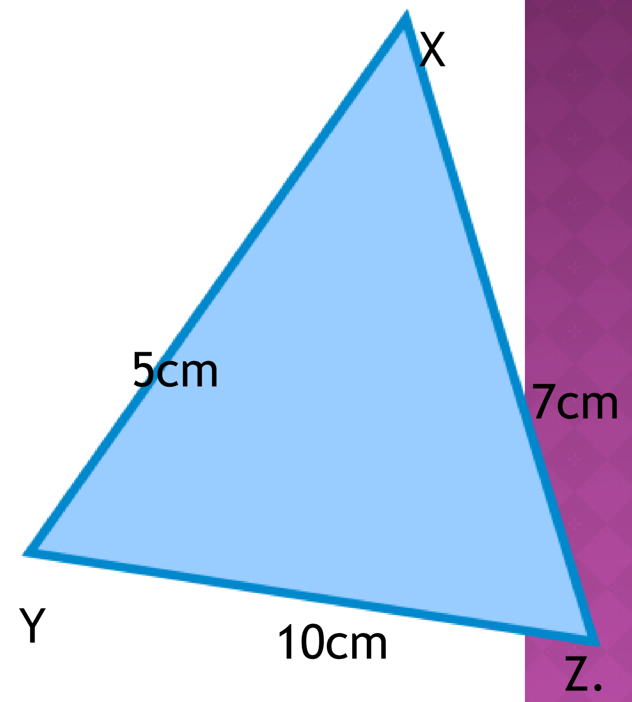
PROPERTIES OF TRIANGLES

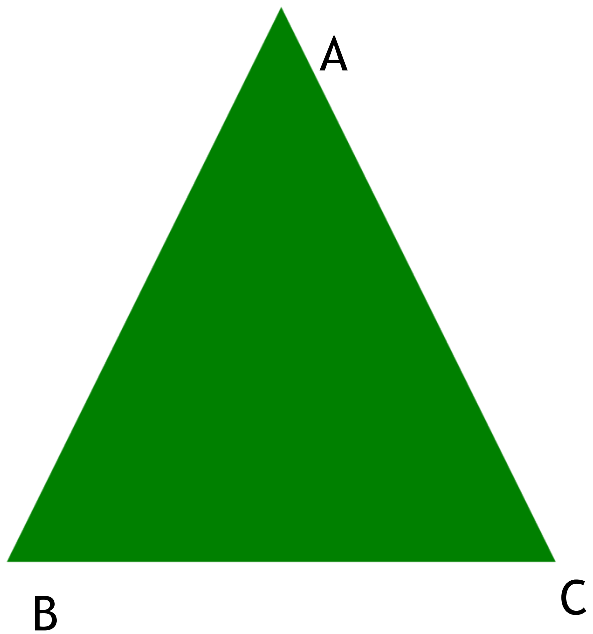
THE SUM OF TWO SIDES OF A TRIANGLE IS ALWAYS GREATER THAN THE THIRD SIDE.

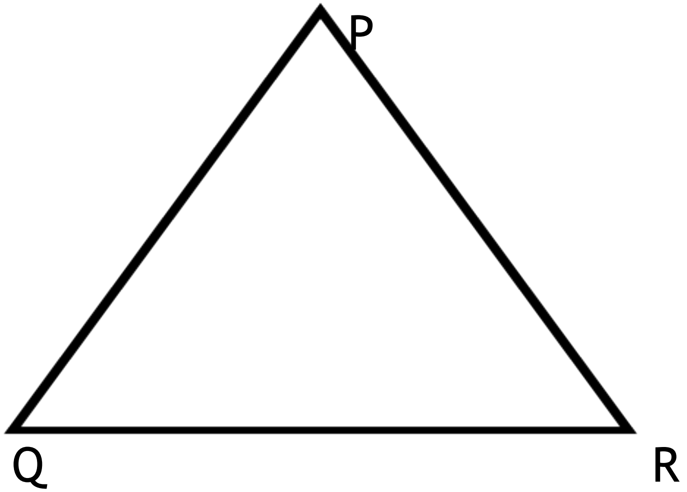
- In the adjacent figure, the three sides are XY,YZ and ZX.
- The lengths of the sides are given 5cm,7cm and 10cm.
- If you add the sides pair wise, you can see the sum is always greater than the third side.



