



MATHS

BOOKS - CENGAGE

PYTHAGORAS' THEOREM

WORKED EXAMPLES

1. Identify the triangle as acute-angled, obtuse-angled, or right-angled whose sides are given.

$a = 5$, $b = 10$, and $c = 11$



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2. Identify the triangle as acute-angled, obtuse-angled, or right-angled whose sides are given.

$$a = b = 12, c = 12\sqrt{2}$$



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3. The altitude of an equilateral triangle is $8\sqrt{3}$ cm. Calculate the area of the triangle.





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TEST YOURSELF (LEVEL 1)

1. What is the length of the longest line that can be drawn on A4 size paper 30 cm by 21 cm?



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2. What is the length of the longest straight stick that can be kept in a room of size 4 m by

5 m by 2 m?



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3. A rope from the top of a mast on a sailboat is attached to a point 2 m from the base of the mast. The rope is 8 m long. What is the height of the mast?



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4. Can the line segments 9, 10, and 11 cm form a right-angled triangle?



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5. Find the value of 'x' in the following:

$$x^2 + 15^2 = 17^2$$



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6. Find the value of 'x' in the following:

$$x^2 + 24^2 = 25^2$$



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7. Find the value of 'x' in the following:

$$3^2 + x^2 = 5^2$$



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8. Find the value of 'x' in the following:

$$6^2 + 8^2 = a^2$$



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9. Identify the triangle as acute-angled, obtuse-angled, right-angled whose sides are given.

$$a = 12, b = 15, \text{ and } c = 20$$



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10. What can you say about the triangle whose sides are (i) 8, 9, and 12 and (ii) 7, 12, and 14?



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11. In an isosceles triangle, the equal sides are each 10 cm and the base is 12 cm. Find the altitude of the triangle.



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12. In an isosceles triangle, altitude is 12 cm and the base is 10 cm each. Find the measure of equal sides.



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13. Find the area of an equilateral triangle of side 12 cm.



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14. If the side of a rhombus is 10 cm and the longer diagonal is 16 cm, find the length of the other diagonal and hence the area of the rhombus.



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TEST YOURSELF (LEVEL 3)

1. In a right-angled triangle, the square of the hypotenuse is equal to twice the product of

the other two sides. One of the acute angles of the triangle is

A. 60°

B. 45°

C. 30°

D. 15°

Answer: B



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2. P and Q are the mid-points of the sides AB and BC, respectively, of ΔABC , right angled at B. Then:

A. $AQ^2 + CP^2 = AC^2$

B. $AQ^2 + CP^2 = \frac{4}{5}AC^2$

C. $AQ^2 + CP^2 = \frac{4}{3}AC^2$

D. $AQ^2 + CP^2 = \frac{5}{4}AC^2$

Answer: D



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3. The sides of a right-angled triangle are consecutive integers. They are

A. 4, 5

B. 9, 10

C. 12, 13

D. 20, 21

Answer: A::B::C



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4. The area of a right-angled triangle is 20cm^2 and one of the sides containing the right angle is 4 cm. The altitude on the hypotenuse is

A. 8 cm

B. 10 cm

C. $\frac{10}{\sqrt{41}}$ cm

D. $\frac{20}{\sqrt{29}}$ cm

Answer: B



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5. In a right-angled triangle with sides a and b , hypotenuse c , the altitude drawn on the hypotenuse is x . Then

A. $ab = x^2$

B. $\frac{1}{a} + \frac{1}{b} = \frac{1}{x}$

C. $a^2 + b^2 = 2x^2$

D. $\frac{1}{a^2} + \frac{1}{b^2} = \frac{1}{x^2}$

Answer: D



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TEST YOURSELF (MCQ)

1. Which of the following is NOT a Pythagorean triad?

A. 5, 12, 13

B. 3, 4, 5

C. 15, 8, 17

D. 7, 24, 26

Answer: D



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2. In a right triangle, base is 1 unit greater than the height. If hypotenuse is 5 units then the other sides are

A. 3, 4

B. 2, 3

C. 1, 4

D. 2, 4

Answer: A



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3. ABC is a right isosceles triangle with $\angle B = 90^\circ$. If length of median from B to AC is 6 cm then area of triangle is

A. 9cm^2

B. 72cm^2

C. 36cm^2

D. 18cm^2

Answer: C



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4. ABC is a right triangle with $\angle B = 90^\circ$. If $AB = BC = 4\sqrt{2}$ cm and BM is the median. Then the length of BM is

A. 6 cm

B. 8 cm

C. 4 cm

D. $4\sqrt{2}$ cm

Answer: C



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5. ABC is a triangle in which medians coincide with altitudes. If length of median is a , then length of its side will be

A. $\frac{\sqrt{3}}{2}a$

B. $\frac{2}{\sqrt{3}}a$

C. $\sqrt{3}a$

D. $\frac{\sqrt{3}}{4}a$

Answer: B



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6. Which of the following are sides of an isosceles right triangle?

