



## MATHS

### BOOKS - TARGET MATHS (HINGLISH)

### PYTHAGORAS THEOREM

#### Example

1. Verify that  $(3,4,5), (5,12,13), (8,15,17), (24,25,7)$  are the Pythagorean triplets



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2. Assign different values to  $a$  and  $b$  and obtain Pythagorean triplets.

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## Practice Set 2 1

1. Identify, with reason, which of the following are Pythagorean triplets :

(3,5,4)

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2. Identify, with reason, which of the following are Pythagorean triplets :

(4, 9, 12)

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3. Identify, with reason, which is Pythagorean triplets.

(5,12,13)

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4. Identify, with reason, which of the following are Pythagorean triplets :

(24,70,74)



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5. Identify , with reason , which of the following are Pythagorean triplets :

(10,24,27)

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6. Identify , with reason , which of the following are Pythagorean triplets :

(11,60,61)

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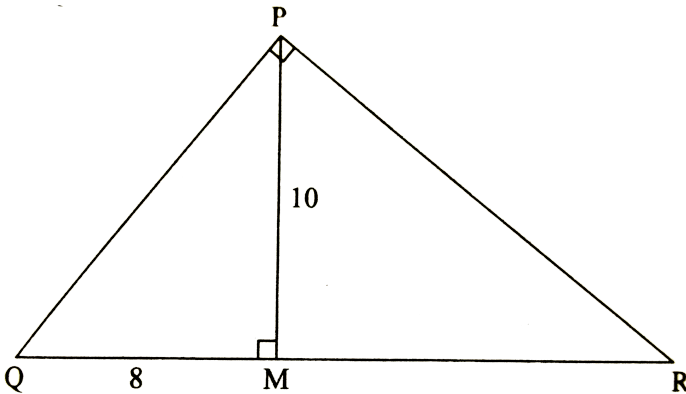
7. In the adjoining figure,

$\angle MNP = 90^\circ$ ,  $segNQ \perp segMP$ ,  $MQ=9$ ,  $QP=4$  find  $NQ$ .

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8. In the figure,  $\angle QPR = 90^\circ$ ,  $segPM \perp segQR$  and

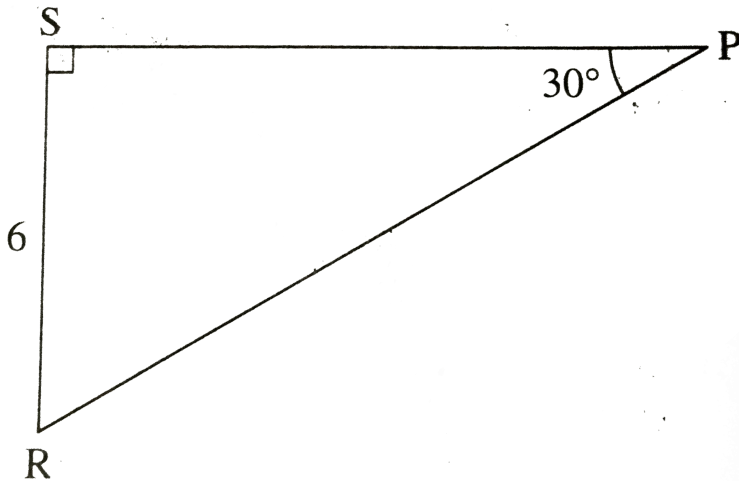
$Q - M - R$ ,  $PM = 10$ .  $QM = 8$ , find  $QR$ .



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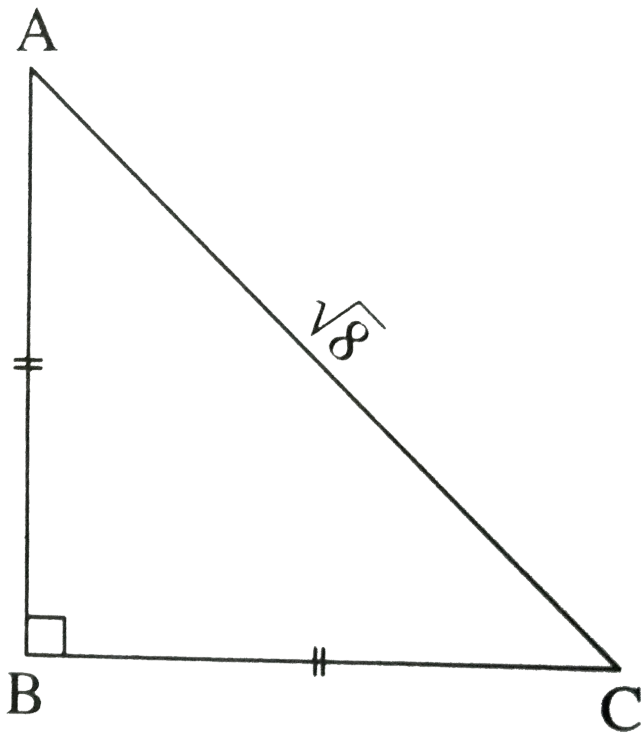
9. See figure Find RP and PS using the information given in

$\triangle$  PSR




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10. For finding AB and BC with the help of information given in figure , complete following activity :



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11. Find the side and perimeter of a square whose diagonal is 10 cm .

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12. In the adjoining figure,

$\angle DFE = 90^\circ$ ,  $FG \perp ED$ . If  $GD = 8$ ,  $FG = 12$ , find

(i) EG

(ii) FD, and

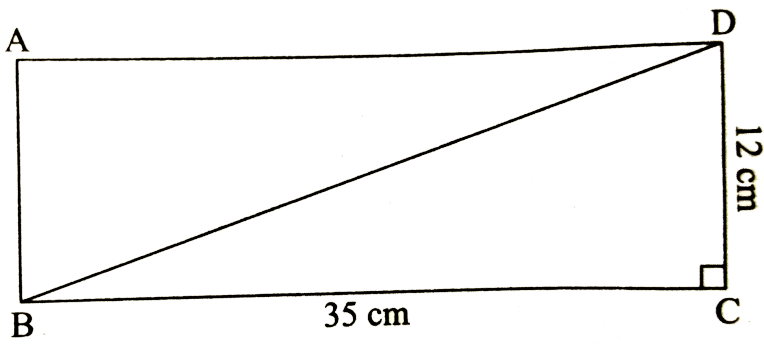
(iii) EF



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13. Find the diagonal of a rectangle whose length is  $35\text{cm}$  and breadth is  $12\text{cm}$ .





