



MATHS

NCERT - NCERT MATHEMATICS (Bengali)

SIMILAR TRIANGLES

Example

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

AC = 5.6 Find AE.

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2. In the given figure LM||AB M

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





3. The diagonals of a quadrilateral ABCD intersect each other at AO = CO

point 'O' such that $\frac{AO}{BO} = \frac{CO}{DO}$. Prove that ABCD is a trapezium

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.



6. A man sees the top of a tower in a mirror which is at a distance of 87.6m from the tower. The mirror is on the ground facing upwards. The man is 0.4m away from the mirror and his height is 1.5m. How tall is the tower?

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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.



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

they are congruent

Watch Video Solution **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. Watch Video Solution

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



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.

Prove that $4(BL^2+CM)^2=5BC^2$.

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

14. The hypotenuse of a right triangle is 6m 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)
$$rac{1}{p^2}=rac{1}{a^2}+rac{1}{b^2}$$
 .

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Do This Fill In The Blanks

1. All squares are





corresponding angles are equal and corresponding sides are equal.



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6. Rhombus and squares are to each other.
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Do This True False
1. Any two similar figures are congruent.
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2. Any two congruent figures are similar.



Non Similar figures



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.





2. In $\triangle ABC$, DE ||BC | AD = x, DB = x - 2,

AE = x + 2 and EC = -1.

Find the value of x.









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

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

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Exercise 81

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

Prove that ΔPQR is an isosceles triangle .



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





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)

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



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.



9. Draw a line segment of length 7.2 cm and divide it in the ratio 5

: 3. Measure the two parts.

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Exercise 8 2			

1. In the given figure, $\angle ADE$ = $\angle B$

(i) Show that $\Delta ABC \sim \Delta ADE$

(ii) If AD = 3.8 cm, AE = 3.6cm, BE = 2.1 cm and BC = 4.2 cm, find DE.



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.



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.







4. A girl of height 90 cm is walking away from the base of a lamp post at a speed of 1.2 m/sec. If the lamp post is 3.6m above the ground, find the length of her shadow after 4 seconds.



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

(i) $\Delta AMC \sim \Delta PNR$ $CM \qquad AB$

- (ii) $\frac{CM}{RN} = \frac{AB}{PQ}$
- (iii) $\Delta CMB \sim \Delta RNQ$



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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





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 ?



9. CD and GH are respectively the bisectors of $\angle ACB$ and $\angle EGF$ such that D and H lie on sides AB and FE of $\triangle ABC$ and $\triangle FEG$ respectively. If $\triangle ABC \sim \triangle FEG$, then show that

(i)
$$\frac{CD}{GH} = \frac{AC}{FG}$$
 (ii) $\Delta DCB \sim \Delta HGE$ (iii) $\Delta DCA \sim \Delta HGF$

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10. AX and DY are altitudes of two similar triangles ΔABC and ΔDEF . Prove that AX : DY = AB : DE.

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.

12. Construct a triangle of sides 4cm, 5 cm and 6 cm. Then, construct a triangle similar to it, whose sides are $\frac{2}{3}$ of the corresponding sides of the first triangle.

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13. Construct an isosceles triangle whose base is 8cm and altitude is 4 cm. Then, draw another triangle whose sides are $1\frac{1}{2}$ times the corresponding sides of the isosceles triangle.







2. In $\triangle ABC$, XY || AC and XY divides the triangle into two parts of equal area. Find the ratio of $\frac{AX}{XB}$.

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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.

4. $\Delta ABC \sim \Delta DEF$. BC = 3cm, EF = 4cm and area of

 $\Delta ABC = 54 cm^2$. Determine 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 $\Delta APQ = rac{1}{16}$ (area of ΔABC).

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



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 a right triangle right angled at B. Let D and E be any points on AB and BC respectively. Prove that $AE^2 + CD^2 = AC^2 + DE^2$.





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5. ABD is a triangle right angled at A and AC \perp BD Show that

(i) AB^2 = BC .BD.

(ii) AC^2 = BC.DC



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

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



and has a stake attached to the

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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 6m and 11m stand on a plane ground. If the distance between the feet of the poles is 12m find the distance between their tops.

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10. In an equilateral triangle ABC, D is a point on side BC such that

BD =
$$\frac{1}{3}$$
 BC. Prove that $9AD^2 = 7AB^2$.

11. In the given figure, ABC is a triangle right angled at B. D and E

are ponts on BC trisect it.

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



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



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.



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,

$$rac{QT}{PR} = rac{QR}{QS} ext{ and } \angle 1 = \angle 2$$

Prove that ΔPQS - ΔTQR .





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 ?





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



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) $\frac{CA}{PA} = \frac{BC}{MP}$.



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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 $\left(AQ^2+BP^2
ight)=13AB^2$





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



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.



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 = 1.8 cm and PF = 3.6 cm

4. In the following figures $DE \parallel BC$.

(i) Find EC (ii) Find AD



ision of a line segment (using Thales theorem)



5. Are triangles formed in each figure similar? If so, name the criterion of similarity. Write the similarity relation in symbolic

form.



6. If pairs of the triangles are similar and then find the value of x.