A. 3, 4, 5

B. 3, 3, 4

C. 12, 12, 5

D. 4, 4, $\sqrt{32}$

Answer: D



7. ABCD is a rectangle in which $AB - BC = 1$ cm. If area of rectangle is 20cm^2 , then its perimeter will be

- A. 16 cm
- B. 20 cm
- C. 18 cm
- D. 25 cm

Answer: C



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8. If the longest line that can be drawn in a square field is 20 cm, then area of the field is

A. $400m^2$

B. $100m^2$

C. $600m^2$

D. $200m^2$

Answer: D



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9. In an isosceles triangle, equal sides are 13 cm. If altitude is 5 cm, then the measure of base is

A. 12 cm

B. 24 cm

C. 6 cm

D. 18 cm

Answer: B



10. ABC is a right triangle with $\angle B = 90^\circ$ and

$AC - AB = 1$. If $BC = \sqrt{n}$ then AB is

A. $\frac{n + 1}{2}$

B. $\frac{n - 1}{2}$

C. $\frac{n}{2}$

D. $\frac{n - 3}{2}$

Answer: B



11. ABCD is a rhombus with side 6 cm. If one of the diagonals is of $3\sqrt{3}$ cm then length of other diagonal is

A. $3\sqrt{5}cm$

B. $5\sqrt{3}cm$

C. $3\sqrt{3}cm$

D. $5\sqrt{5}cm$

Answer: A



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12. The length of wire required for fencing the boundary of a rectangular field with diagonal as 25 m and a side as 15 m is

A. 40 m

B. 60 m

C. 70 m

D. 75 m

Answer: C



13. Each of equal sides of an isosceles triangle is 13 cm. If the length of base is 24 cm then its area is

A. 50cm^2

B. 60cm^2

C. 55cm^2

D. 65cm^2

Answer: B



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14. If the area of an equilateral triangle is equal to that of a square, then the ratio of squares of their sides is

A. $\frac{1}{2}$

B. $\frac{3}{4}$

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

D. $\frac{4}{\sqrt{3}}$

Answer: D



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OLYMPAID AND NTSE LEVEL EXERCISES

1. Sides other than the hypotenuse of a right triangle are 12 cm and 5 cm. What is the area of the largest square which can be drawn on this triangle?

A. 144 sq. cm

B. 169 sq. cm

C. 25 sq. cm

D. 100 sq. cm

Answer: B



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2. A 17 feet long ladder is placed against a vertical wall and it reaches up to the wall 12 feet high. If a person wants to reach a window 15 m high on the wall, then foot of the ladder should be solid

A. away from the wall more than 3.75 feet
but less than 4 feet

B. towards the wall more than 4 feet but
less than 4.25 feet

C. towards the wall more than 3.75 feet but
less than 4 feet

D. away from the wall more than 4 feet but
less than 4.25 feet

Answer: B



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3. A runner runs 5 km north, then 8 km east and then 11 km south. How far is she from her starting point?

A. 24 km

B. 6 km

C. 10 km

D. 14 km

Answer: C



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4. A cable bridge is constructed over a river such that there is tower in the middle of the bridge. Many cables run from top of the tower to the bridge deck. The longest and the shortest cables are a units and b units long, respectively. If the distance between these cables on the deck is x units, then what is the height of the tower?

$$\text{A. } b^2 - \left[\frac{a^2 - (x^2 + b^2)}{2x} \right]^2$$

$$\text{B. } b^2 - \left[\frac{a^2 - (x^2 - b^2)}{2x} \right]^2$$

$$\text{C. } b^2 - \left[\frac{a^2 + (x^2 + b^2)}{2x} \right]^2$$

$$\text{D. } b^2 - \left[\frac{(x^2 + b^2) - a^2}{2x} \right]^2$$

Answer: A



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5. Which of these is the length of the longest diagonal of a cube of edge a .

A. $3a$

B. $a\sqrt{2}$

C. $a\sqrt{3}$

D. $3a^2$

Answer: C



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6. A farmer is standing inside a rectangular field ABCD such that the ratio of his distance from three corners A, B and C is 1 : 2 : 3, respectively. If he is $100\sqrt{6}m$ away from the

fourth corner D, then what is the approximate sum of his distance from all the four corners?

A. 741 m

B. 773 m

C. 823 m

D. 845 m

Answer: D



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