,

$(15)^2 + (8)^2 = (DC)^2 \Rightarrow 225 + 64 = (DC)^2$

$\Rightarrow$ DC = $\sqrt{289} \Rightarrow$ DC= 17cm

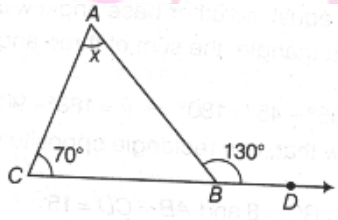
$\Rightarrow$ DC= AB [∵ sides are equal in rhombus) $\Rightarrow$ AB = 17

Perimeter of rhombus = AB +BC+CD+AD

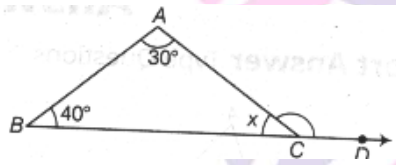
= 17 + 17 + 17 + 17 = 68 cm.

I. True or False

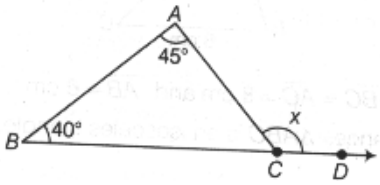
1. The sum of any two angles of triangle is always greater than the third angle.
2. Sum of the measures of three angles of a triangle is greater than 180.
3. It is possible to have a right angled equilateral triangle.
4. It is possible to have a triangle in which each angle is less than 60^0.
5. The difference between the length of any two sides of a triangle is smaller than the length of third side.
6. In the following figure, the value of $x = 60^0$



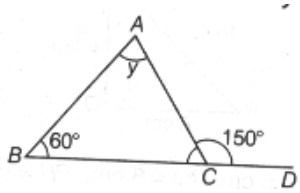
7. In the following figure , the value of $x = 45^0$



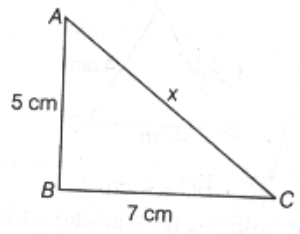
8. In the following figure , the value of $x = 85^0$



9. In the following figure , the value of y is equal to = 90^0



10. In the following figure, the value of x is equal to = 9cm



Answer (True or False)

1. False, sum of any two angles of a triangle is not always greater than the third angle.

E.g. 30^0, 60^0 , 90^0

Hence, $30^0 + 60^0 = 90^0$, $90^0 = 90^0$ etc

2. False, the sum of the measures of three angles of a triangle is always equal to 180^0

i.e. $\angle A + \angle B + \angle C = 180$.

3. False, in a right angles triangle, one angle is equal to 90^0 and in equilateral triangle all angles are equal to 60^0.

4. False, the sum of all angles, in triangle is equal to 180^0. So atleast all three angles can never be less than 60^0.

5. True, the difference between the length of any two sides of a triangle is smaller than the length of third side.

6. True, we know that, the sum of interior opposite angles is equal to exterior angle.

$x + 70^0 = 130^0 \Rightarrow x = 130^0 - 70^0 \Rightarrow x = 60^0$.

7. False, we know that, the sum of interior opposite angles is equal to exterior angle.

$30^0 + 40^0 = 70^0$

Since, x and $70^0 = 180^0$

$\Rightarrow x = 180^0 - 70^0$

$\Rightarrow x = 110^0$.

8. True, we know that, the sum of interior opposite angles is equal to exterior angle.

$\therefore 60^0 + \angle BAC = 150^0 \Rightarrow \angle BAC = 150^0 - 60^0$

$\Rightarrow \angle BAC = 150^0$

10. False , Δ ABC is a right angled triangle. By using Pythagoras property of right angled triangle.

$(AC)^2 + (AB)^2 = (BC)^2$

$\Rightarrow (x)^2 + (5)^2 + (5)^2$

$\Rightarrow x^2 = 25+49$

$\Rightarrow (x)^2 = 74$

$\Rightarrow x = \sqrt{74} = 8.6$ cm

I. Match the following

Column I	Column II
a. Sum of all three angles in a triangle is	(i) 60^0
b. Sum of interior opposite	(ii) 90^0
c. Equilateral triangle have each angle equals to	(iii) exterior angle
d. In a right angled triangle, at least one angle should be equal to	(iv) 180^0

