



# MATHS

## BOOKS - PSEB

### THE TRIANGLE AND ITS PROPERTIES

#### Example

1. Write the six elements (i.e., the 3 sides and the 3 angles ) of  $\triangle ABC$



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2. Write the :

Side opposite to the vertex  $Q$  of  $\triangle PQR$



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3. Write the :

Angle opposite to the side  $LM$  of  $\triangle LMN$



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4. Write the :

Vertex opposite to the side  $RT$  of  $\triangle RST$



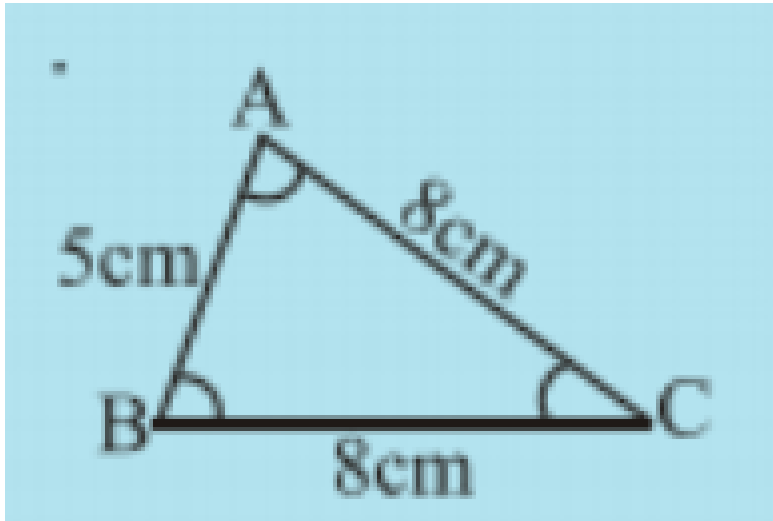
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5. Look at fig and classify each of the triangles

according to its

Sides

# Angles

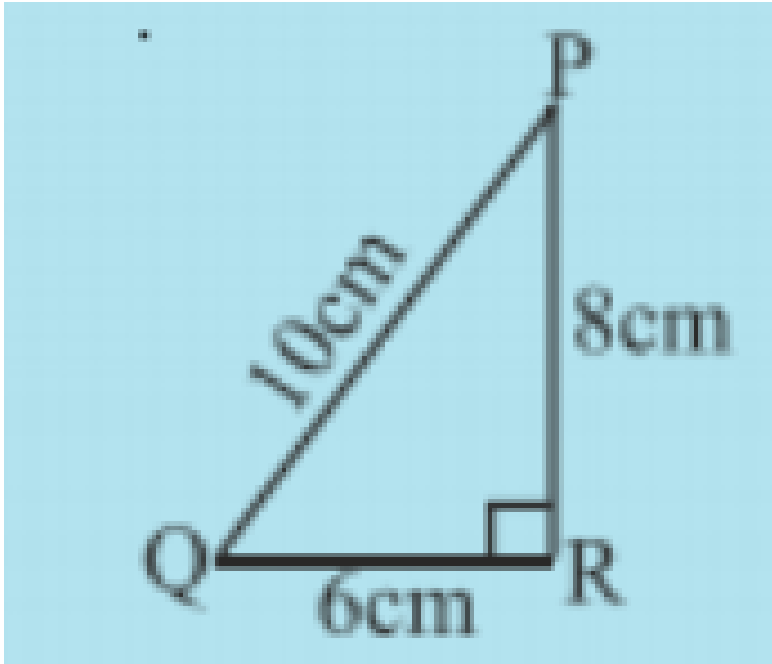


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6. Look at fig and classify each of the triangles according to its

Sides

## Angles

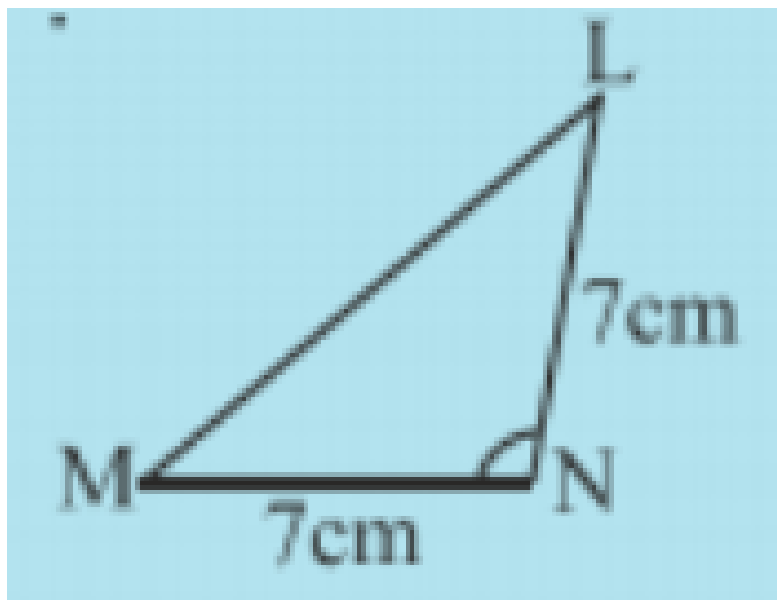


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7. Look at fig and classify each of the triangles according to its

