MATHS

NCERT - NCERT Maths(Tamil)

SIMILAR TRIANGLES

Example

1. In ΔABC, DE ||BC and $\frac{AD}{DB}=\frac{3}{5}$.

AC = 5.6 Find AE.

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2. In the given figure LM||AB

AL = x - 3, AC = 2x, BM = x - 2

and BC = 2x + 3 find the value of x

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3. The diagonals of a quadrilateral ABCD intersect each other at point 'O' such that $\frac{AO}{BO} = \frac{CO}{DO}$. Prove that ABCD is a trapezium

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4. In trapezium ABCD, AB || DC. E and F are points on non-parallel sides AD and BC respectively such that EF || AB. Show that $\frac{AE}{ED} = \frac{BF}{FC}$

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5. A person 1.65m tall casts 1.8m shadow. At the same instance, a lamp post casts a shadow of 5.4 m. Find the height of the lamppost.

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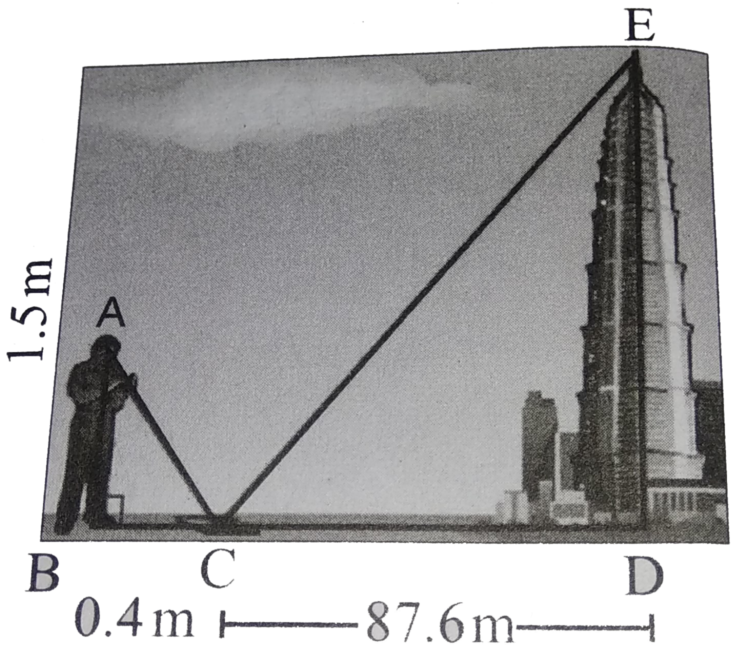
6. A man sees the top of a tower in a mirror which is at a distance of 87.6 m from the tower. The mirror is on the ground , facing upward. The man is 0.4 m away from the mirror and the distance of his eye level from the ground is 1.5 m . How tall is the tower ? (The foot of man, the mirror and the foot of the tower lie along a straight line)



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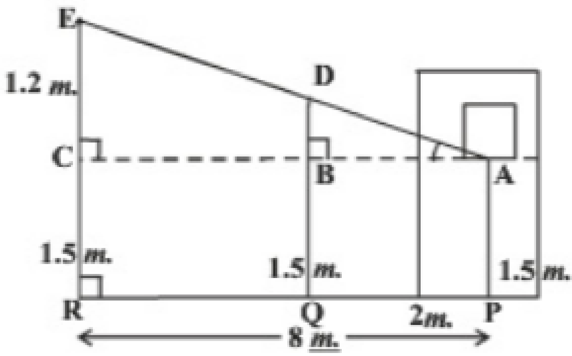
7. Gopal is worrying that his neighbour can peep into his living room from the top floor of his house. He has decided raise the height of the fence that is high enough to block the view from his neighbour's top floor window. What should be the height of the

fence? The measurements are given in the figure.



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8. Prove that if the areas of two similar triangles are equal, then they are congruent

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9. $\Delta ABC \sim \Delta DEF$ and their areas are respectively 64 cm^2 and 121 cm^2. If EF = 15.4 cm., then find BC.

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10. Diagonals of a trapezium ABCD with AB || DC, intersect each other at the point 'O'. If AB = 2CD, find the ratio of areas of triangles AOB and COD.

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11. A ladder 25m long reaches a window of building 20m above the ground. Determine the distance from the foot of the ladder to the building.

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12. BL and CM are medians of a triangle ABC right angled at A. Prove that $4(BL^2 + CM^2) = 5BC^2$

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13. In figure O is any point inside a rectangle ABCD. Prove that $OB^2 + OD^2 = OA^2 + OC^2$.

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14. The hypotenuse of a right triangle is 6 m more than twice of the shortest side. If the third side is 2 m less than the hypotenuse, find the sides of the triangle ?