a. iv	b. iii	c. i	d. ii

II. Match the following

Column I	Column II
a. In a Δ ABC, ∠A =120 ∠B = 30. The measure of ∠C is.	(i) 35^0
b. If an exterior angle of a triangle is 1200, then its adjacent interior angle is	(ii) 65^0
c. Sum of two angles of a triangle is 145. The measure of third angle is	(iii) 30
d. In a right angled triangle, one of the acute angle is 25. The measure of the other acute angle is	(iv) 60^0

a) iii	b) iv	c) i	d) ii

I. Very Short Answer Questions

1. Find the angles of a triangle which are in the ratio 2:3:5

Let the angles be $2x$, $3x$ and $5x$

$\therefore\ 2x + 3x + 5x = 180^0$

$\Rightarrow\ 10x = 180^0$

$\Rightarrow\ x = 180^0$

Angles are 36, 54, 90.

2. If two angles of a triangles are equal and the third angle measures 110, then find the measure of each angle?

Let the angles be $110, x, x$

$\therefore\ x + x + 110^0 = 180^0$

$\Rightarrow\ 2x = 180^0 - 110^0$

$\Rightarrow\ 2x = 70^0$

$\Rightarrow\ x = 35^0$

3. What is the name of side opposite to the angle 90 in a right angles triangle?

Hypotenuse

4. How many right angles does a right triangle has?

One.

II Very Short Answer Questions

1. What is the difference between median and altitude?

Altitude always make right angle with base while median always bisects the base.

2. If one angle of a triangle is equal to the sum of other two then what is the measure of that angle?

It should be a right angle means its measure should be of 90^0.

3. Jiya walks 6 km due east and then 8 km due north. How far is she from her starting place?

By Pythagoras Theorem

$AC^2 = AB^2 + BC^2$

Or $AC^2 = 36 + 64 = 100$

Or AC = $\sqrt{100}$ = 10 cm

4. If one angle of an isosceles triangle is 90^0 then what is the measurement of other two angles?

Since it is an isosceles triangle

∴ Two angles must be equal

So, $x + x + 90^0 = 180^0$

Of $2x\ 180^0 - 90^0$

Or $x = 45^0$

Hence, both the angle should be of 45^0.

5. What is the name of triangle in which two altitudes are two of its side?

Two altitudes are only available in right angle triangle, therefore it must be right angle triangle.

6. In Δ PQR, D is the mid-point of QR.

$\overline{PM}$ is _____.

$\overline{PD}$ is _____.

Is QM = MR?

$\overline{PM}$ is altitude.

$\overline{PD}$ is median

No, QM ≠ MR because M is not the mid point of QR.

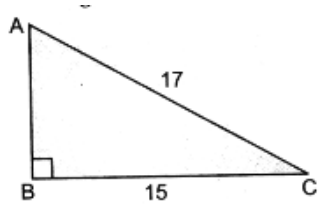
7. The lengths of two sides of a triangle are 12cm and 15 cm . Between what two measure should the length of the third side fall?

Two sides are of 12 cm and 15 cm

The third side should lie between (15-12) to (15+12) i.e, between 3 and 27.

I Short Answer Questions

1. In the above figure, find the length of side AB.



Since given triangle is a right-angled triangle.

Hence, by Pythagoras Theorem,

$(AC)^2 = (AB)^2 + (BC)^2$

$\Rightarrow (17)^2 = (AB)^2 + (15)^2$

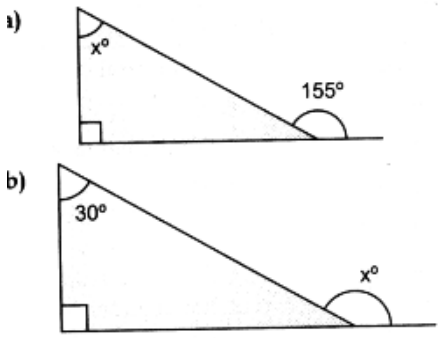
$\Rightarrow (AB)^2 = (17)^2 - (15)^2$

$= 289 - 225$

$(AB)^2 = 64$

$\Rightarrow AB = \sqrt{64} = 8.$

2. In the following figures, find the value of x.



a) Sum of interior opposite angles = Exterior angle

$\Rightarrow x + 90^0 = 155^0$

$\Rightarrow x - 155^0 - 90^0 = 65^0$

b) Similarly,

$30^0 + 90^0 = x$

$x = 120^0$

3. The acute angles of a right angled triangle are in the ratio of 1: 2. Find the values of acute angles.

In this right angled triangle let the acute angles be x and 2x.

