



## MATHS

### BOOKS - CHETAN MATHS (TAMIL ENGLISH)

#### PYTHAGORAS THEOREM

##### Practice Set 2 1

1. In the adjoining figure,  $\angle QPR = 90^\circ$ ,  $\text{seg}PM \perp$  hypotenuse QR, Q - M - R. If PM = 10, QM = 8 then find QR.

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

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3. Length and breadth of a rectangle are 35 cm and 12 cm respectively.

Find length of its diagonal.



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4. In the adjoining figure,

$\angle DFE = 90^\circ$ ,  $FG \perp ED$  if  $GD = 8$ ,  $FG = 12$  then find (i) EG (ii) FD

(iii) EF.



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5. Walls of two buildings on either side of a street are parallel to each other. A ladder 5.8 m long is placed on the street such that its top just reaches the window of a building at the height of 4 m. On turning the ladder over to the other side of the street, its top touches the window of

the other building at a height 4.2 m. Find the width of the street.



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6. In adjoining figure, find RP and PS using the information given in  $\triangle PSR$  find RP and PS.



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7. In the adjoining figure, M is the midpoint of  $QR$ .  $\angle PRQ = 90^\circ$  prove that  $PQ^2 = 4PM^2 - 3PR^2$



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8. Which of the following are pythagorean triplets justify.

3, 5, 4



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9. Which of the following are pythagorean triplets justify.

4,9,12



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10. Which of the following are pythagorean triplets justify.

5,12,13



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11. Which of the following are pythagorean triplets justify.

10,24,27





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12. Which of the following are pythagorean triplets justify.

24,70,74



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13. Which of the following are pythagorean triplets justify.

11,60,61



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## Pratice Set 2 1

1. For finding AB and BC with the help of information in adjoining figure, complete the following activity,  $AB=BC$ .....  $\therefore \angle BAC=$ .....  $\therefore AB=BC=$ ..... $\times AC$

$=$ ..... $\times 8 =$ ..... $\times 2 \times 2 =$ .....

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## Practice Set 2 2

1. In  $\Delta PQR$  seg  $PS$  is median of  $\Delta PQR$ . And  $PT \perp QR$ ,

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



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2. In  $\Delta PQR$  seg  $PS$  is median of  $\Delta PQR$ . And  $PT \perp QR$ ,

$$(ii) PQ^2 = PS^2 - QR \times ST + \left(\frac{QR}{2}\right)^2$$



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3. In adjoining figure, point  $T$  is in the interior of rectangle  $PQRS$ . Prove that,  $TS^2 + TQ^2 = TP^2 + TR^2$





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## Practice Set 2 2

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



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



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## Practive Set 2 2

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

(i) In  $\triangle ABC$ , seg  $CM$  is a median (ii)  $AB = 10$ ,  $AC = 7$ ,  $BC = 9$



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## Problem Set 2

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

(i)  $\triangle ABC$  is an equilateral triangle.

$AB = 2a$



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2. Do sides 7cm, 24 cm, 25 cm form a right angled triangle ? Give reason.



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3. Find the length a diagonal of a rectangle having side 11 cm and 60 cm.

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4. Find the length of the hypotenuse of a right angled triangle if remaining sides are 9 cm and 12 cm.

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5. A side of and isocoles 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 angle ?  
If yes which angle is of  $90^\circ$  ?

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7. In  $\triangle RST$ ,  $\angle S = 90^\circ$ ,  $\angle T = 30^\circ$ ,  $RT = 12$  cm. Find  $RS$  and  $ST$ .



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

$\square ABCD$  is a rectangle (ii)  $AB = 16$  cm (iii)  $A(\square ABC) = 192 \text{sq. cm}$



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

(i)  $\triangle ABC$  is an equilateral triangle.

(ii)  $\text{seg } AM \perp \text{side } BC, B - M - C$

(iii)  $AM = \sqrt{3}$  cm



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10.

In

$\Delta ABC$ , seg  $AP$  is a median. If  $BC = 18$ ,  $AB^2 + AC^2 = 260$  find  $AP$ .

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11.  $\Delta ABC$  is an equilateral triangle. Point  $P$  is on base  $BC$  such that

$PC = \frac{1}{3}BC$ , if  $AB = 6$  cm, find  $AP$ .

$\Delta ABC$  is an equilateral

(ii)  $AB = 6$  cm

$PC = \frac{1}{3}BC$

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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 squares of the diagonals of a parallelogram is equal to the sum of the squares of its sides.



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14. Pranali and Prased 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  $\triangle ABC$  prove that  $4(BL^2 + CM^2) = 5BC^2$



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16. Sum of squares of adjacent sides of a parallelogram is  $130\text{cm}^2$  and length of one of its diagonal is 14 cm. Find length of the other diagonal.