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14. In the figure,  $M$  is the midpoint of  $QR$ .  $\angle PRQ = 90^\circ$ .

Prove that  $PQ^2 = 4PM^2 - 3PR^2$

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15. Walls of two buildings on either side of a street are parallel to each other. A ladder  $5.8\text{ m}$  long is placed on the street such that its top just reaches the window of a

building at the height of  $4m$ . On turning the ladder over to the other side of the street, its top touches the window of the other building at a height  $4.2m$ . Find the width of the street.

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Try This

1. In  $\triangle ABC$ , if  $M$  is the midpoint of  $BC$  and  $\text{seg } AM \perp \text{seg } BC$ , then prove that  $AB^2 + AC^2 = 2AM^2 + 2BM^2$ .

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## Practice Set 2 2

1. In  $\triangle PQR$ , point S is the midpoint of side QR. If  $PQ = 11$ ,  $PR = 17$   $PS = 13$ , find QR.

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## Practice Set 2 3

1. In  $\triangle ABC$ ,  $AB = 10$ ,  $AC = 7$ ,  $BC = 9$ , then find the length of the median drawn from point C to side AB.

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## Practice Set 2 4

1. In the adjoining figure, seg PS is the median of  $\triangle PQR$  and

$PT \perp QR$ .

$$i. PR^2 = PS^2 + QR \times ST + \left(\frac{QR}{2}\right)^2$$



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## Practice Set 2 5

1. In  $\triangle ABC$ , point M is the midpoint of BC,

$AB^2 + AC^2 = 290cm$ ,  $AM=8cm$ , find BC.



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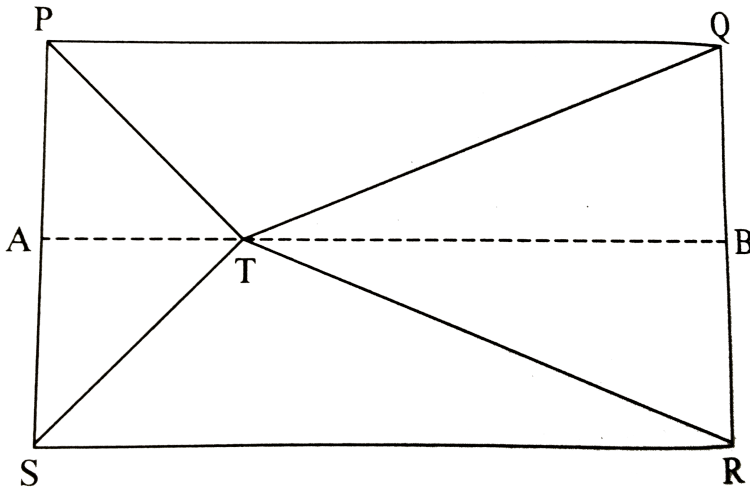
## Practice Set 2 6

1. In the figure, point  $T$  is in the interior of rectangle  $PQRS$ .

Prove that,

$$TS^2 + TQ^2 = TP^2 + TR^2$$

(As shown in the figure, draw seg  $AB \parallel$  side  $SR$  and  $A - T - B$ .)



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## Problem Set 2

1. Out of the following which is the Pythagorean triplet ?

A. (1,5,10)

B. (3,4,5)

C. (2,2,2)

D. (5,5,2)

**Answer: B**



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2. In a right angled triangle, if the sum of the squares of the sides making a right angle is 169, then what is the length

of the hypotenuse?

A. 15

B. 13

C. 5

D. 12

**Answer: B**



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3. out of the dates given below which date constitutes a Pythagorean triplet?

A. 15/08/17

B. 16/08/16

C. 3/5/17

D. 4/9/15

**Answer: A**



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4. If  $a, b, c$  are sides of a triangle and  $a^2 + b^2 = c^2$ , then name the type of the triangle.

A. Obtuse angled triangle

B. Acute angled triangle

C. Right angled triangle



D. Equilateral triangle

**Answer: C**

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5. Find perimeter of a square if its diagonal is  $10\sqrt{2}$  cm .

A. 10 cm

B.  $40\sqrt{2}$  cm

C. 20 cm

D. 40 cm

**Answer: D**

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6. Altitude on the hypotenuse of a right angled triangle divides it in two parts of lengths 4 cm and 9 cm. Find the length of the altitude.

A. 9 cm

B. 4 cm

C. 6 cm

D.  $2\sqrt{6}$  cm

**Answer: C**



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7. The height and base of a right angled triangle are  $24\text{cm}$  and  $18\text{cm}$ , find the length of its hypotenuse.

A. 24 cm

B. 30 cm

C. 15 cm

D. 18 cm

**Answer: B**



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8. In  $\triangle ABC$ ,  $AB = 6\sqrt{3}\text{cm}$ ,  $AC = 12\text{cm}$ ,  $BC = 6\text{cm}$ . Find the measure of  $\angle A$ .

A.  $30^\circ$

B.  $60^\circ$

C.  $90^\circ$

D.  $45^\circ$

**Answer: A**



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## Problem Set 10

1. Find the height of an equilateral triangle have side  $2a$  .



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2. Do sides  $7\text{cm}$ ,  $24\text{cm}$ ,  $25\text{cm}$  form a right angled triangle?

Give reason.



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3. Find the length of a diagonal of a rectangle having sides

$11\text{cm}$  and  $60\text{cm}$ .



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4. Find the length of the hypotenuse of a right

angled triangle if remaining sides are  $9\text{ cm}$  and  $12\text{ cm}$



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5. A side of an isosceles right angled triangle is  $x$ . Find its hypotenuse.