Sides

Angles

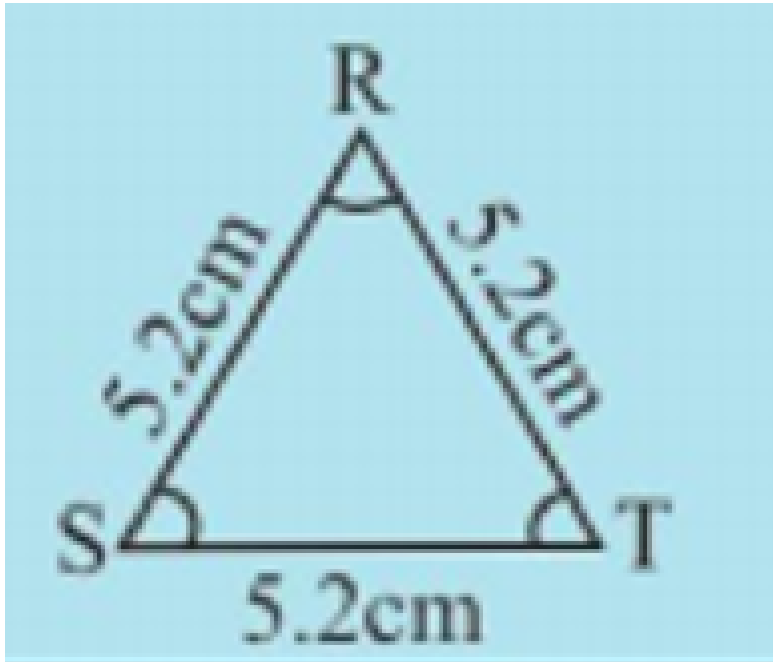


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8. Look at fig and classify each of the triangles according to its

Sides

Angles

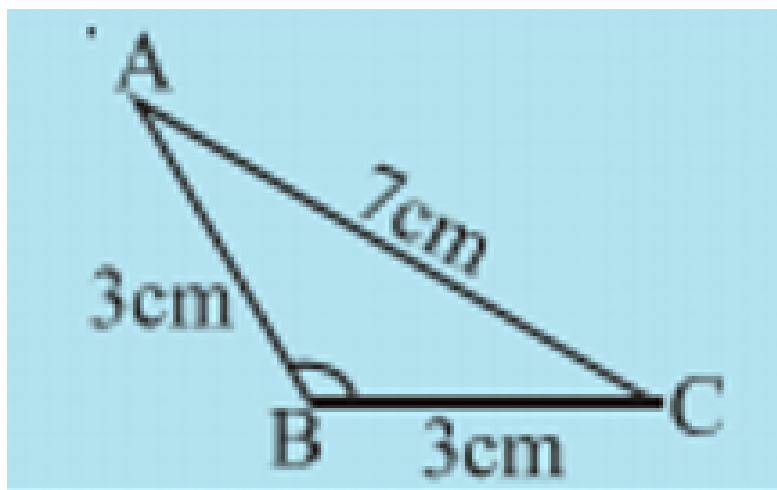


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9. Look at fig and classify each of the triangles according to its

Sides

Angles



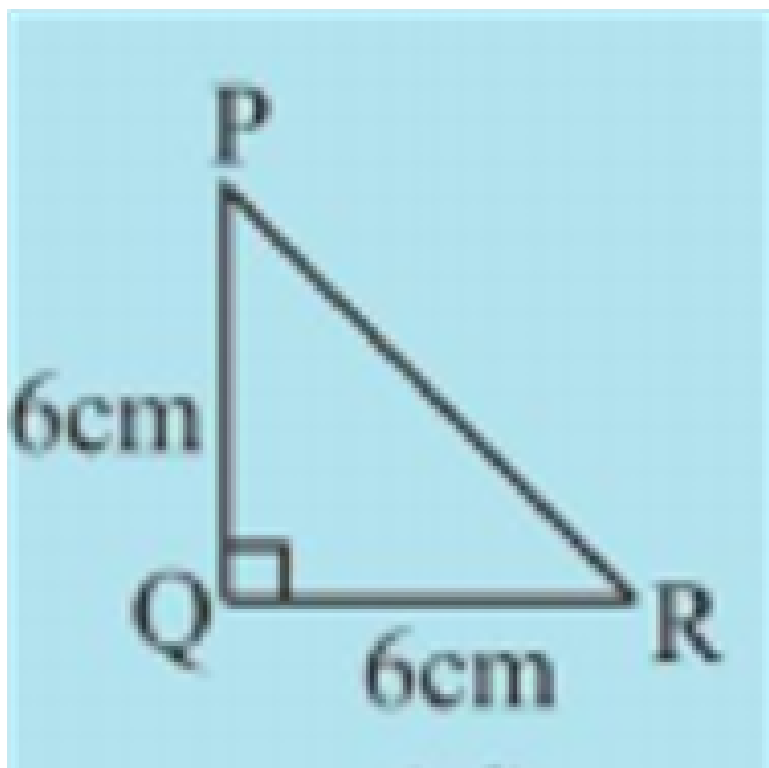
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10. Look at fig and classify each of the triangles according to its

Sides

Angles



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**11.** How many medians can a triangle have?



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**12.** Does a median lie wholly in the interior of the triangle? (If you think that this is not true, draw a figure to show such a case).



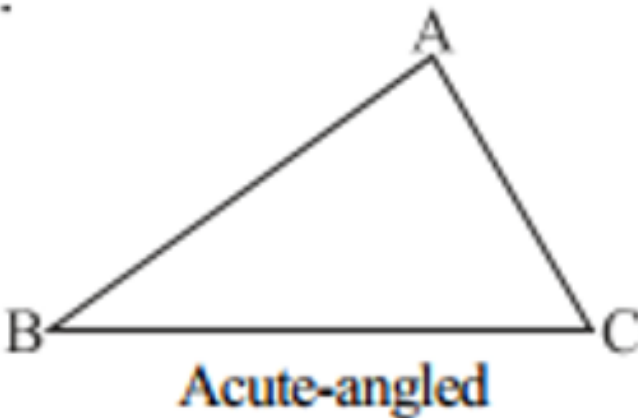
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13. How many altitudes can a triangle have?



