MATHS

BOOKS - CALCUTTA BOOK HOUSE

MATHS (BENGALI ENGLISH)

PYTHAGORAS THEOREM

Very Short Answer Type Questions

1. A person travels from a place firstly 24m west and then 10 m north. Then the distance

of the person from the starting point will be

A. 34 m

B. 17m

C. 26m

D. 25m

Answer: C

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2. If ΔABC be an equilateral triangle and $AD \perp BC$, then AD^2 =

A. $\frac{3}{2}DC^2$

B. $2DC^2$

C. $3DC^2$

D. $4DC^2$

Answer: C

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3. ABC is an isosceles triangle of which $AC = BC$ and $AB^2 = 2AC^2$. Then value of $\angle C$ will be -

A. 30°

B. 90°

C. 45°

D. 60°

Answer: B

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4. Two rods of 13m length and 7m length are situated perpendicularly on the ground and the distance between their foots is 8m.The distance between their top parts is

A. 9m

B. 10 m

C. 11 m

D. 12 m

Answer: B

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5. The lengths of two diagonals of a rhombus are 24cm and 10 cm respectively .Then the perimeter of the rhombus s

A. 13 cm

B. 26 cm

C. 52 cm

D. 25 cm

Answer: C

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Example 2

1. If the ratio of the lengths of three sides of a triangle is $3:4:5$,then the triangle will always be a right-angled triangle.

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2. State True or False- If in a circle of radius 10cm length, a chord subtends right-angle at

the centre , then the length of the chord will be 5 cm.

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Fill In The Blanks

1. In a right-angled triangle, the area of a square drawn on the hypotenuse is equal to the . . .. of the areas of the squares drawn on other two sides.

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2. In an isosceles right-angled triangle if the length of each of two equal sidesin $4\sqrt{2}$, then the length of the hypotenuse will be . . .. cm.

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3. In a rectangle figure ABCD, the two diagonals AC and BD intersect each other at the point O, ifAB = 12 cm,AO = 6.5 cm, then the length of BC is . . .. cm.

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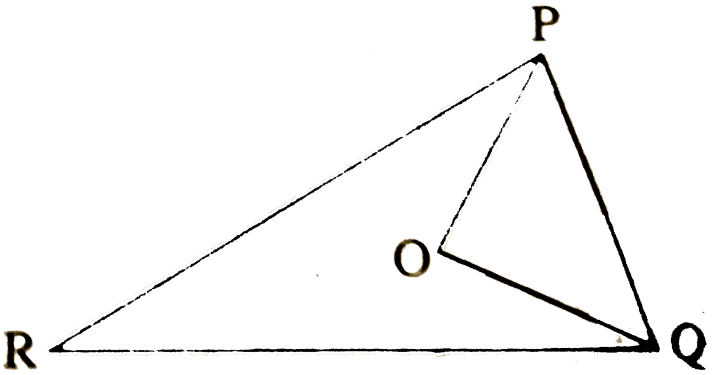
Example 3

1. In the given figure,the point O is situated within the triangle PQR in such a way that, $\angle POQ = 90^\circ$, $OP = 6cm$ and $OQ = 8cm$. If PR= 24 cm and $\angle QPR = 90^\circ$, then find the

length of QR.



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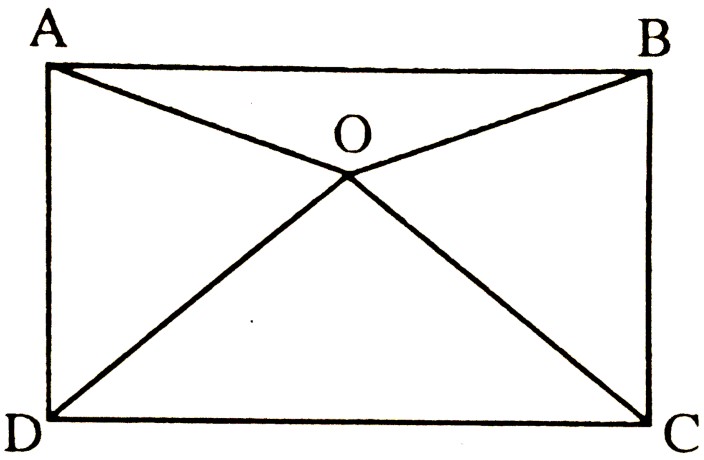
2. The point O is situated within the rectangular figure ABCD in such a way that OB =6 cm, OD =8 cm and OA =5 cm. Determine the