CONTINUED:-

- 5cm + 7cm = 12cm >10cm
- 7cm + 10cm = 17cm >5cm
- 5cm + 10cm = 15cm > 7cm.



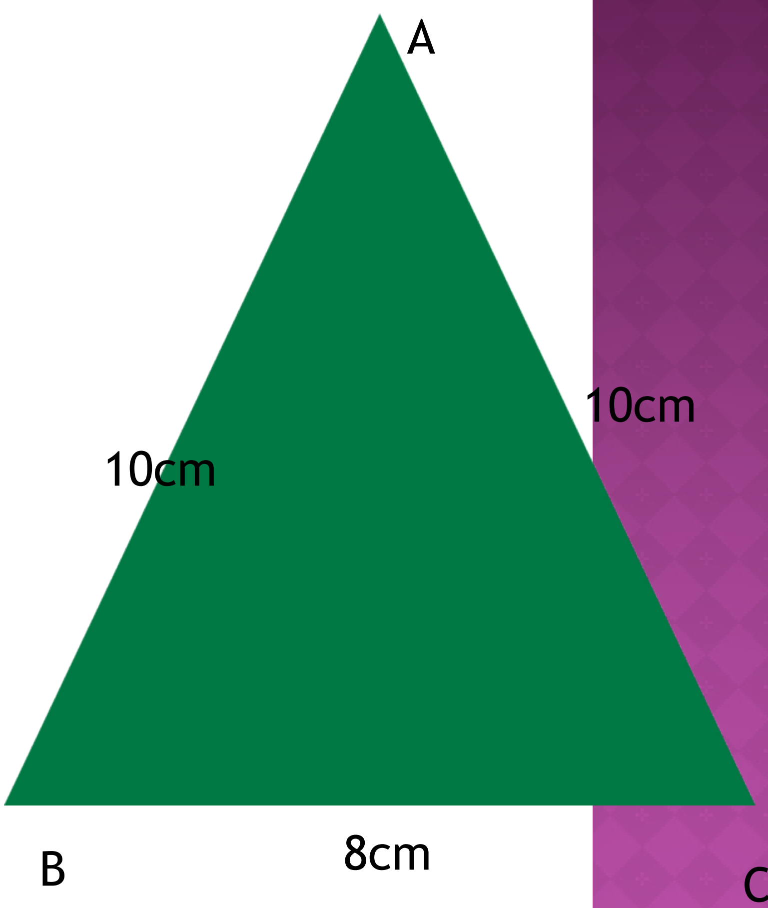


ACTIVITY 1:-

- In the previous slide, two triangles ABC, and PQR are given,
- Measure the length of the sides .
- Find the sum of the sides pair wise and verify the statement “the sum of two sides of a triangle is always greater than the third side.”

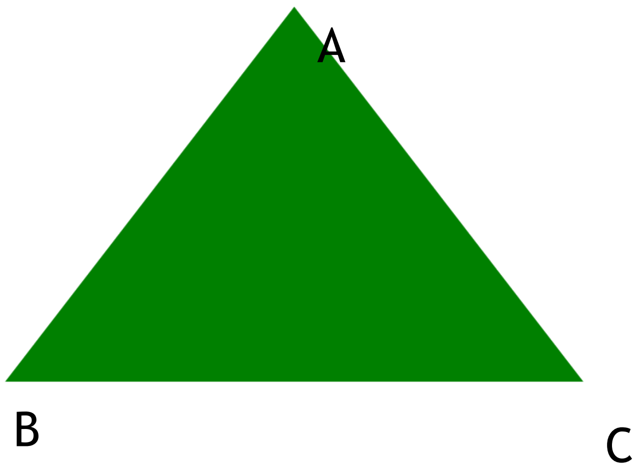
THE DIFFERENCE OF TWO SIDES OF A TRIANGLE IS ALWAYS LESS THAN THE THIRD SIDE.

