MATHS

NCERT - NCERT Maths(KANNADA)

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

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3. 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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4. 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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5. 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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6. Prove that if the area of similar triangles are equal, they are congruent.

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

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

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

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

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12. 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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13. 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 .....

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2. All equilateral triangles are .....

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3. All isosceles triangles are .....

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

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5. Reduced and Enlarged photographs of an object are .....

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

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Do This True False

1. State True / False - Any two similar figures are congruent.

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2. Any two congruent figures are similar.

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3. State True / False - Two polygons are similar if their corresponding angles 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. 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. Using Theorem , prove that a line drawn thought the mid- point of one side of a triangle parallel to another side bisects the third side .(Recall that you have proved it in class IX).

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2. Using Theorem , prove that the line joining the mid-point of any two sides of a triangle is parallel to the third side. (Recall that you have done it is class IX) .

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3. ABCD is a trapezium in which $AB \| DC$ and its diagonals intersect each other at the point O. Show that $\frac{AO}{BO} = \frac{CO}{DO}$

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4. 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. 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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2. 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.

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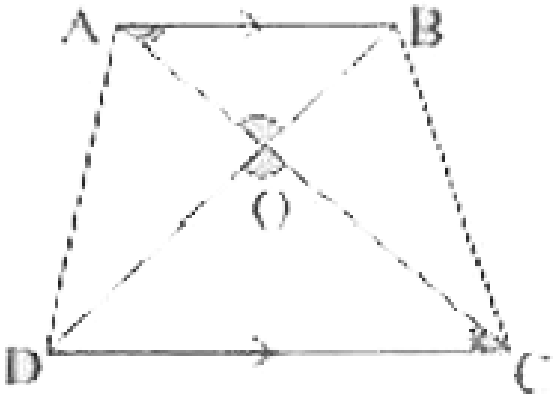
3. Diagonlas AC and BD of a trapezium ABCD with AB ||DC intersect each other at the point O. using a similarity criterion for two triangles, show that $\frac{OA}{OC} = \frac{OB}{OD}$.



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4. 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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5. GD and GH are respectively the bisectors of $\angle ACB$ and $\angle EGF$ such that D and H lie on sides AB and FE of ΔABC and and ΔEFG respectively. If $\Delta ABC \sim \Delta FEG$, show that:

$$\frac{CD}{GH} = \frac{AC}{FG}$$

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

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7. To construct a triangle similar to a given $\triangle$ ABC with its sides $\frac{8}{5}$th the corresponding sides of $\triangle A, B, C$ draw a ray BX such that CBX is an acute angle and X is on the opposite side of A with respect to BC. The minimum number of points to be located at equal distances on the ray BX

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

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9. Construct an isoeceles triangle whose base is 8 cm and altitude 4 cm and then another triangle whose sides $1\frac{1}{2}$ times the corresponding sides of the isoeceles triangle.

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Exercise 8 3

1. D, E, F are mid points of sides BC, CA, AB of ΔABC. Find the ratio of areas of ΔDEF and ΔABC.

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2. In ΔABC, 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 the areas of two similar triangles is equal to the square of the ratio of their corresponding medians.

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4. If $\Delta ABC \sim \Delta DEF$, $BC = 3cm$, $EF = 4cm$, and Area of $\Delta ABC = 54cm^2$, then Area of ΔDEF is

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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 $81cm^2$ and $49cm^2$ respectively. If the altitude of the bigger triangle is 4.5 cm. Find the corresponding altitude of the smaller triangle.

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Exercise 8 4

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

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2. In an equilateral triangle , prove that three times the square pf one side is equal to four times the square of one of its altitudes.

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

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5. A guy wire attached to a vertical pole of height 18 m is 24 m 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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6. 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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7. In an equilateral triangle ABC, D is a point on side BC such that BD = $\frac{1}{3}$ BC. Prove that $9AD^2 = 7AB^2$.

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8. The equilateral triangles are drawn on the sides of a right triangle. Show that the area of the triangle on the hypotenuse is equal to the sum of the areas of the triangles on the other two sides.

OR

In the given figure, PA, QB and RC are each perpendicular to AC. Prove that $\frac{1}{x} + \frac{1}{z} = \frac{1}{y}$

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9. Prove that ara of the equilateral triangle described on the sides of square is half the area of the equilateral triangle described on its diagonal.

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Optional Exercise

1. 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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2. 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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Try This

1. E and F are points on the sides PQ and PR respectively of Δ PQR. For each of the following cases, state whether EF || QR:

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

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

(iii)

$PQ = 1.28cm, PR = 2.56cm, PE = 0.18cm, PF = 0.36cm$

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2. E and F are points on the sides PQ and PR respectively of Δ PQR. For each of the following cases, state whether EF || QR:

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

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

(iii)

$PQ = 1.28cm, PR = 2.56cm, PE = 0.18cm, PF = 0.36cm$

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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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