(i)  $\square ABCD$  is a parallelogram

(ii)  $AB^2 + BC^2 = 130\text{cm}^2$

(iii)  $AC = 14$  cm



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17. In  $\triangle ABC$ ,  $\text{seg}AD \perp \text{seg}BC$ ,  $DB = 3CD$ . Prove that:

$$2AB^2 = 2AC^2 + BC^2$$



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18. In an isosceles triangle, length of each congruent side is 13 cm and length of the base is 10 cm. Find the distance between vertex opposite to base and centroid.



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19. In trapezium ABCD, seg AB  $\parallel$  seg DC. Seg  $BD \perp$  seg AD, seg  $AC \perp$  seg BC. If AD = 15, BC = 15 and AB = 25, then find  $A(\square ABCD)$

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20. 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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21. Seg Pm is a median of  $\Delta PQR$ . If  $PQ = 40$ ,  $PR = 42$  and  $PM = 29$ , find QR.

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



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## Problem Set 2 Mcq

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: C::D**



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

A. 15

B. 13

C. 5

D. 12

**Answer: A::C**



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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. 03 / 05 / 17



D. 04/09/15

**Answer: A**



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

- A. Obtuse angled triangle
- B. Acute angled triangle
- C. Right angled triangle
- D. Equilateral triangle

**Answer: A::D**



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

A. 10 cm

B.  $40\sqrt{2}$

C. 20 cm

D. 40 cm

**Answer: C::D**



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6. Altitude on the hypotenuse of a right angle 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. 18 cm

**Answer: C**



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7. Height and base of a right angled triangle are 24 cm and 18 cm, find the length of its hypotenus.

A. 24 cm

B. 30 cm

C. 15 cm

D. 18 cm

**Answer: C**



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8.

In

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

A.  $30^\circ$

B.  $60^\circ$

C.  $90^\circ$

D.  $45^\circ$

**Answer: C**



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### Additional Mcq S

1. In  $\triangle RST$ ,  $\angle s = 90^\circ$ ,  $RT = 12m$ ,  $ST = 8$  m then  $RS =$

A.  $10\sqrt{8}m$

B.  $5\sqrt{4}m$

C.  $4\sqrt{5}m$

D. 5 m

Answer: D



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2.

In

$\Delta PQR$ ,  $\angle PQR = 90^\circ$ ,  $\text{seg}QM \perp \text{hyp}PR$ ,  $PM = 16$  and  $RM = 9$  then  $QM =$ ...

A. 12

B. 25

C. 7

D.  $16 \times 9$

Answer: A::B



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3. In  $\Delta ABC$ ,  $\angle B = 90^\circ$ ,  $\angle C = 30^\circ$ ,  $AB = 6\text{cm}$  then  $AC = \dots$

A.  $3\sqrt{3}cm$

B.  $4\sqrt{3}cm$

C.  $12\sqrt{3}cm$

D. 12 cm

**Answer: A::B::C**



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4. In  $\Delta PQR$ ,  $\angle Q = 90^\circ$ ,  $PQ = QR = 5\sqrt{2}PR = 10$  then  $\angle P \dots \dots$

A.  $30^\circ$

B.  $45^\circ$

C.  $60^\circ$

D. Data not sufficient

**Answer: D**



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5. Which of the following is a pythagorean triplet?

A. 60,61,11

B. 40,41,42

C. 11,12,15

D. 9,15,17

**Answer: A**



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6. In  $\triangle QSR$ ,  $m\angle Q = 45^\circ$ ,  $m\angle S = 90^\circ$  and  $SR = 4$  find  $QS$

A. 3

B. 4

C. 5

D. 6

**Answer: B**



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7. Apollonius theorem is a theorem relating the length of ..... Of a triangle.

A. Altitude

B. Angle bisector

C. Perpendicular bisector

D. Median and sides

**Answer: A::D**



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8. In the adjoining figure,  $AB^2 + AC^2 = 122$ ,  $BC = 10$ , then find AQ.....



- A. 3
- B. 6
- C. 12
- D. 36

**Answer:**



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9. In  $\triangle PQR$ ,  $m\angle PQR = 90^\circ$ ,  $segQS \perp hypPR$  then

- A.  $QS^2 = PS \times RS$
- B.  $PS^2 = QS \times PR$
- C.  $PR^2 = QS \times PS$
- D.  $PR^2 = QS^2 \times PS^2$

**Answer: B**



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**10.** In which of the following quadrilateral sum of squares of all sides is equal to the sum of squares of diagonals?

A. Parallelogram

B. Rhombus

C. Square

D. (A), (B) and (c )

**Answer: A::B::C::D**



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**Problems For Practice**

1.

In

$\triangle XYZ$ ,  $\angle y = 90^\circ$ ,  $\angle Z = a^\circ$ ,  $\angle x = (a + 30^\circ)$ . If  $XZ = 24$  find  $XY$  and  $YZ$ .



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2.

In

the

adjoining

figure,

$\angle L = \angle MNK = 90^\circ$ ,  $\angle MKL = 30^\circ$  and  $\angle MNK = 45^\circ$ . If  $KL = 6\sqrt{3}$ ,



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3. Sides of triangles are given below. Determine which of the them are right angled triangle.