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6. In  $\Delta PQR$ ,  $PQ = \sqrt{8}$ ,  $QR = \sqrt{5}$ ,  $PR = \sqrt{3}$ . Is  $\Delta PQR$  a right angled triangle? If yes, which angle is of  $90^\circ$ ?

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7. In  $\Delta RST$ ,  $\angle S = 90^\circ$ ,  $\angle T = 30^\circ$ ,  $RT = 12\text{cm}$ , then find  $RS$  and  $ST$ .

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8. Find the diagonal of a rectangle whose length is 16 cm  
area is 192 sq cm

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9. Find the length of the side and perimeter of an  
equilateral triangle whose height is  $\sqrt{3}$  cm

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10. In  $\triangle ABC$ , seg AP is a median. If  $BC = 18$ ,  
 $AB^2 + AC^2 = 260$  then find the length of AP.

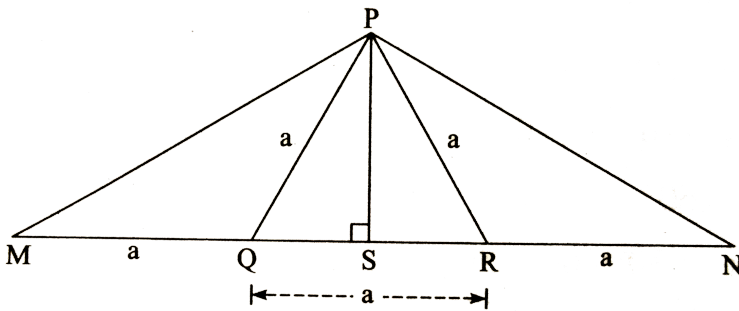
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11.  $\triangle ABC$  is an equilateral triangle. Point P is on base BC such that  $PC = \frac{1}{3}BC$ , if  $AB=6$  cm find AP.

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12. From the information given in the figure, prove that

$$PM = PN = \sqrt{3} \times a.$$



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**13.** Prove that the sum of the squares of the diagonals of a parallelogram is equal to the sum of the squares of its sides.

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**14.** Paranali and Prasad started walking to the East and to the North respectively, from the same point and at the same speed. After 2 hours distance between them was  $15\sqrt{2}$  km. Find their speed per hour.

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15. In  $\triangle ABC$ ,  $\angle BAC = 90^\circ$ , seg BL and seg CM are medians of  $\triangle ABC$ . Then prove that

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



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16. Sum of the squares of adjacent sides of a parallelogram is 130 cm length of one of its diagonals is 14 cm. Find the length of the other diagonal.



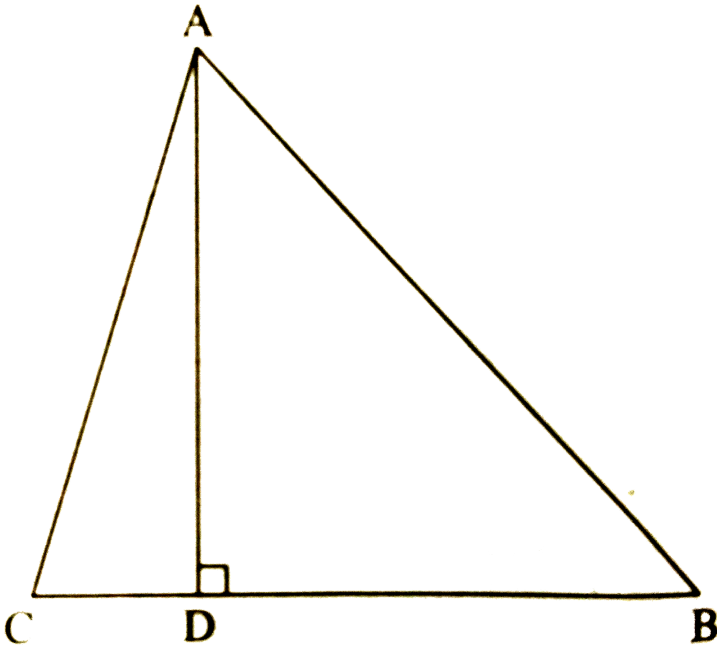
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1. In  $\triangle ABC$ ,

seg  $AD \perp$  seg  $BC$ ,

$DB = 3CD$ .

Prove that  $2AB^2 = 2AC^2 + BC^2$ .



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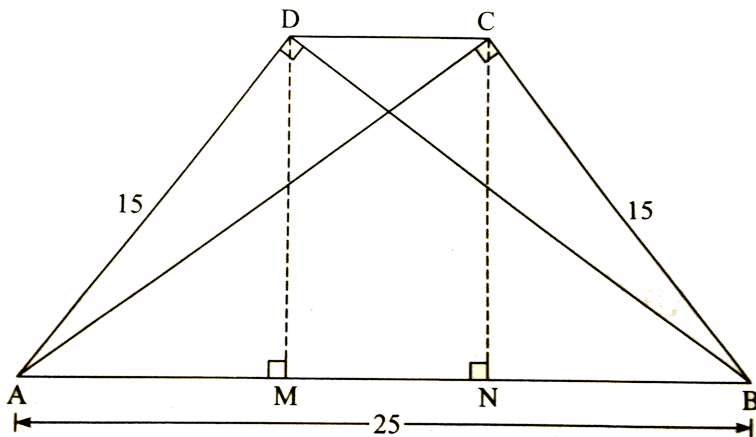
1. In an isosceles triangle, length of the congruent sides is 13 cm and its base is 10 cm. Find the distance between the vertex opposite the base and the centroid.

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## Problem Set 28

1. In a trapezium  $ABCD$ ,  $\text{seg } AB \parallel \text{seg } DC$ ,  $\text{seg } BD \perp \text{seg } AD$ ,  $\text{seg } AC \perp \text{seg } BC$ , if  $AD = 15$ ,  $BC = 15$  and

$AB = 25$ . Find  $A(\square ABCD)$ .