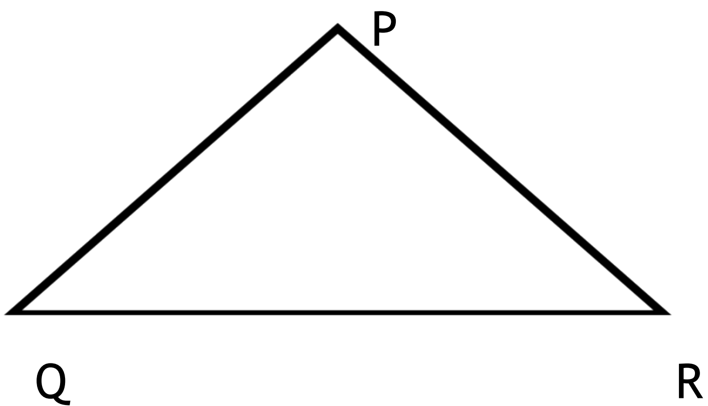
- In the adjacent figure, a triangle ABC is given.
- The lengths of the sides are 10cm,10cm and 8cm.
- If you find the difference of the lengths pair wise , you can notice that the difference is always less than the third side.



CONTINUED:-

- Differences are as follows:-
- AB – AC =10cm – 10cm = 0cm < 8cm(BC)
- AB – BC = 10cm – 8cm = 2cm < 10cm(AC)
- AC – BC = 10cm – 8 cm = 2cm < 10cm(AB)



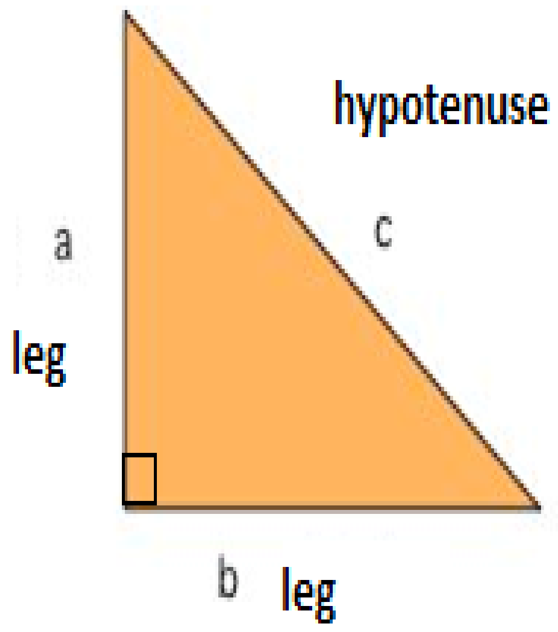


ACTIVITY 2:-

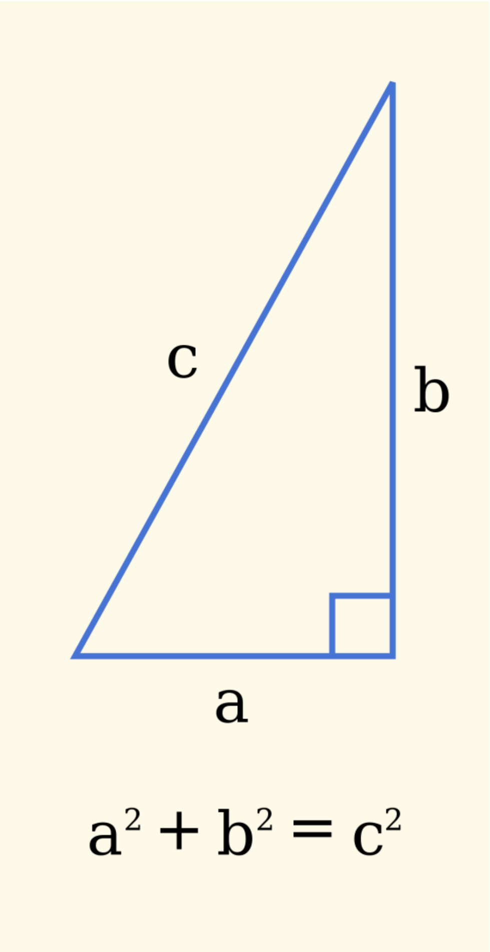
- In the previous slide , two triangles ABC and PQR are given .
- Measure the length of the sides.
- Find out the differences of the sides pair wise.
- Verify the statement “The difference of two sides of a triangle is always less than the third side.”

RIGHT ANGLED TRIANGLE

- The adjacent figure is representing a right angled triangle.
- The longest side is the hypotenuse.
- The two other sides are forming the right angle, usually they are called the legs of the right angle in the triangle.