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15. ABC is a right triangle right angled at C. Let BC = a, CA = b, AB = c and let p be the length of perpendicular from C on AB. Prove that (i) pc = ab (ii) $\frac{1}{p^2} = \frac{1}{a^2} + \frac{1}{b^2}$.

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Do This Fill In The Blanks

1. All squares are .... (similar/congruent).

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2. All equilateral triangles are ....

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3. Two polygons with same number of sides are .... if their corresponding angles are equal and corresponding sides are equal.

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4. Rhombus and squares are .... to each other.

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Do This True False

1. All similar triangles are congruent - True/False

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2. Any two congruent figures are similar.

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3. Two polygons with same number of sides are .... if their corresponding angles are equal and corresponding sides are equal.

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4. Give two different examples of pair of

Similar figures

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5. Give two different examples of pair of

Non Similar figures

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Do This

1. What value(s) of x will make DE || AB, in the given figure ?

AD = 8x + 9 , CD= x + 3 ,

BE = 3x + 4 , CE = x.

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2. In $\Delta ACB, \angle C = 90^\circ$ and CD $\perp$ AB

Prove that $\frac{BC^2}{AC^2} = \frac{BD}{AD}$.

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3. A ladder 15m long reaches a window which is 9 m above the ground on one side of a street. Keeping its foot at the same point, the ladder is turned to other side of the street to reach a window 12m high. Find the width of the street.

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4. In the given fig. if AD $\perp$ BC

Prove that $AB^2 + CD^2 = BD^2 + AC^2$.

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Exercise 8 1

1. In ΔPQR, ST is a line such that $\frac{PS}{SQ} = \frac{PT}{TR}$ and also $\angle PST = \Delta PRQ.$

Prove that ΔPQR is an isosceles triangle .

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2. In the given figure, LM || CB and LN || CD Prove that $\frac{AM}{AB} = \frac{AN}{AD}$

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3. In the given figure, DE || AC and DF || AE Prove that $\frac{BF}{FE} = \frac{BE}{EC}$

.

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4. Prove that a line drawn through the mid-point of one side of a triangle parallel to another side bisects the third side (Using basic proportionality theorem).

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5. Prove that a line joining the midpoints of any two sides of a triangle is parallel to the third side. (Using converse of basic proportionality theorem)

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6. In the given figure, DE || OQ and DF || OR. Show that EF || QR.

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7. In the adjacent figure, A, B and C are points on OP, OQ and OR respectively such that AB || PQ and AC||PR. Show that BC || QR.

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8. The diagonals of a quadrilateral ABCD intersect each other at point 'O' such that $\frac{AO}{BO}=\frac{CO}{DO}$. Prove that ABCD is a trapezium

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9. A line perpendicular to the line segment joining the points (1, 0) and (2, 3) divides it in the ratio 1: n. Find the equation of the line.

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Exercise 8 2

1. In $\Delta ABC, \angle ABC = 90^\circ, AD = DC, AB = 12cm$ and $BC = 6.5$ cm. Find the area of ΔADB .

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2. The perimeters of two similar triangles are 30 cm and 20 cm respectively. If one side of the first triangle is 12 cm, determine the corresponding side of the second triangle.

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3. In the given figure, AB || CD || EF. given that AB=7.5 cm, DC= y cm EF = 4.5 cm and BC = x cm, find the values of x and y.

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4. A girl of height 120cm is walking away from the base of a lamp post at a speed of 0.6 m/sec. . If the lamp is 3.6 m above the ground level, then find the length of her shadow after 4 seconds.

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5. In right triangle ABC, right angle is 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)$CM = \frac{1}{2}AB.$

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6. Diagonals AC and BD of a trapezium ABCD with AB || DC intersect each other at the point 'O'. Using the criterion of similarity for two triangles, show that $\frac{OA}{OC} = \frac{OB}{OD}$.

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7. In the given figure, LM || CB and LN || CD Prove that $\frac{AM}{AB} = \frac{AN}{AD}$

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8. A flag pole 4m tall casts a 6 m shadow. At the same time, a nearby building casts a shadow of 24m. How tall is the building ?

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9. Given that $\Delta ABC \sim \Delta PQR$, CM and RN are respectively the medians of ΔABC and ΔPQR. Prove that

(i) $\Delta AMC \sim \Delta PNR$

(ii) $\dfrac{CM}{RN} = \dfrac{AB}{PQ}$

(iii) $\Delta CMB \sim \Delta RNQ$

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10. The perimeter of two similar triangles ΔABC and ΔDEF are 36 cm and 24 cm respectively . If DE = 10 cm , then AB is ....