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## Problem Set 29

1. In the adjoining figure,  $\triangle PQR$  is an equilateral triangle.

Point S is on seg QR. such that  $QS = \frac{1}{3}QR$ . Prove that :

$$9PS^2 = 7PQ^2.$$

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## Problem Set 30

1. Seg  $PM$  is a median of  $\triangle PQR$ . If  $PQ=40, PR=42$  and  $PM=29$ , find  $QR$ .

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## Problem Set 31

1. Seg  $AM$  is a median of  $\triangle ABC$ . If  $AB=22, AC=34, BC=24$ , find  $AM$ .

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## Activities For Practice

1. In  $\triangle ABC$ , point M is the midpoint of BC,  $AB^2 + AC^2 = 290\text{cm}$ ,  $AM=8\text{cm}$ , find BC.

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2. Find the length of the side and perimeter of an equilateral triangle whose height is  $\sqrt{3}$  cm

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## Multiple Choice Questions

1. Which of the following triplets will not form a right angled triangle?

A. 50, 30, 40

B. 15, 20, 25

C. 20, 29, 21

D. 12, 16, 11

**Answer: D**



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2. If in  $\triangle ABC$   $AB = 15$  cm,  $BC = 17$  cm and  $AC = 8$  cm then which of the following will be a right angle?



A.  $\angle A$

B.  $\angle B$

C.  $\angle C$

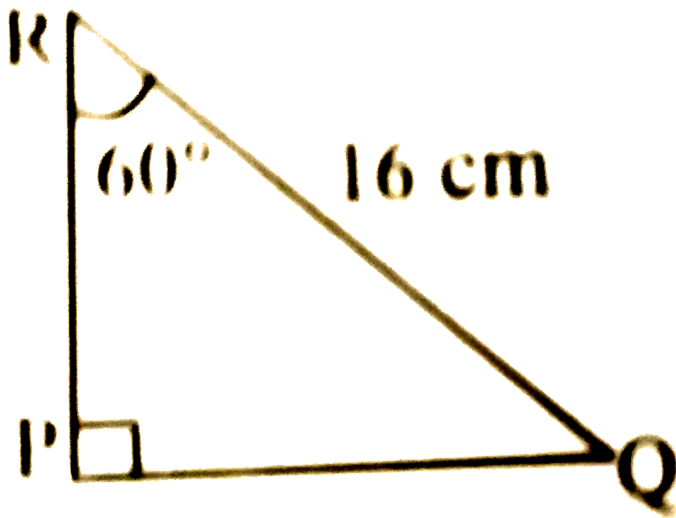
D. non of these

**Answer:**



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**3.** From the figure given below, the length of PQ and PR are ..... and ..... respectively.



A.  $8\text{ cm}$ ,  $8\sqrt{2}\text{ cm}$

B.  $8\sqrt{2}\text{ cm}$ ,  $8\text{ cm}$

C.  $8\text{ cm}$ ,  $8\sqrt{3}\text{ cm}$

D.  $8\sqrt{3}\text{ cm}$ ,  $8\text{ cm}$

**Answer:**



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4. The length of the longest segment which can be drawn in a rectangle of length 84cm and breadth 13 cm is .....

A. 84 cm

B. 85 cm

C. 86 cm

D. 97 cm

**Answer:**

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5. If the diagonal of a square is  $25\sqrt{2}cm$ , then the length of its side is .....

A. 50 cm

B. 25 cm

C. 5 cm

D.  $5\sqrt{2}cm$

**Answer: B**



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**6.** If the length of the hypotenuse of isosceles right angled triangle is 10 cm, then the length of the equal sides will be

..... .

A. 10 cm

B.  $10\sqrt{2}cm$

C. 5 cm

D.  $5\sqrt{2}cm$

**Answer: D**



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7. If the diagonals of a rhombus are 12cm and 16cm, find the length of each side.

A. 10 cm

B. 20 cm

C.  $10\sqrt{2}cm$

D.  $20\sqrt{2}cm$

**Answer:**



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**8.** The diagonal of a square of side 8 cm is

A. 8 cm

B.  $4\sqrt{2}cm$

C.  $8\sqrt{2}cm$

D.  $8\sqrt{3}cm$

**Answer:**



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9. In an isosceles  $\triangle ABC$ , if

$AC = BC$  and  $AB^2 = 2AC^2$  then  $\angle C = ?$

A.  $30^\circ$

B.  $45^\circ$

C.  $60^\circ$

D.  $90^\circ$

**Answer:**

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10. ABC is an isosceles triangle in which  $\angle ACB = 90^\circ$ . If

$AC = 2$  cm, then the value of AB is

A.  $\sqrt{2}$  cm

B.  $2\sqrt{2}cm$

C.  $3\sqrt{2}cm$

D.  $4\sqrt{2}cm$

**Answer:**



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11. In an equilateral triangle ABC, if  $AD \perp BC$ , B-D-C and  $AB = 12\text{ cm}$ , then the value of AD is

A. 6 cm

B.  $6\sqrt{3}cm$

C. 4 cm



D.  $4\sqrt{3}cm$

**Answer:**

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**12.** A man goes 9 m due east and then 40 m due north. How far is he from the starting point?

A. 35 m

B. 39 m

C. 41 m

D. 45 m

**Answer: C**

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13. A ladder 25 m long reaches a window of a building 20 m above the ground. Determine the distance of the foot of the ladder from the building.