length of OC



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3. In the triangle ABC,the perpendicular AD, from the point A on the side BC meets the side BC at the point D. If BD=8cm , DC =2 cm andAD = 4 cm, then find the measure of $\angle BAC$.

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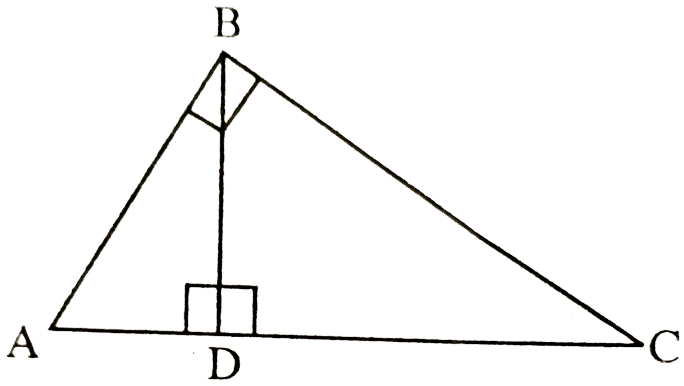
4. In a right-angled triangle ABC, $\angle ABC = 90^\circ$, $AB = 3cm$, $BC = 4cm$ and the perpendicular BD on the side AC from the point B which meets the side AC at the point D. Determine the length of BD.



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Long Answer Type Question

1. If the following are the lengths of the three sides of a triangle, then write the cases where the triangles are right -angled triangles :

(a) 8cm,15 cm,17 cm (b) 9 cam,11 cm , 6 cm ,

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2. In the road of Laxmi's locality there is a ladder of 15m length kept in such a way that it has touched Pujas's window at a height of 9 m above the ground. Now keeping the foot of the ladder at the same point of that road, the ladder is rotated in such a way that it touched Laxmi's window situated on the other side of the road. If Laxmi's window is 12m above the ground, then determine the breadth of that road.

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3. If the length of one diagonal of a rhombus having the side10 cm length of 12 cm,then calculate the length of other diagonal.

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4. PQR is a triangle whose $\angle Q$ is right angle. If S is any point on QR, then prove that $PS^2 + QR^2 = PR^2 + QS^2$

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5. Prove that the sum of squares drawn on the sides of a rhombus is equal to the sum of squares drawn on two diagonals.

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6. ABC is an equilateral triangle. AD is perpendicular to BC. Prove that $AB^2 + BC^2 + CA^2 = 4AD^2$

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7. ABC is a right-angled triangle of which $\angle A$ = right angle. P and Q are two points on AB and AC respectively.By joining P,Q,B,Q and C,P prove that $BQ^2 + PC^2 = BC^2 + PQ^2$

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8. If the diagonals of the quadrilateral ABCD intersect each other orthogonally,then prove that $AB^2 + CD^2 = BC^2 + DA^2$

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9. AD is the height of the triangle ABC. If $AB > AC$,then prove that $AB^2 - AC^2 = BD^2 - CD^2$.

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10. Two perpendicular BD and CE are drawn from the vertices B and C respectively on the sides AC and AB of the ΔABC,which intersect each other at the point P. Prove that $AC^2 + BP^2 = AB^2 + CP^2$

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11. ABC is a right-angled isoscels triangles of which $\angle C$ is a right angle. If D is any point on AB. Then prove that $AD^2 + BD^2 = 2CD^2$

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12. In $\Delta ABC, \angle A =$ right angle. If CD is a median, then prove that $BC^2 = CD^2 + 3AD^2$.