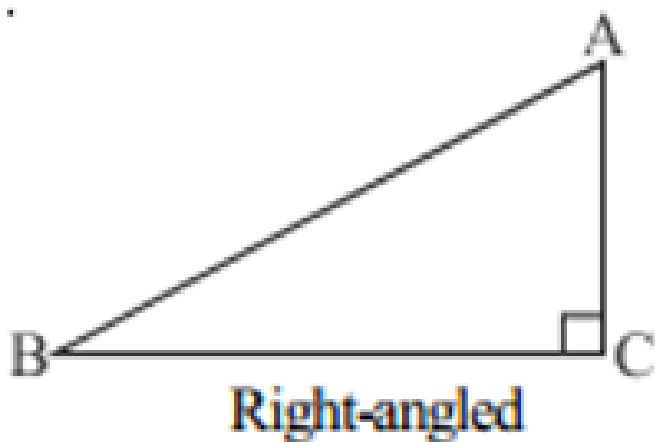
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14. Draw rough sketches of altitudes from A to  $\overline{BC}$  for the following triangles



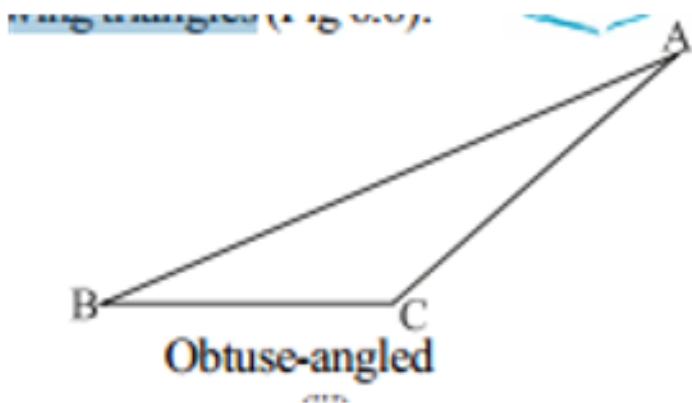
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15. Draw rough sketches of altitudes from A to  $\overline{BC}$  for the following triangles



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16. Draw rough sketches of altitudes from A to  $\overline{BC}$  for the following triangles



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17. Will an altitude always lie in the interior of a triangle? If you think that this need not be

true, draw a rough sketch to show such a case.



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**18.** Can you think of a triangle in which two altitudes of the triangle are two of its sides?



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**19.** Can the altitude and median be same for a triangle?



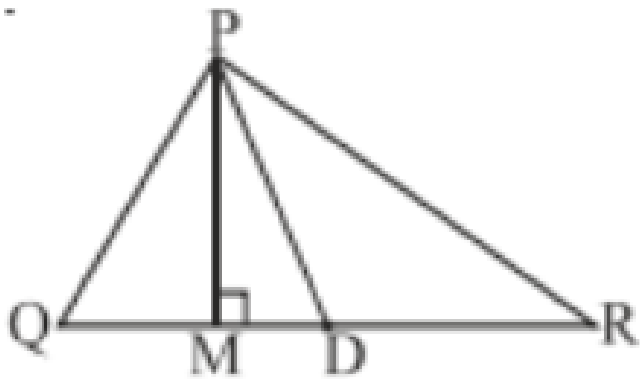
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20. In triangle  $PQR$ ,  $D$  is the mid-point of  $\overline{QR}$ .

$\overline{PM}$  is \_\_\_\_\_.

$PD$  is \_\_\_\_\_.

Is  $QM = MR$ ?



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21. Draw rough sketches for the following:

In  $\triangle ABC$ ,  $BE$  is a median.



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22. Draw rough sketches for the following:

In  $\triangle PQR$ ,  $PQ$  and  $PR$  are altitude of the triangle.



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**23.** Draw rough sketches for the following:

In  $\triangle XYZ$ ,  $YL$  is an altitude in the exterior of the triangle.



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**24.** Verify by drawing a diagram if the median and altitude of an isosceles triangle can be same.



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**25.** Exterior angles can be formed for a triangle in many ways. Three of them are shown here



There are three more ways of getting exterior angles. Try to produce those rough sketches.



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**26.** Are the exterior angles formed at each vertex of a triangle equal?



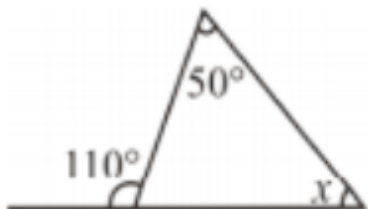
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27. What can you say about the sum of an exterior angle of a triangle and its adjacent interior angle?



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28. Find angle  $x$  in Fig.





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**29.** What can you say about each of the interior opposite angles, when the exterior angle is a right angle?



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**30.** What can you say about each of the interior opposite angles, when the exterior

angle is

an obtuse angle?



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**31.** What can you say about each of the interior opposite angles, when the exterior angle is

an acute angle?



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**32.** Can the exterior angle of a triangle be a straight angle?



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**33.** The exterior angle of a triangle is of measure  $70^\circ$  and one of its interior opposite angles is of measure  $20^\circ$ . Find the measure of the other interior opposite angle.



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**34.** The two interior opposite angles of an exterior angles of a triangle are  $60^\circ$  and  $80^\circ$ .

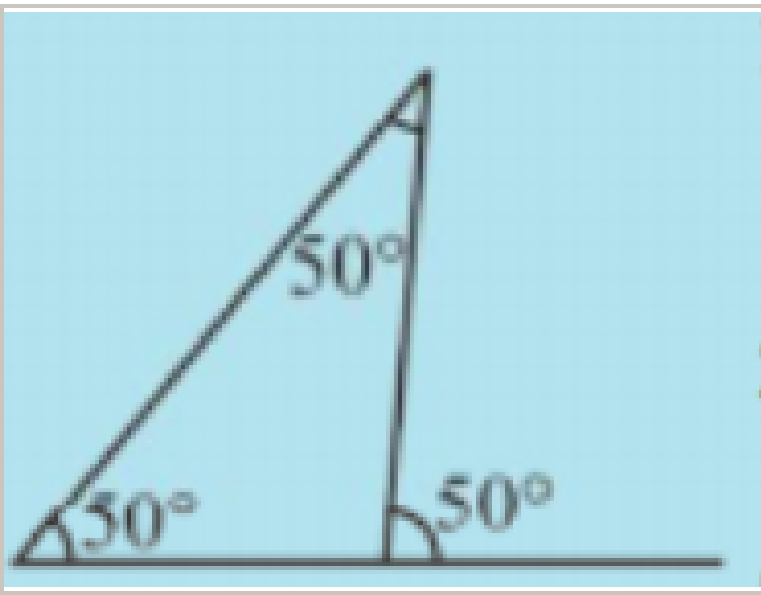
Find the measure of the exterior angle.