A. 10 m

B. 12 m

C. 15 m

D. 18 m

**Answer: C**

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14. In  $\triangle PQR$ ,  $\angle PQR = 90^\circ$  and  $segQS \perp$  hypotnuse  
PR,-P-S-R,then

A.  $PR^2 = PQ \times PR$

B.  $QS^2 = PS \times SR$

C.  $PR^2 = PS \times SR$

D.  $QS^2 = PQ \times QR$

**Answer:**



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15. In  $\triangle ABC$ ,  $\angle B = 90^\circ$ ,  $BD \perp AC$ ,  $A - D - C$ . If  
CD=2 cm and AD=8cm then BD is equal to

A. 2 cm

B. 4 cm

C. 6 cm

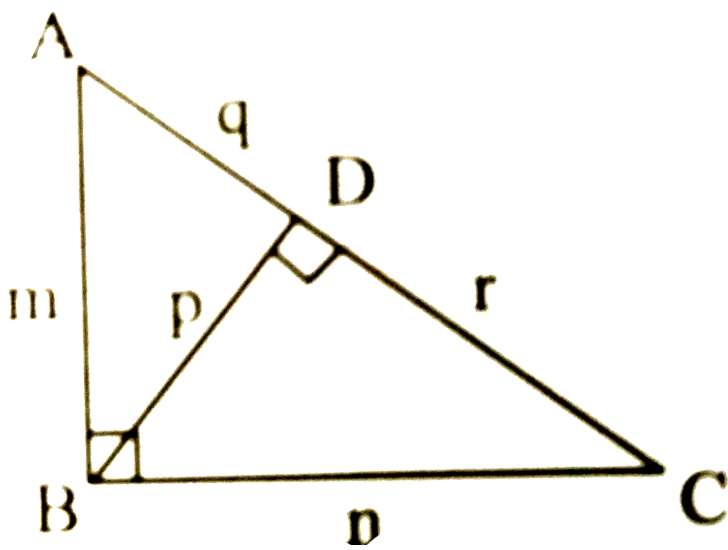
D. 8 cm

**Answer:**



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**16.** for the figure given below , which of the following relations is corret ?



A.  $P^2 = qr$

B.  $m^2 + n^2 = q^2 + r^2$

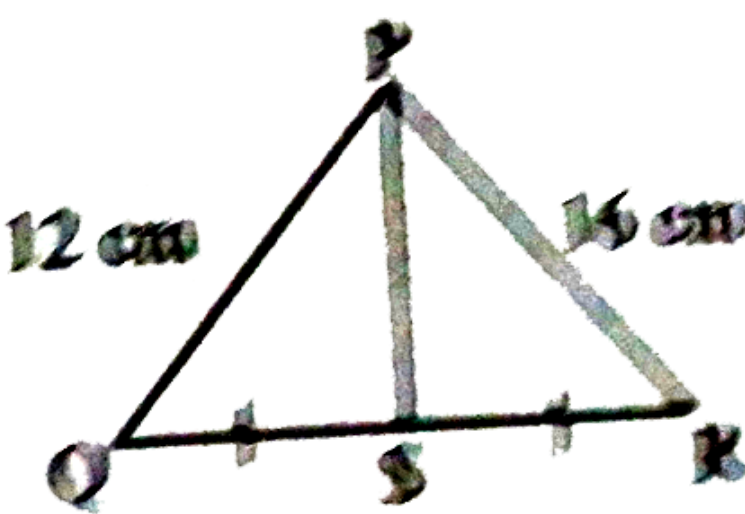
C.  $p^2 = q^2 + r^2$

D.  $p^2 = mn$

**Answer:**

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17. In  $\triangle PQR$ ,  $PS$  is the median. If  $PQ=12$  cm,  $PR=16$  cm  
 $PS=10$  cm, then  $QR=$  .....



- A. 10 cm
- B.  $20\sqrt{2}$  cm
- C. 20 cm
- D.  $10\sqrt{2}$  cm

**Answer:**

18. In  $\triangle ABC$ ,  $CD$  is the median. If  $AC^2 + BC^2 = 290$  and  $CD = 9$  then  $AD =$

A. 6

B. 7

C. 8

D. 9

**Answer:**

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1. Identify the Pythagorean triplets from the following:

i. (15,10,35)

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2. Identify the Pythagorean triplets from the following:

ii. (28,45,53)

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3. Identify the Pythagorean triplets from the following:

iii. (10,10,20)

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4. Identify the Pythagorean triplets from the following:

iv. (16,63,65)

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5. Identify the Pythagorean triplets from the following:

v. (20,21,29)

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6. Identify the Pythagorean triplets from the following:

vi. (9,20,21)

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7. See the given figure. In  $\triangle ABC$ ,  $\angle B = 90^\circ$ ,  $\angle A = 30^\circ$ ,  $AC = 14$ , then find  $AB$  and  $BC$ .

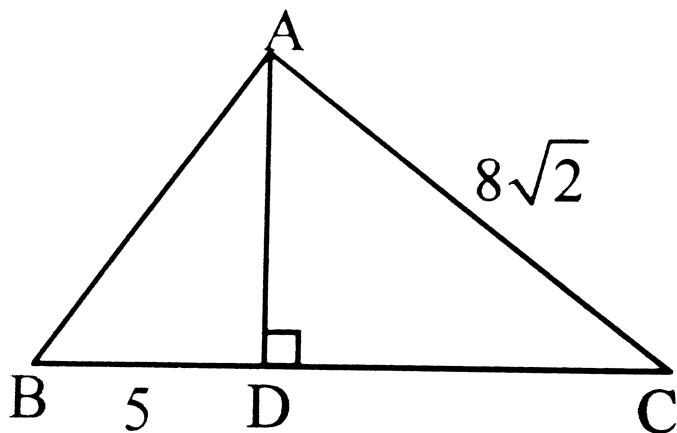
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8. In  $\triangle PQR$ ,  $\angle P = 30^\circ$ ,  $\angle Q = 60^\circ$ ,  $\angle R = 90^\circ$  and  $PQ = 12\text{cm}$ , then find  $PR$  and  $QR$ .

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9. See the given figure, In  $\triangle ABC$ , seg  $AD \perp$  seg  $BC$ ,  $\angle C = 45^\circ$ ,  $BD = 5$  and  $AC = 8\sqrt{2}$ ,

find AD and BC.



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10. Find the length of the altitude of an equilateral triangle with side 6 cm.

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11. In the given figure,

$$\angle PQR = 90^\circ, \text{ seg } QN \perp \text{ seg } PR, PN = 9, NR = 16$$

.Find QN.