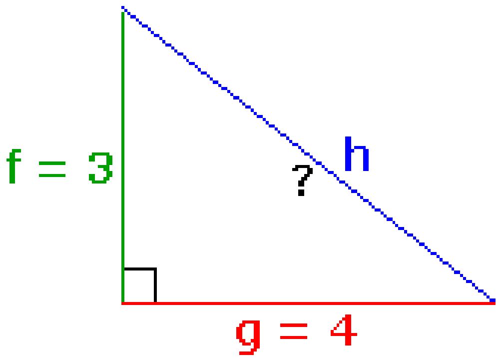
PYTHAGORAS THEOREM



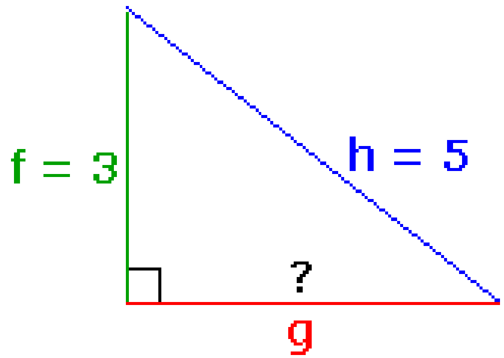
- In a right – angled triangle , the sum of the square of two smaller sides is always equal to the square of the hypotenuse.
- Here, c is the hypotenuse, thus

$$a^2+b^2=c^2$$

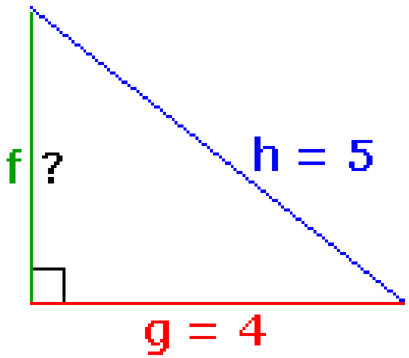
SOME ILLUSTRATIVE EXAMPLES



$$h^2 = f^2 + g^2$$
$$h^2 = (3)^2 + (4)^2$$
$$h^2 = 9 + 16$$
$$h^2 = 25$$
$$h = 5$$