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**35.** Is something wrong in this diagram?

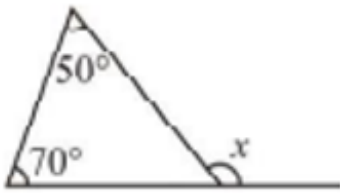
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**36.** Find the value of the unknown exterior angle  $x$  in the following diagrams:





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**37.** Find the value of the unknown exterior angle  $x$  in the following diagrams:



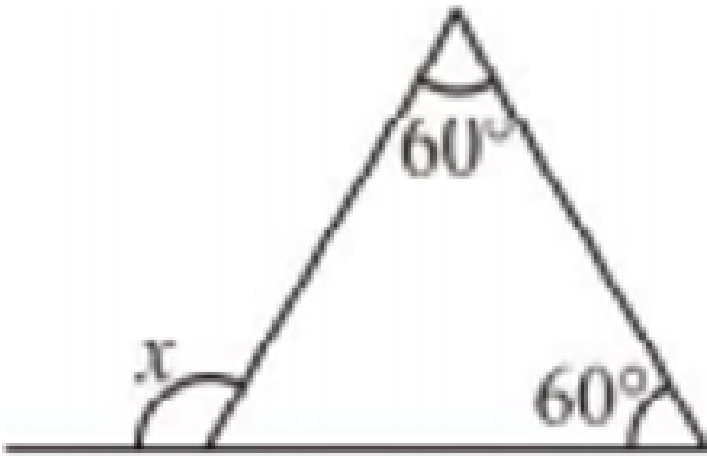
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**38.** Find the value of the unknown exterior angle  $x$  in the following diagrams:



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**39.** Find the value of the unknown exterior angle  $x$  in the following diagrams:



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**40.** Find the value of the unknown exterior angle  $x$  in the following diagrams:

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**41.** Find the value of the unknown exterior angle  $x$  in the following diagrams:



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**42.** Find the value of the unknown interior angle  $x$  in the following figures:



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**43.** Find the value of the unknown interior angle  $x$  in the following figures:



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**44.** Find the value of the unknown interior angle  $x$  in the following figures:



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**45.** Find the value of the unknown interior angle  $x$  in the following figures:



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**46.** Find the value of the unknown interior angle  $x$  in the following figures:



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**47.** Find the value of the unknown interior angle  $x$  in the following figures:



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**48.** The total measure of the three angles of a triangle is  $180^\circ$ .

To justify this let us use the exterior angle property of a triangle.



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49. In the given figure find  $m\angle P$ .



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50. Find the value of the unknown  $x$  in the following diagrams:



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**51.** Find the value of the unknown  $x$  in the following diagrams:



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**52.** Find the value of the unknown  $x$  in the following diagrams:



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**53.** Find the values of the unknowns  $x$  and  $y$  in the following diagrams:



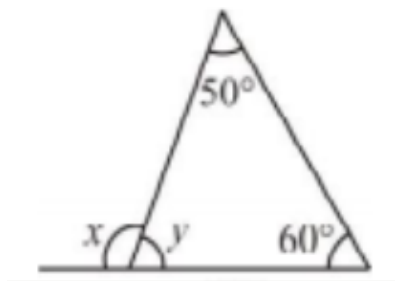
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**54.** Find the values of the unknowns  $x$  and  $y$  in the following diagrams:



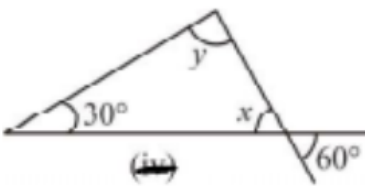
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**55.** Find the values of the unknowns  $x$  and  $y$  in the following diagrams:



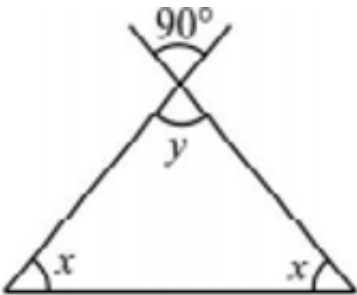
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**56.** Find the values of the unknowns  $x$  and  $y$  in the following diagrams:



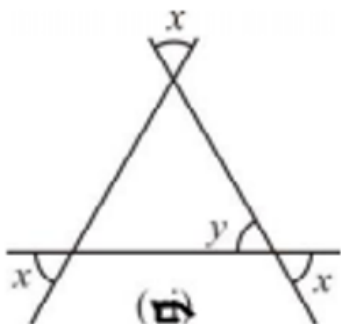
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57. Find the values of the unknowns  $x$  and  $y$  in the following diagrams:



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58. Find the values of the unknowns  $x$  and  $y$  in the following diagrams:



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59. Two angles of a triangle are  $30^\circ$  and  $80^\circ$ . Find the third angle.

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**60.** One of the angles of a triangle is  $80^\circ$  and the other two angles are equal. Find the measure of each of the equal angles.



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**61.** The three angles of a triangle are in the ratio 1:2:1. Find all the angles of the triangle. Classify the triangle in two different ways.



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**62.** Can you have a triangle with two right angles?



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**63.** Can you have a triangle with two obtuse angles?



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**64.** Can you have a triangle with two acute angles?



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**65.** Can you have a triangle with all the three angles greater than  $60^\circ$ ?



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**66.** Can you have a triangle with all the angles equal to  $60^\circ$ ?