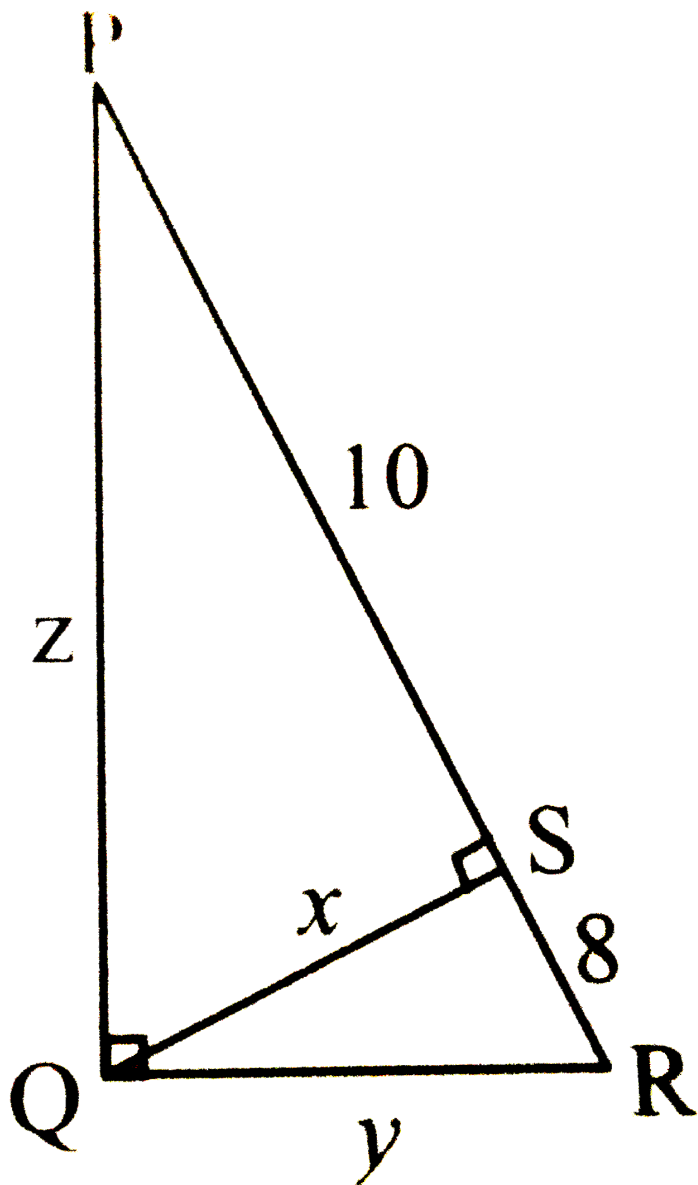


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12. See the given figure. In

$\Delta PQR$ ,  $\angle PQR = 90^\circ$ ,  $\text{seg } QS \perp \text{ seg } PR$ , then

find  $x, y, z$ .

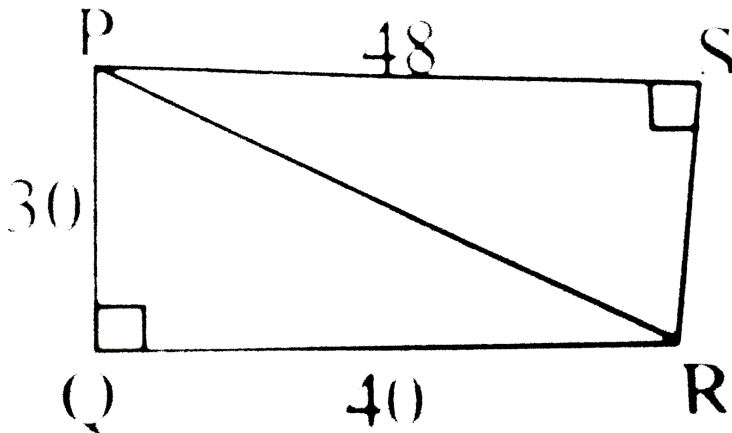


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13. In the right angled triangle, sides making right angle are 9cm and 12cm . Find the length of the hypotenuse.

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14. In the adjoining figure, if  $\angle PQR = 90^\circ$ ,  $\angle PSR = 90^\circ$ , then find PR and RS.



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15. Find the diagonal of a square whose side is 10 cm.

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16. Find the side of a square whose diagonal is  $16\sqrt{2}cm$ .

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17. In  $\triangle LMN$ ,  $l = 5$ ,  $m = 13$ ,  $n = 12$ . State whether  $\triangle LMN$  is a right angled triangle or not.

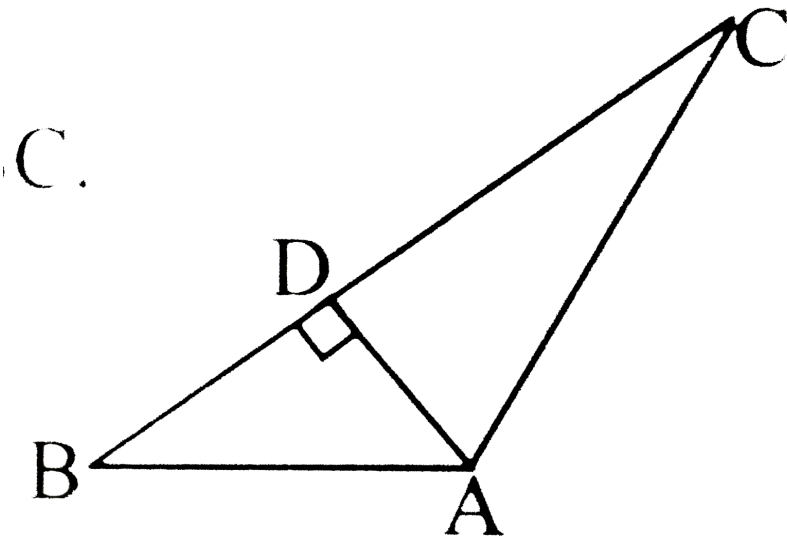
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18. A ladder 10m long reaches a window 8 m above the ground. Find the distance of the foot of the ladder from base of the wall.