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13. OX,OY and OZ are the perpendiculars drawn from an internal point O of the ΔABC on its sides BC, CA and AB respectively. Prove that

$$AZ^2 + BX^2 + CY^2 = AY^2 + CX^2 + BZ^2$$

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14. In the ΔRST, $\angle S$ right angle.X and Y are the midpoints of RS and ST respectively . Prove

that $RY^2 + XT^2 = 5XY^2$.

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15. If in ΔABC, $AD \perp BC$, then prove that $AB^2 + CD^2 = AC^2 + BD^2$

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16. Prove that the area of the square drawn on the diagonal of a square is twice the area of the given square.

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

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18. ABCD is a rhombus.Prove that $AB^2 + BC^2 + CD^2 + DA^2 = AC^2 + BD^2$

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19. In $\Delta ABC, AD \perp BC$. Prove that $AB^2 - BD^2 = AC^2 - CD^2$

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20. In $\Delta ABC, AD \perp BC$ which intersects BC at D. If $BD = 3CD$, then prove that $2AB^2 = 2AC^2 + BC^2$

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21. In the isosceles triangle ABC, AB=AC and BE is perpendicular to AC from B. Prove that $BC^2 = 2AC \times CE$

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22. In an isosceles right-angled triangle ABC, $\angle B = 90^\circ$. The bisector of $\angle BAC$ intersects the side BC at the point D. Prove that $CD^2 = 2BD^2$

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23. Prove that the sum of the areas of the squares drawn on the sides of a rhombus is equal to the sum of the areas of two squares drawn on the diagonals of the given square.

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24. ΔPQR is a right-angled isosceles triangle of which the two sides PQ and QR are equal . The bisector of$\angle P$ intersects the side QR at the point S.Prove that $SR^2 = 2QS^2$.

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25. P is an external point of the square ABCD. If $PA > PB$,then prove that $PA^2 - PB^2 \cong PD^2 - PC^2$

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26. In the right-angled ABC, $\angle A = 1$ right angle. BE and CF are two medians of ΔABC . Prove that $4\left(BE^2 + CF^2\right) = 5BC^2$

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27. A perpendicular AD is drawn on BC from the vertex A of the acute ΔABC. Prove that $AC^2 = AB^2 + BC^2 - 2BC.BD$

OR

Prove that the square drawn on the opposite side of theacute angle of an acute triangle is equal to the areas of the sum of the squares drawn on its other two sides being subtracted by twice the area of the rectangle formed by

one of its sides and the projection of the other side to this side.

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28. Prove that if equilateral triangles are drawn on the sides of a right-angled triangles then the area of the equilateral triangle, drawn on the hypotenuse is equal to the sum of the areas of the other two equilateral triangals drawn on its other two sides.

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29. O is an internal point of the rectangle PQRS. Prove that $OQ^2 + OS^2 = OP^2 + QR^2$

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30. In the right-angled triangle ABC,$\angle C = 90^\circ$ .If the length of perpendicular drawn from C on AB be p and AB=c,BC =a,CA=b , then prove that $(a)\frac{1}{p^2} = \frac{1}{a^2} + \frac{1}{b^2}, (b)pc = ab.$

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31. ΔABC is an equilateral triangle . D is a point on the side BC such that $BD = \frac{1}{3}BC$. Prove that $7AB^2 = 9AD^2$

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32. Prove that if the difference of the areas of the squares drawn on any two sides of a triangle be equal to the area of square drawn ono its third side, then the triangle is a right-angled triangle.

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33. In ΔABC,AD is a perpendicular drawn from A to the side BC. If $AD^2 = BD.CD$, then prove that the triangle is a right-angled triangle.

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34. One of the two acute angles of a righ-angled triangle is twice the other.Prove that between the sides adjacent to the right angle,

the area of the square drawn on the greater side is thrice the area of the square drawn on the smaller side.