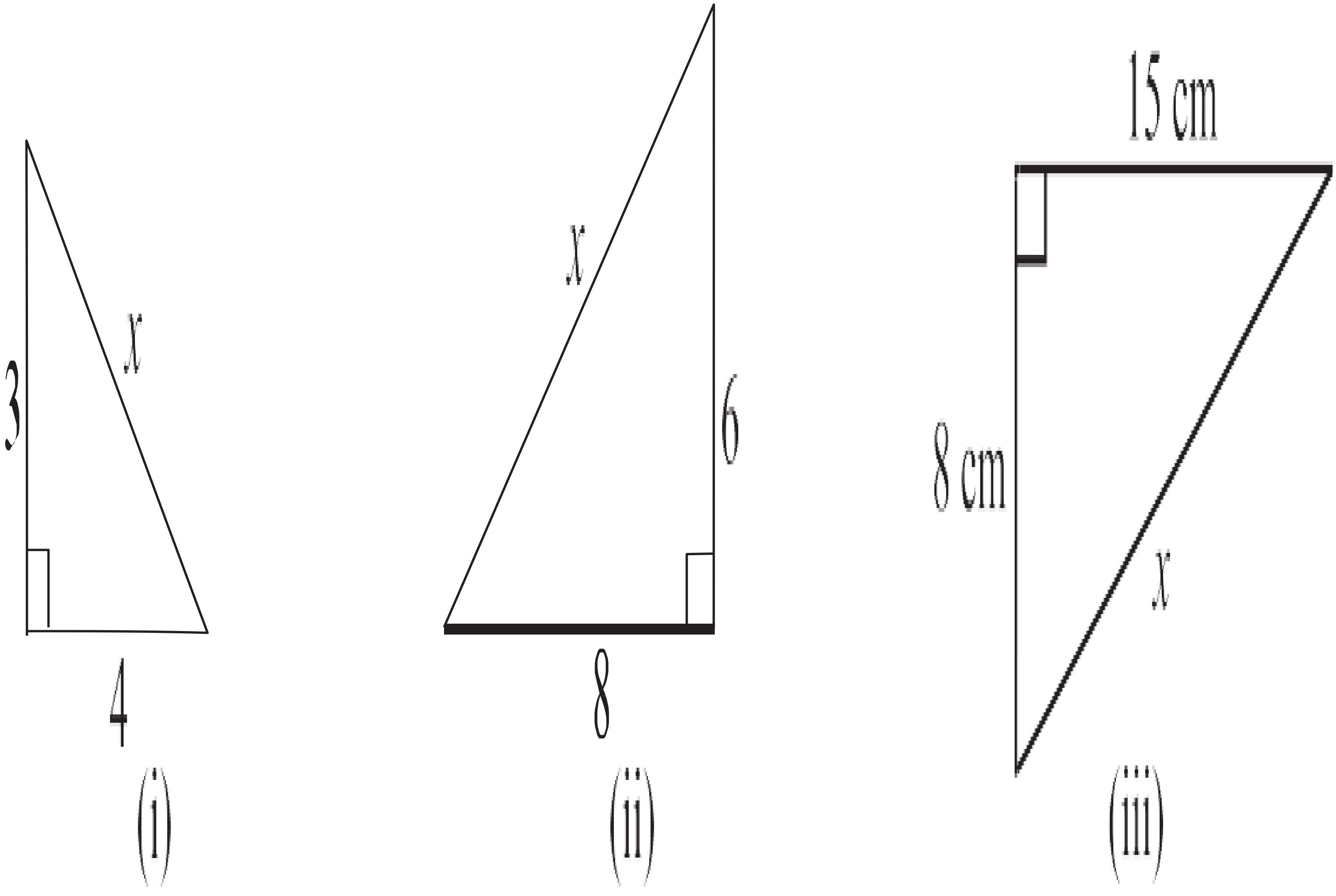


$$h^2 = f^2 + g^2$$
$$g^2 = h^2 - f^2$$
$$g^2 = (5)^2 - (3)^2$$
$$g^2 = 25 - 9$$
$$g^2 = 16$$
$$g = 4$$