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19. See the given figure. In  $\triangle ABC$ , seg  $AD \perp$  seg  $BC$ . Prove that:

$$AB^2 + CD^2 = BD^2 + AC^2$$







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20. In  $\triangle ABC$ ,  $\angle C = 90^\circ$ . If  $BC=a$ ,  $CA=b$ ,  $AB=c$  and the length of the altitude from vertex  $C$  on side  $AB$  is  $p$ , then

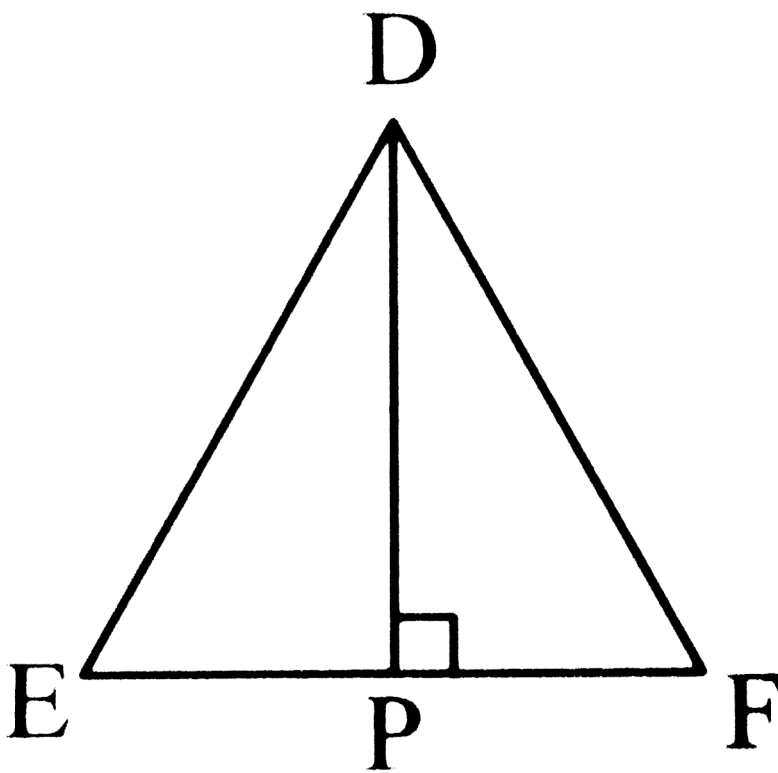
show that i.  $cp=ab$  ii.  $\frac{1}{(p)^2} = \frac{1}{(a)^2} + \frac{1}{(b)^2}$



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21.  $\triangle DEF$  is an equilateral triangle. Seg

$DP \perp$  side  $EF$ , and  $E-P-F$ . Prove that:  $DP^2 = 3EP^2$



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22. Prove that three times the square of any side of an equilateral-triangle is equal to four times the square of the altitude.

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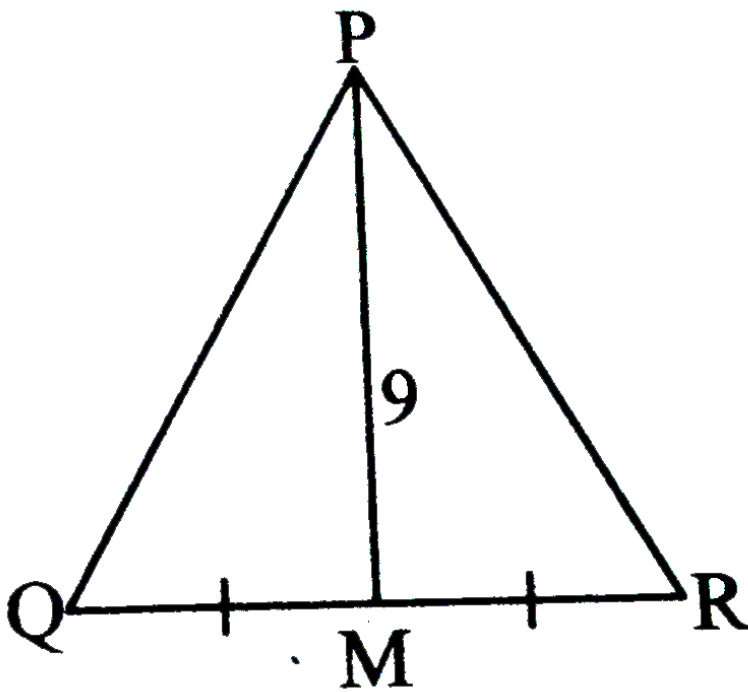
23. In an isosceles triangle  $PQR$ ,  $PQ = PR$  and  $S$  is any point on side  $QR$ . Then prove that:  $PQ^2 - PS^2 = QS \times SR$ .



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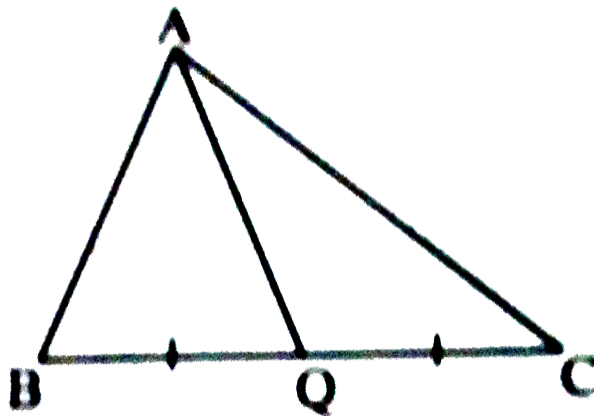
## Additional Problems For Practice Based On The Practice Set 2 2

1. In the given figure, seg  $PM$  is a median of  $\triangle PQR$ .  $PM = 9$  and  $PQ^2 + PR^2 = 290$ , then find  $QR$ .