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11. Construct a triangle similar to the given ΔABC, with its sides equal to $\frac{5}{3}$ of the corresponding sides of the triangle ABC.

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Exercise 8 3

1. In trigle ABC, the points D, E, F are the midpoints of the sides BC,CA, and AB respee. Tively. Using vector methed ,show that the area of Δ DEF is equal to $\frac{1}{4}$ (area of ABC).

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2. In figure the line segment xy is parallel to side AC of ΔABC and it divides the triangle into two parts of equal areas. Find the ratio $\frac{AX}{AB}$

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3. Prove that the ratio of areas of two similar triangles is equal to the square of the ratio of their corresponding medians.

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4. If ΔABC is similar to ΔDEF such that BC=3 cm, EF=4 cm and area of $\Delta ABC = 54cm^2$. Find the area of ΔDEF.

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5. ABC is a triangle and PQ is a straight line meeting AB in P and AC in Q. If AP = 1 cm, BP = 3cm, AQ = 1.5 cm and CQ = 4.5 cm, prove that area of $\Delta APQ = \frac{1}{16}$ (area of ΔABC).

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6. The areas of two similar triangles are $81 cm^2$ and $49 cm^2$ respectively. If the altitude of the bigger triangle is 4.5 cm. Find the corresponding altitude of the smaller triangle.

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Exercise 8 4

1. Prove that the sum of the squares of the sides of a rhombus is equal to the sum of the squares of its diagonals

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2. ABC is right - angled triangle at B. Let D and E be any two point on AB and BC respectively . Prove that $AE^2 + CD^2 = AC^2 + DE^2$

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3. Prove that three times the square of any side of an equilateral triangle is equal to four times the square of the altitude.

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4. PQR is a triangle right angled at P and M is a point on QR such that PM $\perp$ QR . Show that PM^2 = QM .MR.

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5. ABCD is a quadrilateral in which AD = BC and $\angle DAB = \angle CBA$

Prove that

$(i)\Delta ABD \cong \Delta BAC$

(ii) $BD = AC$

(iii)$\angle ABD = \angle BAC$

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6. ABC is an isosceles triangle right angled at C. Prove that $AB^2 = 2AC^2$.

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7. 'O' is any point in the interior of a triangle ABC. If $OD \perp BC, OE \perp$ AC and OF $\perp$ AB, show that

(i)

$$OA^2 + OB^2 + OC^2 - OD^2 - OE^2 - OF^2 = AF^2 + BD^2 + CE^2$$

(ii) $AF^2 + BD^2 + CE^2 = AE^2 + CD^2 + BE^2$.

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8. A wire attached to a vertical pole of height 18m is 24m long and has a stake attached to the other end. How far from the base of the pole should the stake be driven so that the wire will be taut?

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9. Two poles of heights 6 m and 11 stand vertically on a plane ground. If the distance between their feet is 12 m, what is the distance between their tops ?

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10. Solve the following sub question :

In an equilateral triangle ABC, the side BC is trisected at D. prove that $9AD^2 = 7AB^2$

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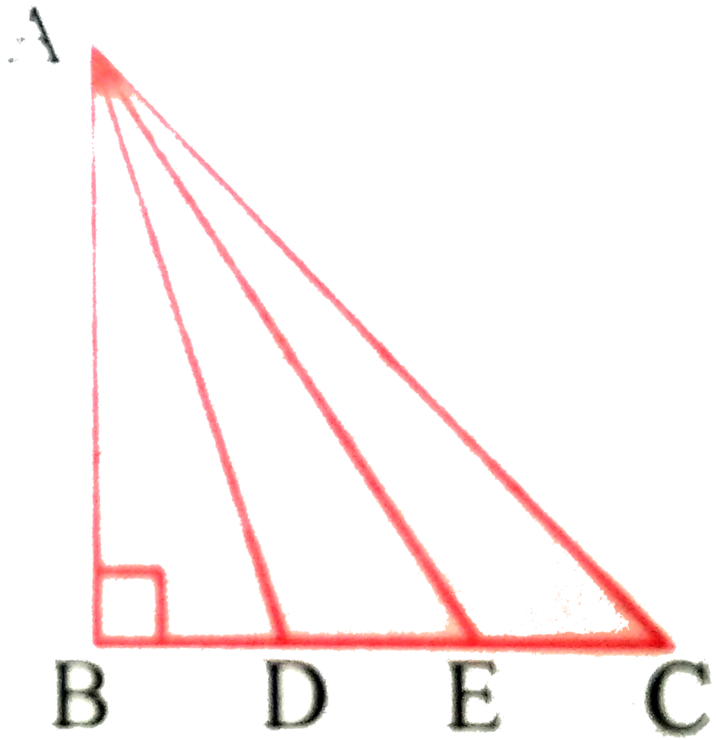
11. In the adjacent figure, ABC is a right angled triangle with right angle at B and points D, E trisect BC. Prove that

$8AE^2 = 3AC^2 + 5AD^2$.