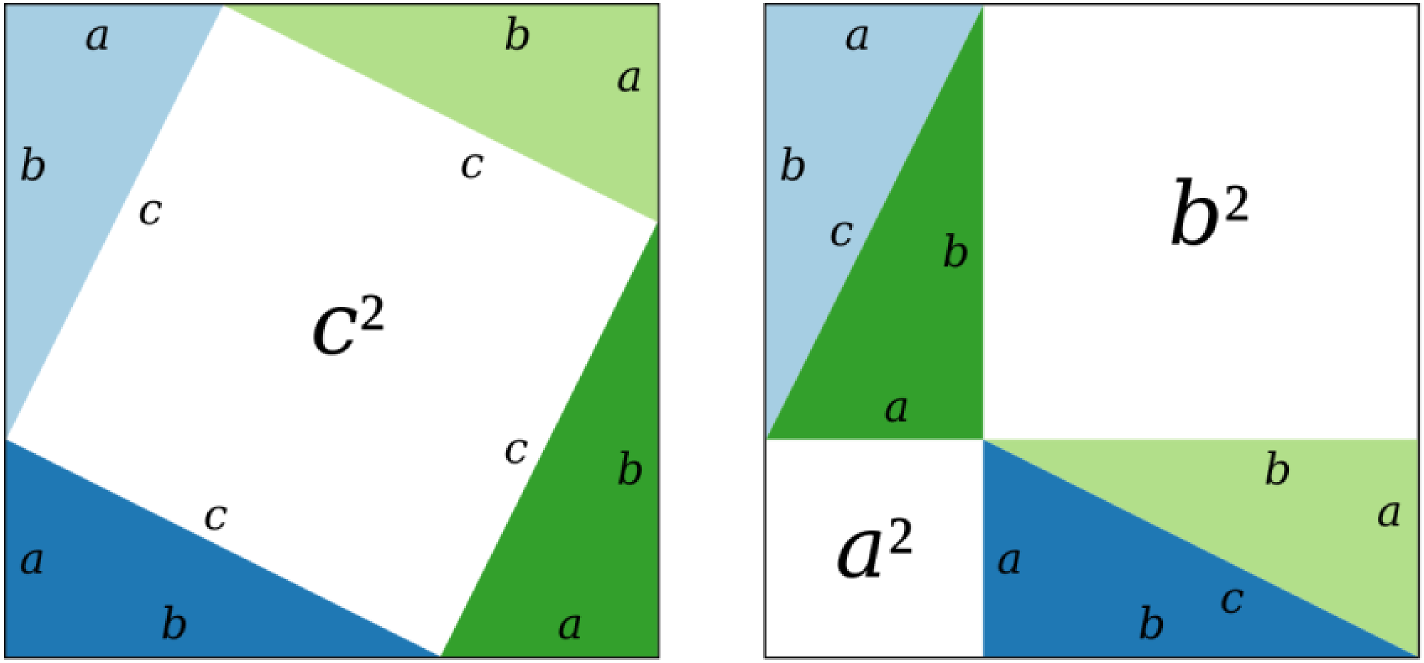


$$h^2 = f^2 + g^2$$
$$f^2 = h^2 - g^2$$
$$f^2 = (5)^2 - (4)^2$$
$$f^2 = 25 - 16$$
$$f^2 = 9$$
$$f = 3$$

FIND OUT THE LENGTH OF UNKNOWN SIDES IN THE FOLLOWING FIGURE.



GEOMETRICAL PROOF:-



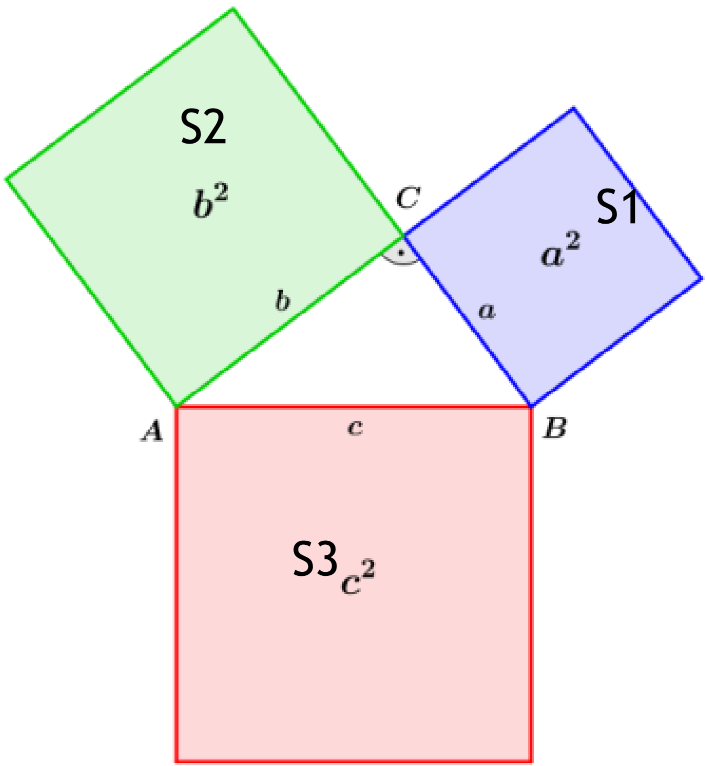
$$c^2 = a^2 + b^2$$

JUSTIFICATION:-

- 1.Draw a right angled triangle with legs ‘a’ , ‘b’ and hypotenuse ‘c.’
  2. Draw two square of side (a+b).
  3. Draw three squares of sides ‘a’ , ‘b’ and ‘c’ respectively.
  4. Arrange the pieces according to above arrangement.