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2. In the figure below, if  $AB^2 + AC^2 = 122$ ,  $BC = 10\text{cm}$ , then find the length of median drawn to side BC.



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3. In  $\triangle ABC$ ,  $\angle ABC = 90^\circ$ ,  $AB = 12$ ,  $BC = 16$  and seg  $BP$  is the median drawn to side  $AC$ . Find the length of seg  $BP$ .

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4. Adjacent sides of a parallelogram are 11 cm and 17 cm. If the length of one of its diagonal is 26 cm, find the length of the other.

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

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**Chapter Assessment**

1. Which of the following triplets will not form a right angled triangle?

A. (5,12,13)

B. (8,15,17)

C. (20,10,11)

D. (0,40,41)

**Answer:**



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2. In  $\Delta PQR$ ,  $\angle Q = 30^\circ$ ,  $\angle R = 90^\circ$  and the length of the hypotenuse is 20 cm. What will be length of QR?

A. 10cm

B.  $10\sqrt{3}cm$

C.  $10\sqrt{2}cm$

D.  $5\sqrt{2}cm$

**Answer:**



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**3.** If the length of the diagonal of a square is 16 cm, then its perimeter will be

A. 32cm

B.  $32\sqrt{2}cm$



C. 64cm

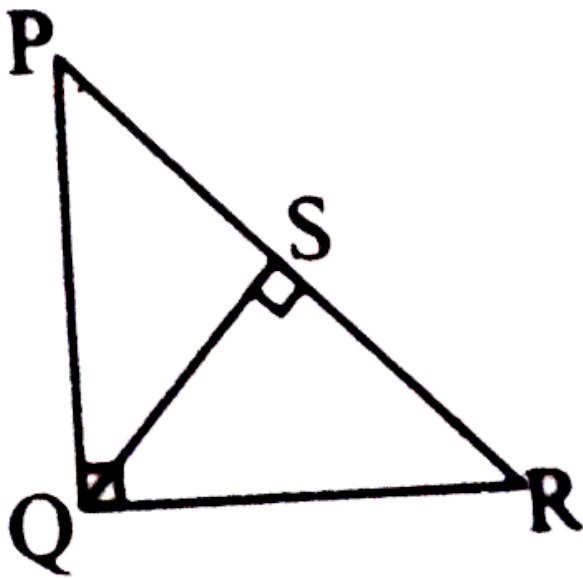
D.  $64\sqrt{2}cm$

**Answer:**



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4. In  $\Delta PQR$ ,  $\angle Q = 90^\circ$  and  $QS \perp PR$ . If  $PS=32cm$ ,  $SR=8cm$ , then  $QS=$



A. 8cm

B.  $2\sqrt{10}cm$

C. 16cm

D. 40cm

**Answer:**

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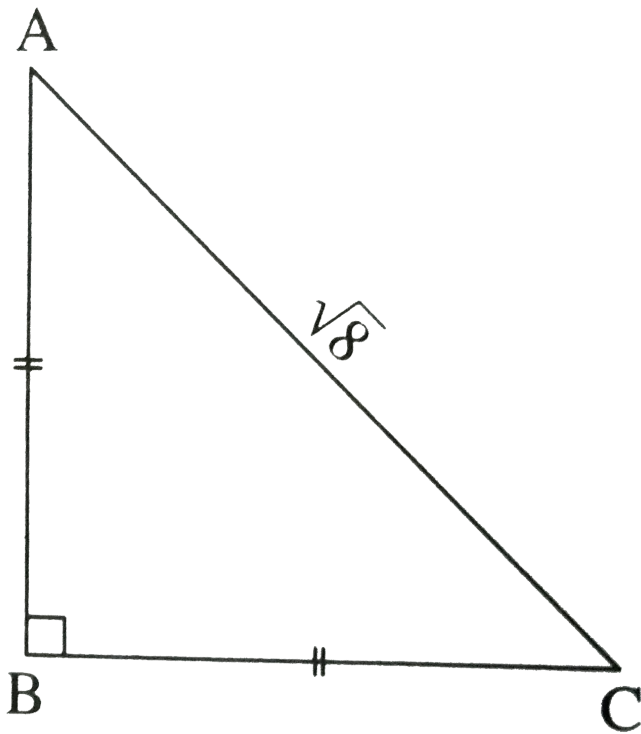
5. Find the diagonal of rectangle having length and breadth 12cm and 8cm respectively.

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6. In  $\Delta ABC$ ,  $AP$  is a median. If  $AP = 7$ ,  $AB^2 + AC^2 = 260$ , then find  $BC$ .

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7. For finding  $AB$  and  $BC$  with the help of information given in figure , complete following activity :



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8. A 50 m long ladder reaches a window 14 m above the ground. Find the distance of the foot of the ladder from the base of the wall.

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9. Find the side of a square whose diagonal is 10 cm.

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10. The height of an equilateral triangle having each side 12 cm, is

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11. Prove that, in a right-angled triangle, the square of hypotenuse is equal to the sum of the square of remaining two sides.





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12.  $\triangle ABC$  is an equilateral triangle. Point P is on base BC such that  $PC = \frac{1}{3}BC$ , if  $AB = 6$  cm find AP.



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13. In the adjoining figure,

$\angle DFE = 90^\circ$ ,  $FG \perp ED$ . If  $GD = 8$ ,  $FG = 12$ , find

(i) EG

(ii) FD, and

(iii) EF



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14. The length of one side of a parallelogram is 17 cm. If the length of its diagonals are 12 cm and 26 cm, then find the length of the other sides of the parallelogram.

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15.  $ABC$  is a triangle in which  $AB = AC$  and  $D$  is any point in  $BC$ . Prove that  $AB^2 - AD^2 = BD \cdot CD$ .

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16. If  $a$  and  $b$  are natural numbers and  $a > b$ , then show that  $(a^2 + b^2)$ ,  $(a^2 - b^2)$ ,  $(2ab)$  is a Pythagorean triplet. Find two Pythagorean triplets using any convenient values of  $a$  and  $b$ .



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