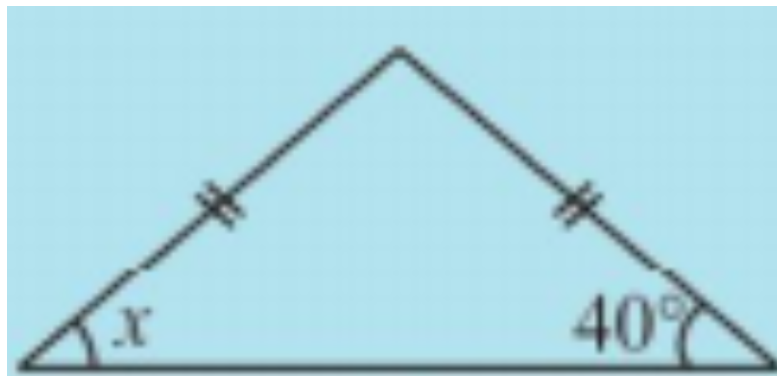
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**67.** Can you have a triangle with all the three angles less than  $60^\circ$ ?



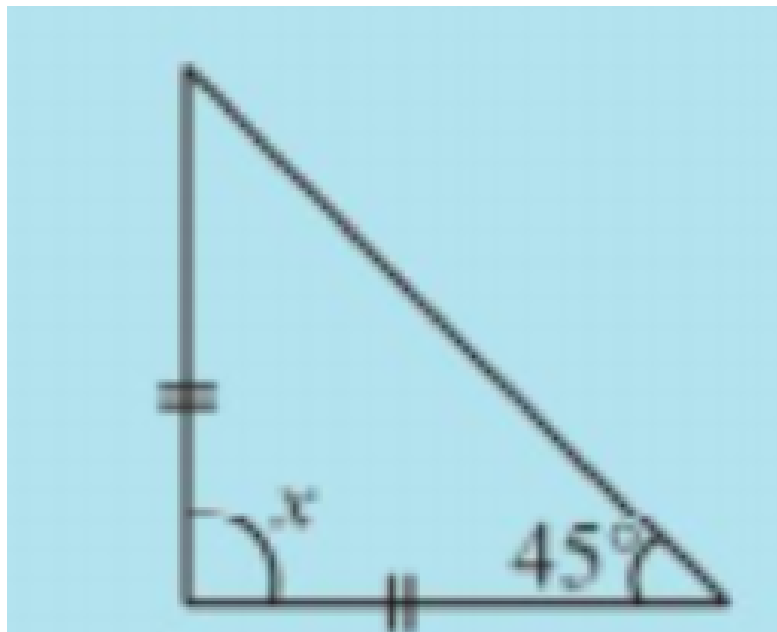
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68. Find angle  $x$  in each figure:



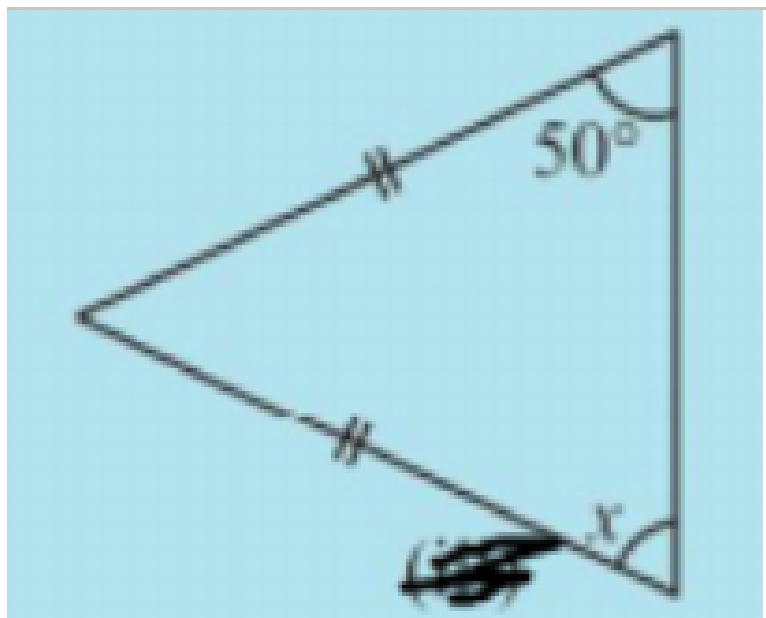
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69. Find angle  $x$  in each figure:



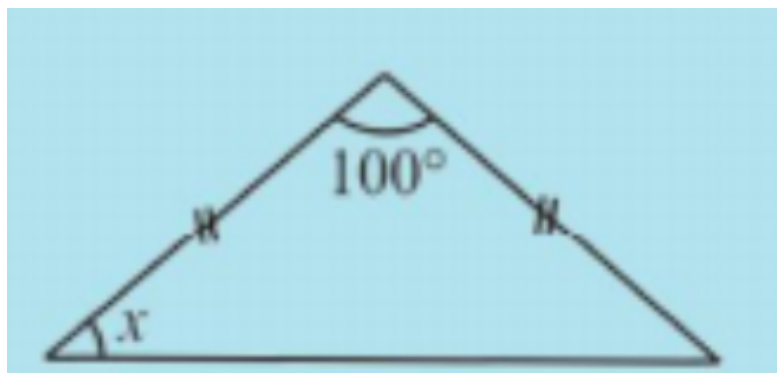
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70. Find angle  $x$  in each figure:



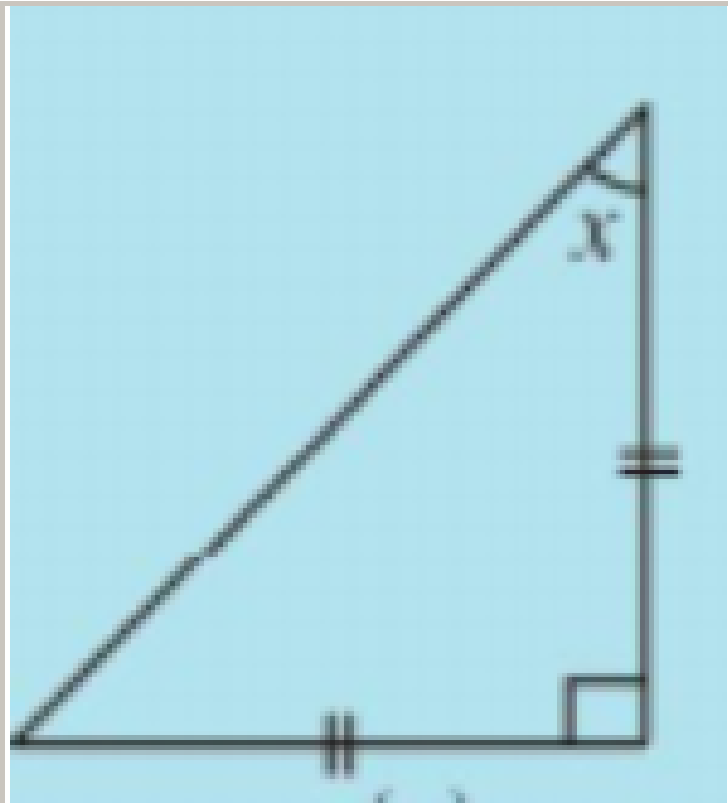
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71. Find angle  $x$  in each figure:



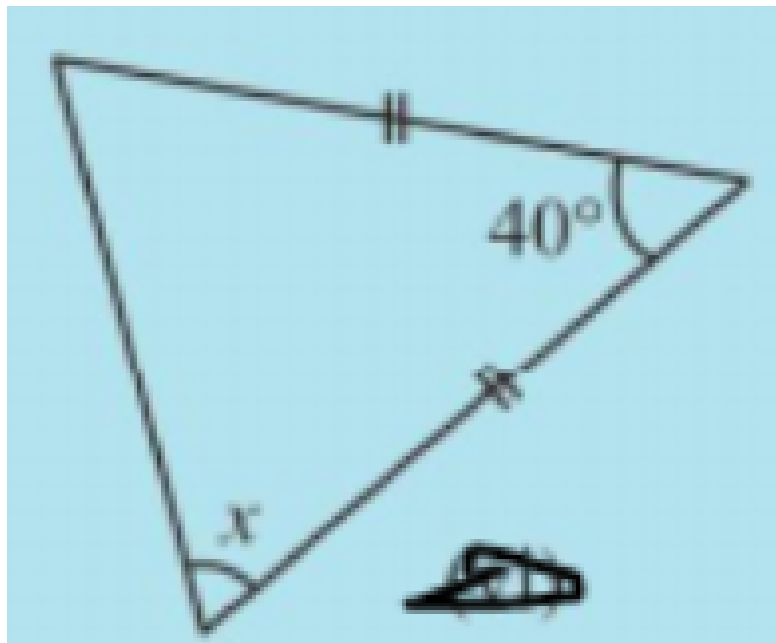
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72. Find angle  $x$  in each figure:



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73. Find angle  $x$  in each figure:



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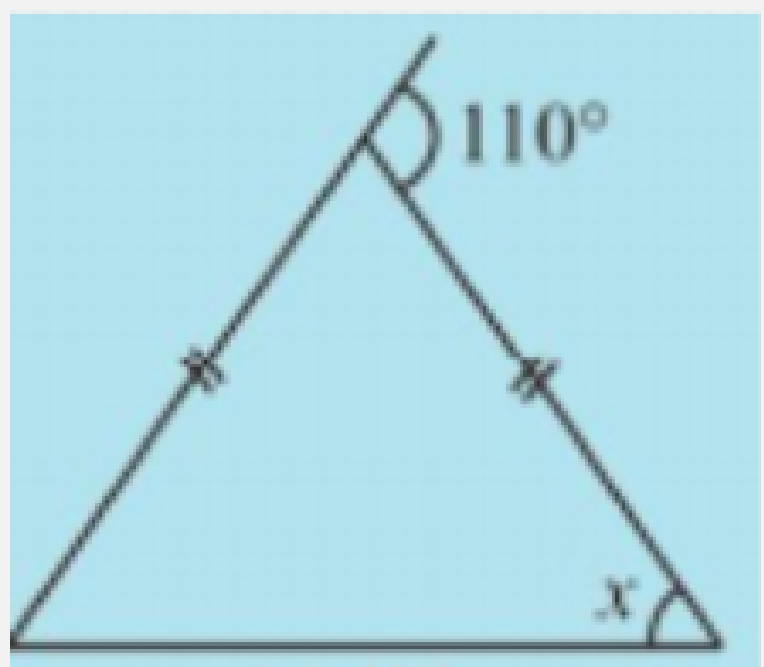
74. Find angle  $x$  in each figure:





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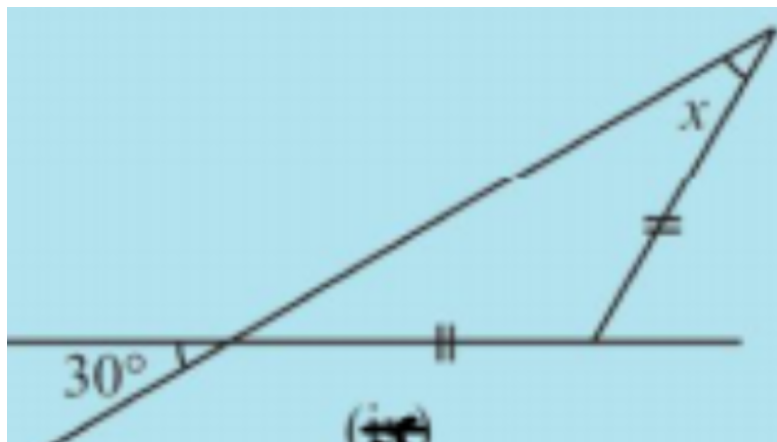
75. Find angle  $x$  in each figure:



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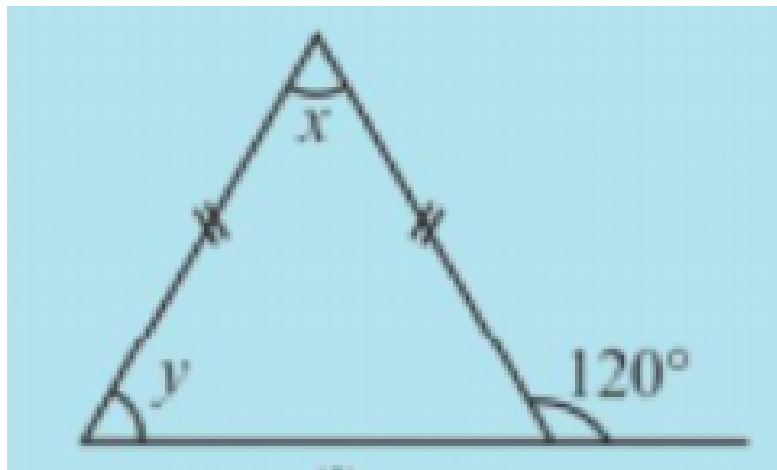


76. Find angle  $x$  in each figure:



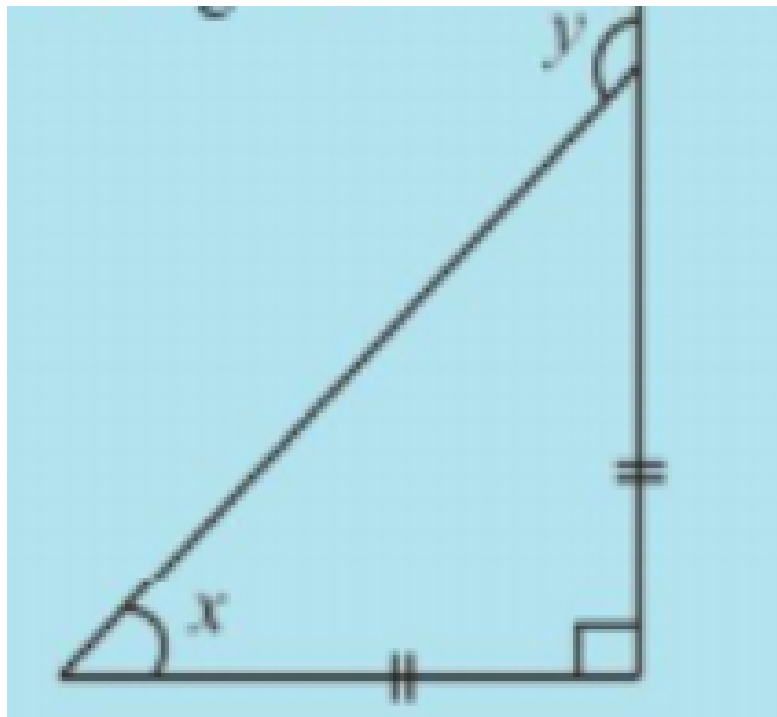
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77. Find angles  $x$  and  $y$  each figure.



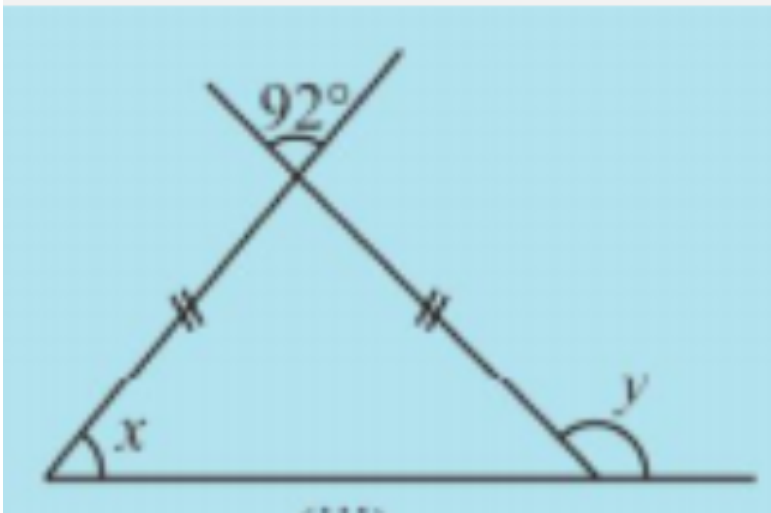
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78. Find angles  $x$  and  $y$  each figure.



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79. Find angles  $x$  and  $y$  each figure.



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



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**81.** The lengths of two sides of a triangle are 6 cm and 8 cm. Between which two numbers can length of the third side fall?



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

2 cm, 3 cm, 5 cm



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

3 cm, 6 cm, 7 cm



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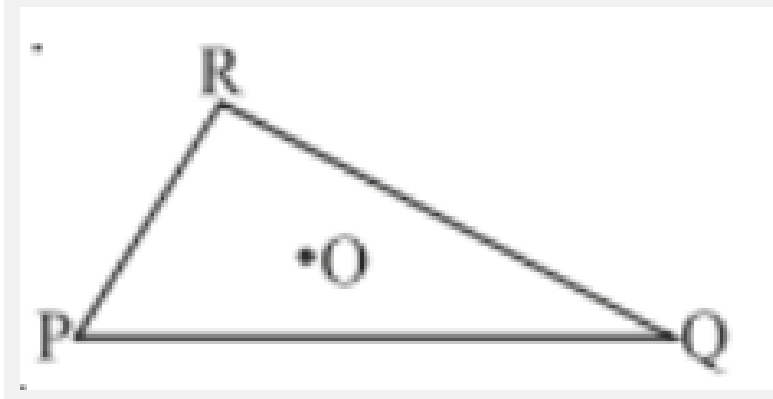
**84.** Is it possible to have a triangle with the following sides?

6 cm, 3 cm, 2 cm



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85. Take any point  $O$  in the interior of a triangle  $PQR$ . Is



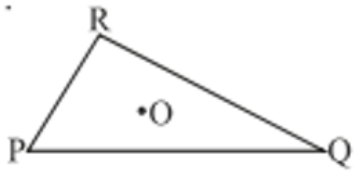
$OP + OQ > PQ$ ?