By angle sum property

$90^0 + x + 2x = 180^0$

$\Rightarrow 90^0 + 3x = 180^0$

$\Rightarrow 3x = 180^0 - 90^0$

$\Rightarrow 3x = 90$

$\Rightarrow x = \frac{90^0}{3} = 30^0$

Hence, acute angles are 30^0 and 30^0

4. If two angles of a triangle are equal and third angle is of 110. Find the equal angles.

Let the equal angles be x

$\therefore x + x = 110^0 = 180^0$ (By angle sum property)

$\Rightarrow 2x + 110^0 = 180^0$

$\Rightarrow 2x = 180^0 - 110^0$

$\Rightarrow 2x = 70^0$

$\Rightarrow x = \frac{70^0}{2}$

$\Rightarrow x = 35^0$

Hence, equal angles are of 35^0

5. Is there a triangle whose sides have lengths 10.2 cm, 5.8 cm and 4.5cm?

Since sides are :

10.2 cm 5.8 cm, 4.5cm

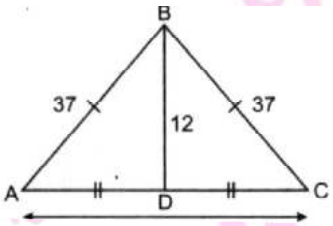
a) $10.2 + 5.8 = 16 > 4.5$ b) $10.2 + 4.5 = 14.7 > 5.8$ c) $5.8 + 4.5 = 10.3 > 10.2$

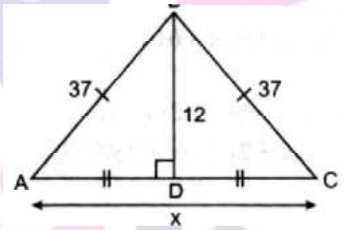
Since sum of any two sides is greater than third side.

Hence, there may be a triangle with these sides.

II Short Answer Questions

1. Find the value of x





In Δ ABD, ∠ D= 90^0

(Median of isosceles triangle)

Hence, ΔABC is right angled triangle

$\therefore AB^2 = BD^2 + AD^2$

$\Rightarrow (37)^2 = (12)^2 + (\frac{x}{2})^2$

$\Rightarrow 1369 = 144 + (\frac{x}{2})^2$

$\Rightarrow \frac{x^2}{4} = 1369 - 144 = 1225$

$\Rightarrow x^2 = 4 \times 1225$

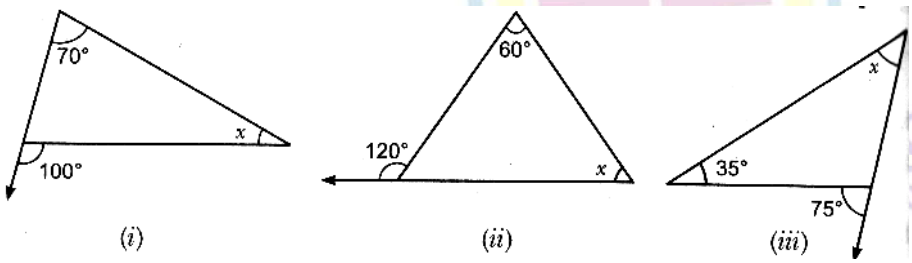
$\Rightarrow x = \sqrt{4 \times 1225}$

$x = 2\sqrt{5 \times 5 \times 7 \times 7}$

$= 2 \times 5 \times 7 = 70$

III Short Answer Questions

1. Find the value of the unknown interior angle x in the following figures.



(i) (ii) (iii)

i) Exterior angle = Sum of interior opposite angles.

$100 = x + 70$

Or $x = 30$

ii) Exterior angle = Sum of interior opposite angles.