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12. ABC is an isosceles triangle right angled at B. Similar triangles ACD and ABE are constructed on sides AC and AB. Find the ratio between the areas of ΔABE and ΔACD

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13. Equilateral triangles are drawn on the three sides of a right angled triangle. Show that the area of the triangle on the hypotenuse is equal to the sum of the areas of triangles on the other two sides.

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14. Prove that the area of the equilateral triangle described on the side of a square is half the area of the equilateral triangles described on its diagonal.

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Optional Exercise

1. In the given figure,

$$\frac{QT}{PR}=\frac{QR}{QS} \text{ and } \angle 1=\angle 2$$

Prove that $\Delta PQS \sim \Delta TQR$.

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2. Ravi is 1.82m tall. He wants to find the height of a tree in his backyard. From the tree's base he walked 12.20 m. along the tree's shadow to a position where the end of his shadow exactly overlaps the end of the tree's shadow. He is now 6.10m from the end of the shadow. How tall is the tree ?

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3. The diagonal AC of a parallelogram ABCD intersects DP at the point Q, where 'P' is any point on side AB. Prove that $CQ \times PQ = QA \times QD$.

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4. ΔABC and ΔAMP are two right triangles right angled at B and M respectively.

Prove that (i) $\Delta ABC \sim \Delta AMP$ and

(ii) $\dfrac{CA}{PA} = \dfrac{BC}{MP}$.

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5. An aeroplane leaves an airport and flies due north at a speed of 1000 kmph. At the same time, another aeroplane leaves the same airport and flies due west at a speed of 1200 kmph. How far apart will the two planes be after $1\frac{1}{2}$ hour ?

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6. In a right triangle ABC right angled at C, P and Q are points on sides AC and CB respectively which divide these sides in the ratio of 2 : 1.

Prove that (i) $9AQ^2 = 9AC^2 + 4BC^2$

(ii) $9BP^2 = 9BC^2 + 4AC^2$

(iii) $9(AQ^2 + BP^2) = 13AB^2$

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Try This

1. In triangle ΔPQR, E and F are points on the sides PQ and PR respectively. State whether EF ||QR or not?

(i) PE = 3.9 cm EQ = 3 cm PF = 3.6 cm and FR = 2.4 cm

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2. In triangle ΔPQR, E and F are points on the sides PQ and PR respectively. State whether EF ||QR or not?

(ii) PE = 4 cm, QE = 4.5 cm, PF = 8 cm and RF = 9 cm.

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3. In triangle ΔPQR, E and F are points on the sides PQ and PR respectively. State whether EF ||QR or not?

(iii) PQ = 1.28 cm PR = 2.56 cm PE = 0.18 cm and PF = 0.36 cm

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4. In the following figures DE || BC.

(i) Find EC (ii) Find AD

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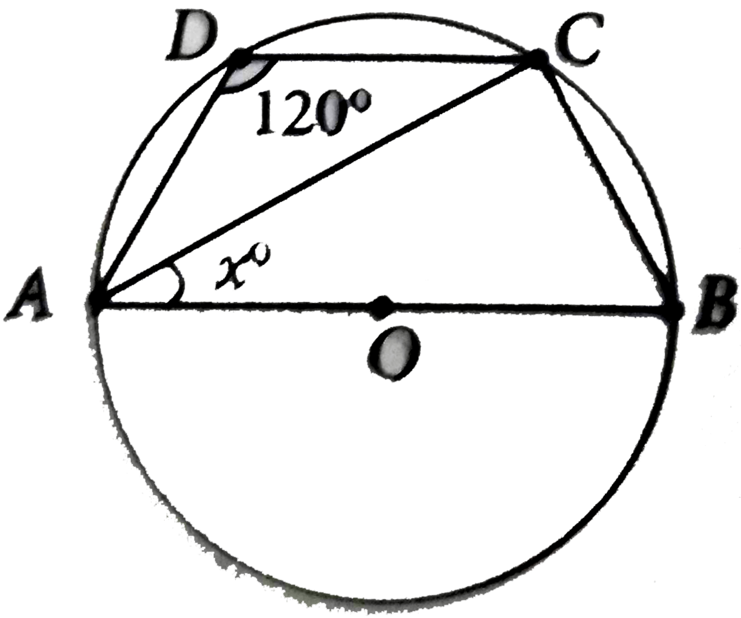
5. Find the value of x in the given figure.



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