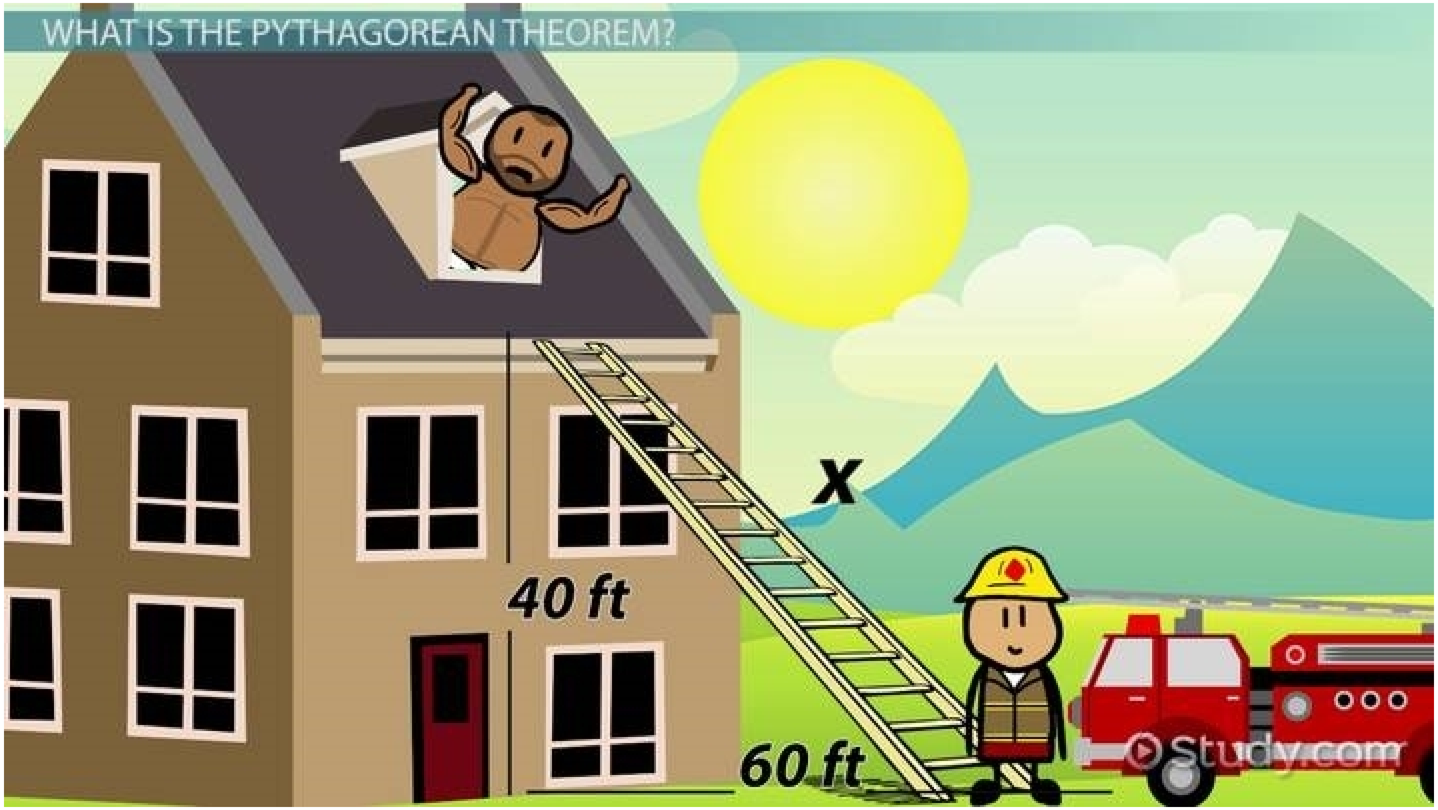
- **5. In the first square, the area is representing a square and four right angled triangle having sides 'a' and 'b'. the area is = c^2 + 4 X ½ ab**
- **6. In the second arrangement, the area is representing two squares of sides 'a' and 'b' respectively along with two rectangles of sides 'a' and 'b'.**
  The area is= $a^2 + b^2$ + 2X ab
  7. Thus, c^2 + 2ab = $a^2 + b^2 +$ 2ab(From the results of point 5 &6).
- **since 2ab is on both sides , we can subtract it from both sides)**
- $c^2 = a^2 + b^2$

PYTHAGORAS THEOREM



- Geometrical meaning:-
- If you draw three squares taking the sides a,b,and c.(Let S1,S2 and S3).
- You will find that the S1 and S2 together occupy the surface which is equal to the area of S3.

USES OF PHYTHAGORAS THEOREM



Uses in Everyday Life

<u>You can use the Pythagorean Theorem to:</u>

1.) Find the answers about the baseball diamond.

Ex. How far does a catcher have to throw the ball to get from home plate to second base?

2.) The theorem could determine what kind of ladder would you need when you need to get to your roof.

3.) You could use it to determine the difference between people (height, weight, and age)

4.) Also, you could use the theorem to find the differences from two different places.


THANK YOU