$120 = x + 60^0$

Or $x = 60^0$

iii) Exterior angle = Sum of interior opposite angles

$75 = 35^0 + x$

Or $x = 40^0$

2. Is it possible to have a triangle with the following sides?

i) 2cm, 3cm, 5cm ii)3cm, 6cm, 7 cm

i) Suppose such a triangle is possible Now the sum of any two sides must be greater than the third side

Is. $2 + 3 > 5$? No.

The triangle is not possible.

ii) Similarly

Is $3 + 6 > 7$? Yes

Is $6 + 7 > 3$? Yes

Is $3 + 7 > 6$? Yes

∴The triangle is possible

3. ABC is a triangle, right- angled at C. If AB = 25 cm and AC = 7 cm, find BC.

AB = 25 cm and AC = 7 cm, find BC=?

BY Pythagoras theorem

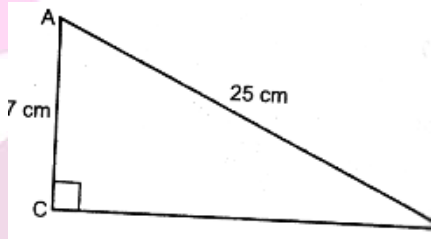
$AB^2 = AC^2 + BC^2$

$\Rightarrow (25)^2 = (7)^2 + BC^2$

$BC^2 = 625\text{-}49$

$BC^2 = 576$

BC= $\sqrt{576} = 24\,cm$



4. A tree is broken at a height of 5m from the ground and its top touches the ground at a distance of 12m from the base of the tree. Find the original height of the tree.

Original height of tree = AC + BA

BY Pythagoras theorem

$AB^2 = AC^2 + BC^2$

$AB^2 = (5)^2 + (12)^2$

$= 25 + 144 = 169$

$AB = \sqrt{169} = 13.$

5. The diagonals of a rhombus measure 16 cm and 30 cm. Find its perimeter.

Since the diagonals of rhombus bisect each other at 900

In $\triangle AOB$

By Pythagoras Theorem

$AB^2 = AO^2 + BO^2$

$AB^2 = 8^2 + 15^2$

$AB^2 = 64 + 225 = 289$

$AB = \sqrt{289} = 17cm$

Now the perimeter of rhombus = 4 x side

$= 4 \times 17 = 68$ cm

6. In given figure, $\triangle$ ABC, DE||BC. Find the value x, y and z.

In $\triangle$ ABC,

$\because$ DE||BCand AB is transversal

$\therefore \angle 30^0$ (Corresponding AC as transversal

$\angle y = 40^0$

Now by angle sum property of triangle,

$\angle x + \angle y + \angle z = 180^0$

$\angle z + 30 + 40 = 180^0$

$\angle z = 110^0$

Long Answer Questions

1. The length of two sides of a triangle are 12 cm, 15cm. Between what two measures should the length of third ball.

In a triangle sum of the lengths of the sides is always greater than the side.

Let the third side be x.

$\therefore$ We can say

$12+15 > x$

$\Rightarrow 27 > x \Rightarrow x < 27$

$\Rightarrow 15 + x > 12 - 15$

$\Rightarrow x > 12 - 15$

$\Rightarrow x > -3$

Again,

$x + 12 > 15$

$\Rightarrow x > 15-12$

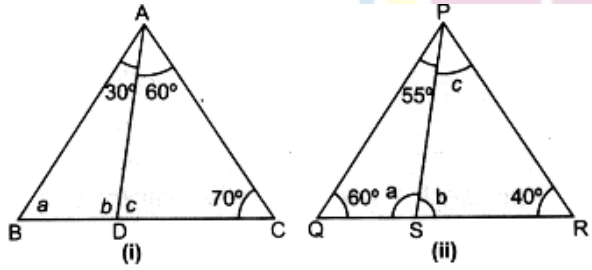
$\Rightarrow x > 3$

We know $3 > -3$

$\Rightarrow x > 3 \text{ and } x < 27$

So, the length of third side should fall between 3 cm and 27 cm.

2. In figures (i) and (ii), then find the values of a, b and c.



In figure (i)

$\angle A + \angle B + \angle C = 180^0$

[since, sum of all angles of a triangle is 180]

$\Rightarrow 90^0 + a + 70^0 = 180^0$

$\Rightarrow a + 160^0 = 180^0$

$\Rightarrow a = 180^0 - 160^0 = 20^0$

Since, c is an the exterior angle of $\triangle$ ABD.

