MATHS

BOOKS - KALYANI MATHS (ASSAMESE ENGLISH)

PYTHAGORAS THEOREM

Example

1. ABC is a right angled triangle right angled at C. CD is perpendicular on the hypotenuse AB. Prove that $\frac{AC^2}{BC^2} = \frac{AD}{DB}$

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2. ABC is a right angled triangle right angled at C. CD is perpendicular on the hypotenuse AB. Prove that $\frac{BC^2}{CD^2} = \frac{AB}{AD}$

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3. ABC is a right angled triangle right angled at C. CD is perpendicular on the hypotenuse AB. Prove that $\frac{BC^2}{AC^2} = \frac{DB}{AD}$.

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4. The perpendicular from C on the side AB of a triangle ABC intersect AB at D and $BD = mAD$. Prove that $(m+1)BC^2 = (m+1)AC^2 + (m-1)AB^2$.

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5. In the triangle ABC, $BC + CA = m^2 + 2mn - n^2$, $CA + AB = (m + n)^2$ and $AB + BC = 2m^2$. Show that it is a right angled triangle.

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Exercise

1. The length of a diagonal of a square is $16cm$. Find the length of the side of it.

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2. The length of the hypotenuse of an isosceles right angled triangle is $8\sqrt{2}cm$. Find the length of the other two sides.

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3. If the length of a diagonal of a square is $'2a'$ prove that its area is$2a^2$.

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4. In an equilateral triangle with side $'a'$ prove that its altitudes = $\frac{\sqrt{3}}{2}a$ and its area = $\frac{\sqrt{3}}{4}a^2$.

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

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6. If x and y are the mid-points of the sides CA and CB respectively of a ΔABC right angled at C. prove that $4Ay^2 = 4AC^2 + BC^2$

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7. If PB and AQ are the medians of a ΔABC right angled at C. Prove that

$4AQ^2 = 4AC^2 + BC^2$

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8. If PB and AQ are the medians of a ΔABC right angled at C. Prove that

$4BP^2 = 4BC^2 + AC^2$

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9. If PB and AQ are the medians of a ΔABC right angled at C. Prove that

$4(AQ^2 + BP^2) = 5AB^2$

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10. ABC a right angle triangle, right angled at B. AD and CE are the medians drawn from A and C respectively. If $AC = 5m$ and $AD = \frac{3\sqrt{5}}{2}m$, find the length of CE.

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11. P and Q are points on the sides CA and CB of a ΔABC, right angled at C. Prove that $AQ^2 + BP^2 = AB^2 + PQ^2$.

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12. In ΔABC , $AD \perp BC$ such that $AD^2 = BD.CD.$ Prove that ΔABC is right angled at A.

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13. ΔABC is a right angled triangle right angled at A and $AD \perp BC.$ Prove that $AD^2 = BD.CD.$

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14. ΔABC is a right angled at B and D is mid-point of BC. Prove that $AC^2 = 4AD^2 - 3AB^2.$

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15. ΔPQR is right angled at Q and the points S and T trisect the side QR. Prove that $8PT^2 = 3PR^2 + 5PS^2$.

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

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17. In an equilateral triangle ABC, D is a point on side BC such that BD =1/3BC.Prove that $9AD^2 = 7AB^2$

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18. ΔABC is right angled at C and $CD \perp AB$. If $BC = a$, $CA = b$, $AB = c$ and $CD = p$. Then prove that $cp = ab$

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19. Of triangle ABC,$\angle B = 90^\circ$ and $BD \perp AC$.IF AB=c,BC=a,CA=b and BD=p then prove that ,$\frac{1}{p^2} = \frac{1}{a^2} + \frac{1}{c^2}$.

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

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21. Two poles of height $10m$ and $15m$ stand vertically on a plane ground. If the distance between their feet is $5\sqrt{3}m$, find the distance between their tops.

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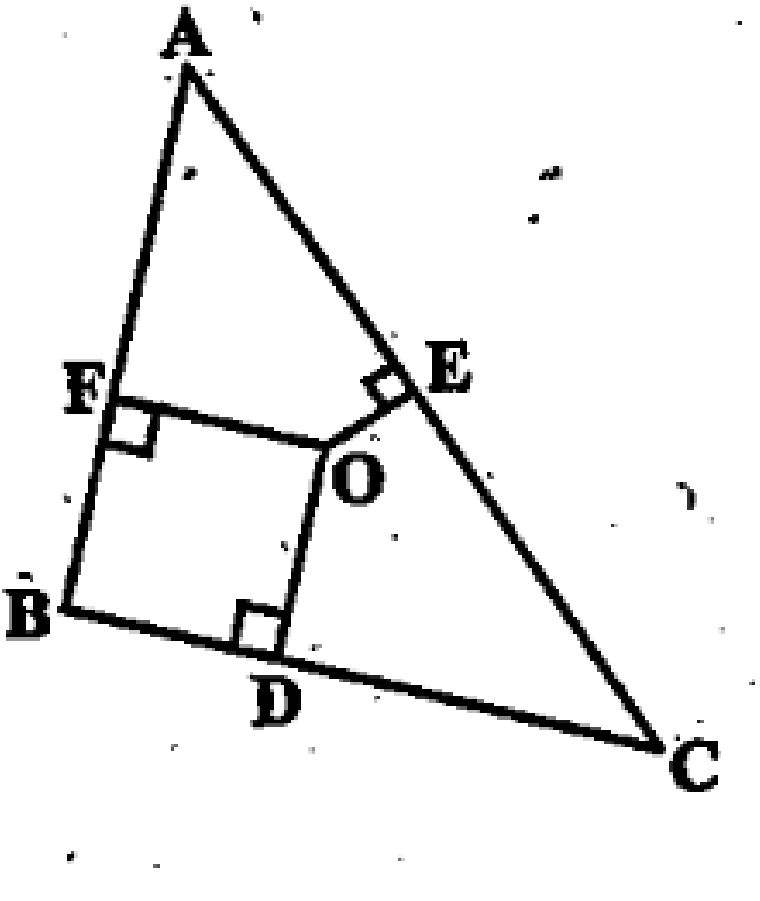
22. In Fig.6.45,O is a point in the interior of a triangle ABC, $OD \perp BC, OE \perp AC$ and $OF \perp AB$.Show that