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**86.** Take any point  $O$  in the interior of a triangle  $PQR$ . Is

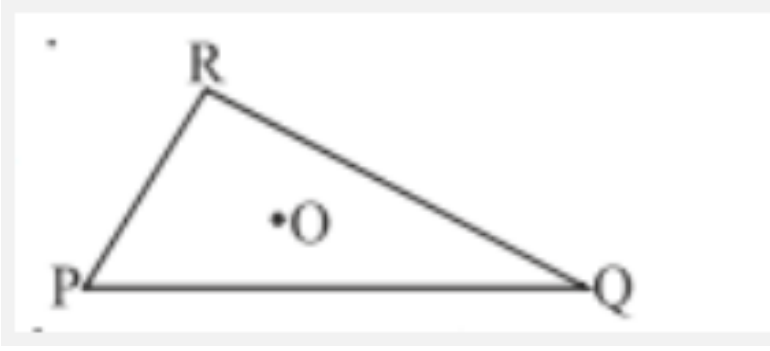
$OQ + OR > QR$ ?



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**87.** Take any point  $O$  in the interior of a triangle  $PQR$ . Is





$OR + OP > RP$ ?



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**88.** AM is a median of a triangle ABC.

Is  $AB + BC + CA > 2 AM$ ? (Consider the sides of triangles  $\triangle ABM$  triangle  $AMC$ .)



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**89.** ABCD is quadrilateral. Is

$$AB + BC + CD + DA < 2 (AC + BD)?$$



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



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**91.** Is the sum of any two angles of a triangle always greater than the third angle?



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**92.** Determine whether the triangle whose lengths of sides are 3 cm, 4 cm, 5 cm is a right-angled triangle.



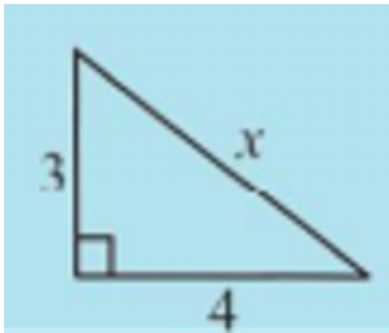
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93. ABC is right-angled at C. If AC = 5 cm and BC = 12 cm find the length of AB.



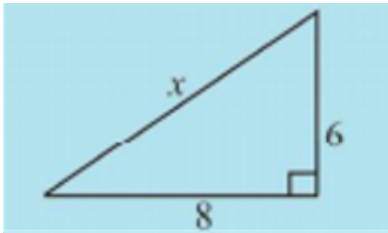
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94. Find the unknown length  $x$  in the following figures



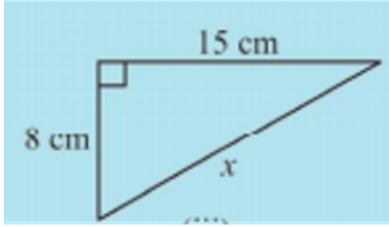
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95. Find the unknown length  $x$  in the following figures



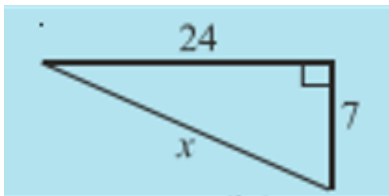
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96. Find the unknown length  $x$  in the following figures



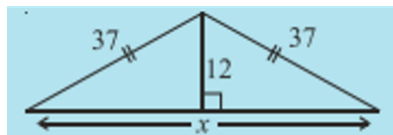
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**97.** Find the unknown length  $x$  in the following figures



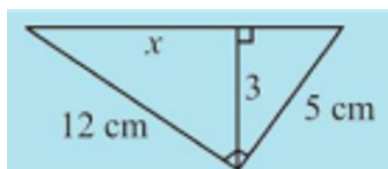
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98. Find the unknown length  $x$  in the following figures



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99. Find the unknown length  $x$  in the following figures



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**100.** PQR is a triangle, right-angled at P. If PQ = 10 cm and PR = 24 cm, find QR.



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



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**102.** A 15 m long ladder reached a window 12 m high from the ground on placing it against a wall at a distance  $a$ . Find the distance of the foot of the ladder from the wall.



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**103.** Which of the following can be the sides of a right triangle?

(i) 2.5 cm, 6.5 cm, 6 cm.

(ii) 2 cm, 2 cm, 5 cm.

(iii) 1.5 cm, 2cm, 2.5 cm.

In the case of right-angled triangles, identify the right angles.



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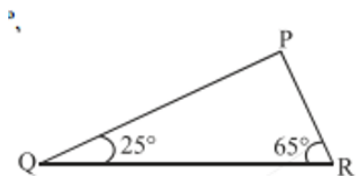
**104.** A tree is broken at a height of 5 m from the ground and its top touches the ground at a distance of 12 m from the base of the tree. Find the original height of the tree.



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**105.** Angle Q and R of a  $\triangle PQR$  are  $25^\circ$  and  $65^\circ$ . Write which of the following is true:

$$PQ^2 + QR^2 = RP^2$$



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**106.** Angle Q and R of a  $\triangle PQR$  are  $25^\circ$  and  $65^\circ$ . Write which of the following is true:



$$PQ^2 + RP^2 = QR^2$$



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**107.** Angle Q and R of a  $\triangle PQR$  are  $25^\circ$  and  $65^\circ$  Write which of the following is true:



$$RP^2 + QR^2 = PQ^2$$



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**108.** Find the perimeter of the rectangle whose length is 40 cm and a diagonal is 41 cm.



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



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**110.** Which is the longest side in the triangle PQR, right-angled at P?



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**111.** Which is the longest side in the triangle ABC, right-angled at B?



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**112.** Which is the longest side of a right triangle?



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**113.** 'The diagonal of a rectangle produce by itself the same area as produced by its length and breadth'– This is Baudhayan Theorem. Compare it with the Pythagoras property.



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