$\therefore \angle C = a + 30^0 = 20^0 + 30^0 = 50^0$

[exterior angle = sum of interior angles]

Since, b is an the exterior angle of ΔADC

$\angle b = 60^0 + 70^0 = 130^0$

[exterior angles = sum of opposite interior angles]

In figure (ii).

In Δ PQS, $\angle QPS + \angle PQS + \angle PSQ = 180^0$

[since, sum of all angles of a triangles is 180^0]

$\Rightarrow 55^0 + 60^0 + a = 180^0 \Rightarrow 115^0 + a = 180^0$

$\therefore a = 180^0 - 115^0 = 65^0$

Now, $a + b = 180^0$

[since, linear pair has sum of 180]

$\Rightarrow 65^0 + b = 180^0$

$\Rightarrow b = 180^0 - 65^0 = 115^0$

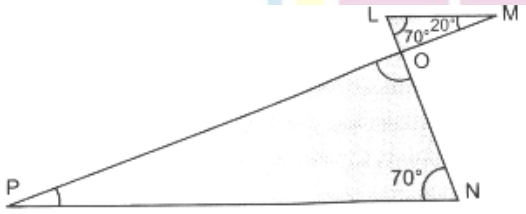
In Δ PSR , $\angle PSR + \angle SPR + \angle PRS = 180^0$

[since sum of all angles of a triangle is 180^0]

$\Rightarrow 115^0 + c + 40^0 = 180^0$

$\Rightarrow c = 180^0 - 155^0 = 25^0$

3. In figure, find the measures of $\angle$PON and $\angle$NPO



In Δ LOM, $\angle OLM = \angle OML + \angle LOM = 180$

$\Rightarrow 70^0 + 20^0 + \angle LOM = 180^0$

$\Rightarrow 90^0 + \angle LOM = 180^0$

$\Rightarrow \angle LOM = 180^0 - 90^0 = 90^0$

$\angle LOM = \angle PON$

[since, vertically opposite angles are equal]

$\therefore \angle PON = 90^0$

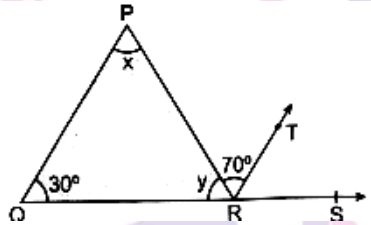
In $\angle PON$,

$\angle PON + \angle NPO + \angle ONP = 180^0$

$\Rightarrow 90^0 + \angle NPO + 70^0 = 180^0$

$\Rightarrow \angle NPO = 180^0 - 160^0 = 20^0$

4. In figure, QP ∥ RT. Find the values of x and y.



Given, QP ∥ RT

$\angle x = \angle PRT$

[since, alternate angles are equal]

$\angle x = 70$

In ΔPQR,

$x + 30 + y = 180$

[since, sum of all angles of a triangle is 180]

$\Rightarrow 70 + 30 + y = 180$

$\Rightarrow 100 + y = 180 \Rightarrow y = 180 - 100 = 80.$

5. O is any point in the interior of a triangle PQR and QO produced meets PR at A (in fig.) Is :

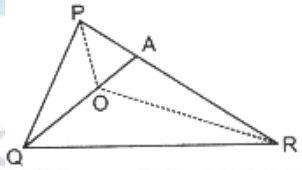
a) PQ + PA> QA?

b) PQ + PA > OQ + OA?

c) PQ + PA + AR > OQ + OA +AR?

d) PQ + PR > OQ + OR?

e) PQ + QR + PR >OP + OQ + OR?



a) PQ + PA> QA?

Yes, because sum of two sides of a triangle is always greater than the third side.

b) PQ + PA > OQ + OA?