(i)

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

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23. O is a point in the interior of ΔABC. OD,OE and OF are the perpendicular drawn to the sides BC, CA and AB respectively. Prove that

$AF^2 + BD^2 + CE^2 = AE^2 + BF^2 + CD^2.$

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

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

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26. A ship rail $25km$ due south and then $60km$ due west. How far it is then from the starting point.

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27. B is due west of A and C is due north of B. If the distance between B and C is $48km$ and the distance between A and C is $73km$. Find the distance between A and B.

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28. A man travels $27km$ due south then $24km$ due west. Finally $20km$ due north. How far is he from the starting point?

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29. An aeroplane leaves an airport and flies due north at a speed of 1000 km per hour. At the same time another aeroplane leaves the same airport and flies due west at a speed of 1200 km per hour. How far apart will be the twö planes after $1\left(\frac{1}{2}\right)$ hours?.

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30. In an isosceles triangle ABC if $AC = BC$ and $AB^2 = 2AC^2$, prove that $\angle C$ is a right angle.

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31. The length of the sides of a triangle are $ax - by$,$ay + bx$ and $\sqrt{\left(a^2 + b^2\right)\left(x^2 + y^2\right)}$. Show that it is a right angled triangle.

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32. The length of the sides of a triangle are $a+b$,$ab-1$ and $\sqrt{(a^2+1)(b^2+1)}$. Show that it is a right angled triangle.

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33. In the triangle ABC, $BC=m^2-n^2$, $AC=3mn$ and $AB=m^2+n^2$. Prove that it is a right angled triangle.

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34. The perimeter of two similar triangles are respectively 25cm. and 15 cm. If one side of the first triangle is 9 cm.,find the corresponding side of the second triangle.

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35. X is point on PQ and Y is a point on PR of a ΔPQR such that $XY \mid\mid QR$. If $\frac{PQ}{XQ} = \frac{7}{3}$ and $PR = 6.3cm$, find YR

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36. Corresponding sides of two similar triangles are in the ratio $2:3$. If the area of the similar triangle is $48cm^2$, find the area of the larger triangle.

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37. The areas of two similar triangles ABC and PQR are in the ratio $9:16$. If $BC = 4.5cm$, find the length of QR.

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38. In a right angle triangle the length of the sides adjacent to the right angle and $\sqrt{a}$ and $\sqrt{1-a}$. Find the length of the hypotenuse.

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39. All squares are __-. (Similar, congruent)

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40. Fill in the gap :

All rectangles are _____.

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41. Fill in the gap :

The ratio of the areas of two similar triangles is equal to the square of the ratio of their _____.

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42. Fill in the gap :

Two triangles are similar if their _____ sides are proportional.

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43. Fill in the gap :

Pythagoras Theorem states that in a right angle, the square of hypotenuse is _____ to the sum of the square of the other two sides.

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44. In ΔLMN , $\angle L = 60^\circ$, $\angle M = 50^\circ$. If $\Delta LMN \sim \Delta PQR$, Then the value of $\angle R$ is

A. 40°

B. 30°

C. 70°

D. 110°

Answer:

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45. ABC and BDE are two equilateral triangles such that D is the mid-point of BC.Ratio of the areas of triangle ABC and BDE is

a)$2:1$ b)$1:2$ c)$4:1$ d)$1:4$

A. $2:1$

B. $1:2$

C. $4:1$

D. $1:4$

Answer:

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46. Sides of two similar triangle are in the ratio 4:9.Areas of these triangle are in the ratio

a)$2:3$ b)$4:9$ c)$81:16$ d)$16:81$

A. $2:3$

B. $4:9$

C. $81:16$

D. $16:81$

Answer:

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47. Length of an altitude of an equilateral triangle of side $'2a'cm$ is

A. $3acm$

B. $\sqrt{3}acm$

C. $\frac{\sqrt{3}}{2}acm$

D. $2\sqrt{3}acm$

Answer:

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48. ΔABC is an isosceles triangle in which $\angle C = 90^\circ$. If $AC = 6cm$, Then AB is

A. $6\sqrt{2}cm$

B. $6cm$

C. $2\sqrt{6}cm$

D. $4\sqrt{2}cm$

Answer:

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