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35. In $\Delta ABC, \angle A$ is a right angle and AO is perpendicular to BC. Prove that $AO^2 = BO.CO.$

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36. Prove that in the quadrilateral of which the two diagonals intersect each other at right angles, the sum of the squares of any two sides is equal to the sum squares of the other two sides.

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37. ΔABC is an obtus triangle in which $\angle B$= obtus angle. If AD is perpendicular to BC (or

extended BC) ,then prove that

$AC^2 = AB^2 + BC^2 + 2BC \times BD$.

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38. In ΔABC, AD is a median and AM $\perp$ BC.Prove that

(a) $AC^2 = AD^2 + BC.DM + \left(\frac{BC}{2}\right)^2$ (b) $AB^2 = AD^2 - BC.DM + \left(\frac{BC}{2}\right)^2$ (c) $AC^2 + AB^2 = 2AD^2 + \frac{1}{2}BC^2$

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Example 6

1. A person at first travels 28m east from a certain place and then he travels $\sqrt{57}$m south of it. The distance of the person from the starting point will be

A. $\left(28+\sqrt{57}\right)m$

B. 29 m

C. $\left(28-\sqrt{57}\right)m$

D. None of these

Answer: b

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2. In $\Delta ABC, AB = 6\sqrt{3}cm, AC = 12cm$ and BC = 6 cm. Then the value of $\angle B$ will be

A. 120°

B. 60°

C. 90°

D. 45°

Answer: C

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3. A ladder is situated against a wall in such a way that its foot is at a distance of 2.5m away from the wall and its vertex touches a window which is at a height of 6m from the ground.Then the length of the ladder will be

A. 6.1m

B. 6.3 m

C. 6.4m

D. 6.5m

Answer: d

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4. An aeroplane flows towards the north from an airport at a speed of 1000km per hour.In the same time another aeroplane also flows towards the west at a speed of 1200 km per hour the same place. Then the distance

between the aeroplanes after $1\frac{1}{2}$ hours will be

A. $30\sqrt{61}km$

B. $300\sqrt{61}km$

C. $3\sqrt{61}km$

D. $300\sqrt{62}km$

Answer: b

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Short Answer Type Questions

1. The length of the sides of an equilateral ΔABC is 2 a units.Find the height of the triangle.

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2. Two pillars of lengths 6m and 11m stands up vertically with the ground. If the distance between their foots be 12m,then find the distance between their vertices.

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3. A ladder of length 10m just touches a window 8 m high from the ground on a wall. Find the distance between the foot of the ladder from the wall.

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4. O is an internal point of the rectangle ABCD such that OB = 6 cm,OD =8 cm and OA $= \sqrt{19}cm$. Then find the length of OC.

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5. In the right-angled triangle ABC,$\angle A$= right angle. If AB $= (3x - \sqrt{2})cm$, $BC = \sqrt{9x^2 + 2}$ cm, then find the value of AC.

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6. If the ratio of three sides of a triangle be $\sqrt{2} : \sqrt{3} : \sqrt{5}$, then the triangle is always a right-angled triangle.

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7. The quantities 5a, 12a and 13a are all Pythagorian quantities.

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8. If the area of the square drawn on any side of a triangle is equal to the sum of the areas of the squares drawn on the other two sides of the triangle ,then the triangle will be right-

angled triangle, the opposite angle of the greatest side of which will be .....

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9. The number 5,12 ..... are Pythagorian numbers.

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10. If D be the mid-point of the side BC of ΔABC, then $AB^2 + AC^2 = 2BD^2 +$

"....."`.

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11. If the length of one of the diagonals of a rhombus with sides 13cm be 10cm, then find the length of its other diagonal.

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12. The lengths of three sides of a triangle are 5cm, 12cm and 13 cm. Then find the length of

the perpendicular drawn from the opposite vertex of the side of length 13 cm to that side.

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13. If the distance between the foots of two pillar of lengths 35 m and 50m be 20m, then find the distance between their vertices.

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14. If the lengths of the diagonals of a rhombus be 18cm and 24 cm. Then find the length of its sides.

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