Yes, because : $PQ + PA > QA$

$PQ + PA > QO + OA$ [$QA = QO + OA$]

c) $PQ + PA + AR > OQ + OA + AR$

Yes because : $PQ + PA > OQ + OA$

Adding AR in both sides, we get

$PQ + PA + AR > OQ + OA + AR$

d) $PQ + PR > OQ + OR$

Yes because, $PQ + PA > QO + OA$ (1)

$OA + AR > OR$

Adding (1) and (2) we get

$PQ + PA + OA + AR > QO + OA + OR$

$PQ + PR > OQ + OR$

e) $PQ + QR + PR > OP + OQ + OR$

Yes, because

$PQ + PR + > OQ + OR$ ---1

$PQ + QR + > OP + OR$_____2

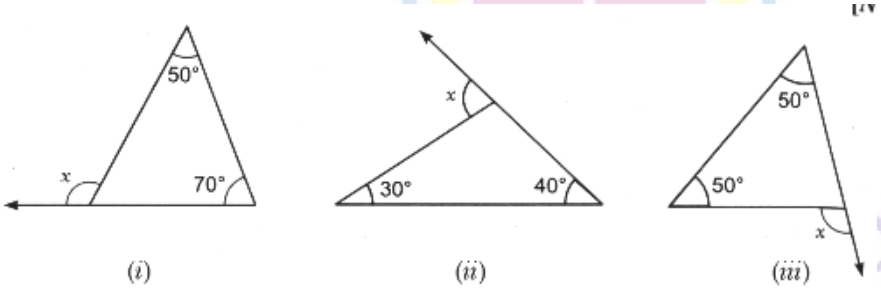
$PR + PQ > OP + OQ$_____3

Adding (1), (2) and (3) we get

$2(PQ + PR + QR) > 2(OP + OQ + OR)$

II Long Answer Questions

1. Find the value of the unknown exterior angle x in the following diagrams:



(i) (ii) (iii)

i) Exterior angle = Sum of interior opposite angles

$x = 50^0 + 70^0 \Rightarrow x = 120^0$

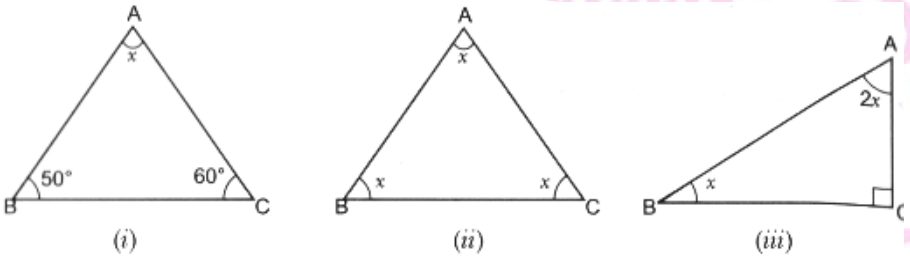
ii) Exterior angle = Sum of interior opposite angles

$x = 30^0 + 40^0 \Rightarrow x = 70^0$

iii) Exterior angle = Sum of interior opposite angles

$x = 50^0 + 50^0 \Rightarrow x = 100^0$

2. Find the value of the unknown x in the following diagrams:



i) By angle sum property of a triangle

$x = 50^0 + 60^0 = 180^0$

Or $x = 70^0$

ii)) By angle sum property of a triangle

$x + x + x = 180^0$

Or $x = 60^0$

iii) By angle sum property

$x + 2x + 60^0 = 180^0$

Or $3x = 180^0 - 90^0$ Or $x = 30^0$

3. The measure of three angles of a triangle is in the ratio 5:3:1. Find the measures of these angles.

Let the three angles be $5x$, $3x$ and x

By angle sum property of triangle.

$x + 3x + 5x = 180^0$

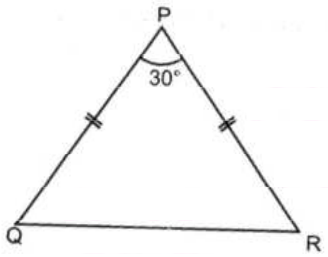
or $9x = 180^0$ or $x = \frac{180^0}{9} = 20^0$

∴ The angles of triangle are $x = 20$

$3x = 3 \times 20^0 = 60^0$

$5x = 5 \times 20^0 = 100^0$

4. In given figure Δ PQR, PQ = PR. Find the measure of $\angle$Q and $\angle$R.



In Δ PQR

$\because$ PQ = PR

$\therefore \angle Q = \angle R = x$ [Equal sides have equal opposite angles]

By angle sum property of triangle

$x + x + 30^0 = 180^0$

$2x + 30^0 = 180^0$

$2x = 150^0$ or $x = 75^0$

$\therefore$ The measure of $\angle$Q and $\angle$R. $= 75^0$