(i) 8, 15, 17 (ii) 20,30,40

(iii) 11,12,15 (iv) 20 ,16 ,12



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

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5. E is a point on hypotenuse DF of  $\triangle DFH$ , such that seg  $HE \perp \text{seg}DF$ ,  $\text{seg}EG \perp \text{seg}FH$  and  $\text{seg}EK \perp \text{seg}DH$  prove that,

(i)  $EG^2 = FG \times EK$

(ii)  $EK^2 = DK \times EG$



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6. In adjoining figure, seg AD bot side BC, B-D-C. Prove that

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



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7. In the adjoining figure,

$\angle PQR = 90^\circ$  seg  $QS \perp$  side  $PR$ ,  $PS = 4$ ,  $PQ = 6$ . Find  $x, y$  and  $z$ .



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8.

$\triangle DEF$  is an equilateral triangle. Seg  $DP \perp$  side  $EF$ .  $E - P - F$ . Prove that



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9.

$\triangle PQR$  is an equilateral triangle, seg  $PM \perp$  side  $QR$ ,  $Q - M - R$ . Prove that



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10. In the adjoining figure, seg

$BD \perp$  side  $AC$ ,  $C - D - A$ . Prove that:  $AB^2 = BC^2 + AC^2 - BC \cdot AC$



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11. In

$\triangle PQR$ ,  $M$  is the midpoint of side  $QR$ . If  $PQ = 11$ ,  $PR = 17$  and  $QR = 12$  then

.



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



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13. In  $\triangle ABC$ ,  $AB^2 + AC^2 = 122$  and  $BC = 10$  Find the length of the median on side  $BC$ .



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



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15. If 'O' is any point in the interior of rectangle ABCD, then prove that :

$$OB^2 + OD^2 = OA^2 + OC^2$$



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16. In the adjoining figure ,  $\Delta PQR$  is an equilateral triangle.  $QR = RN$  .

Prove that  $PN^2 = 3PR^2$



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17. In the adjoining figure,  $\angle PQR = 90^\circ$   $T$  is the midpoint of side  $QR$ .

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



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## Assignment 2

1. Solve the following sub questions:

Is 28,21 and 35 a pythagorean triplet?



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2. Solve the following sub questions:

in  $\Delta PQR$ , angle  $PQR = 90^\circ$  "seg"  $QS$  bot "hypotenuse"  $PR$ ,  $PS = 16$ ,  $RS =$

9 "find"  $QS$



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3. Solve any one of the following questions :

In  $\triangle ADC$ ,  $\angle ADC = 90^\circ$ ,  $\angle C = 45^\circ$ ,  $AC = 8\sqrt{2} \text{ cm}$ . Find  $AD$ .



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4.

In  $\triangle XYZ$ ,  $\angle y = 90^\circ$ ,  $\angle Z = a^\circ$ ,  $\angle X = (a + 30)^\circ$  find  $\angle x$



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5. Solve the any one of following sub questions:

In

$\triangle PQR$ , seg  $PM$  is a median  $PM = 10$  and  $PQ^2 + PR^2 = 328$  then find  $QR$



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6. Solve the any one of following sub questions:

If  $m$  and  $n$  are two distinct numbers then prove that  $m^2 - n^2$ ,  $2mn$  and  $m^2 + n^2$  is a pythagorean triplet.



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7. Solve the following sub question :

in the adjoining figure, seg  $PS$  is side  $QR$ . If  $PQ = a$ ,  $PR = b$ ,  $QS = c$  and  $RS = d$  then complete the following activity to prove that  $(a + b)(a - b) = (c + d)(c - d)$

Proof: In  $\triangle PSQ$ ,  $\angle PSQ = 90^\circ$

$$PQ^2 = PS^2 + QS^2$$

$$PS^2 = PQ^2 - QS^2$$

In  $\triangle PSR$ ,  $\angle PSR = 90^\circ$

$$PR^2 = PS^2 + RS^2$$

$$PS^2 = PR^2 - RS^2 = a^2 - d^2$$

$$a^2 - c^2 = b^2 - d^2$$

$$a^2 - b^2 = C^2 - d^2$$

$$\square \times \square = \square \times \square$$

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8. Solve the following sub question

in

$\triangle ABD$ ,  $\angle BAD = 90^\circ$  seg  $AC \perp$  hypo  $BD$ ,  $B - C - D$  show  $\hat{i} AB^2 = BC \cdot$



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### Assignment 3

1. Solve the following sub questions :

State and prove 'Pythagoras theorem'

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## Assignment 4

1. Solve the following sub questions:

In

$\Delta ABC$ ,  $\angle ACB = 90^\circ$  seg  $CD \perp$  side  $AB$ ,  $A - D - B$  seg  $DE \perp$  side  $AC$ .



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## Assignment 5

1. Solve the following sub question :

In an equilateral triangle  $ABC$ , the side  $BC$  is trisected at  $D$ . prove that

$$9AD^2 = 7AB^2$$



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