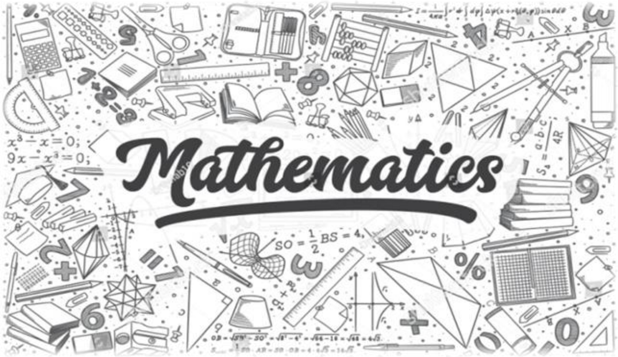
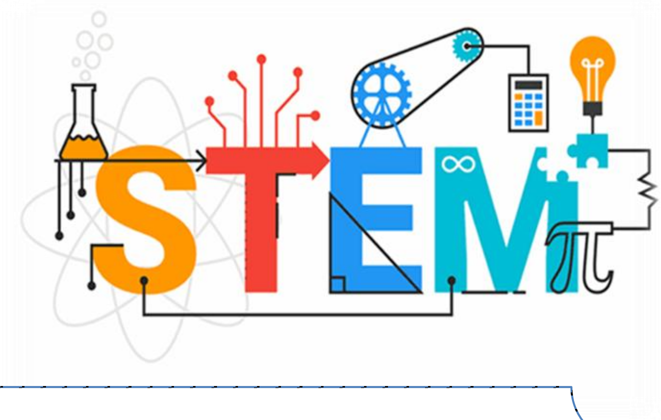



# TWGHs Lo Kon Ting Memorial College
# Mathematics
# STEM Education

## S2 Chapter 8
## Pythagoras' Theorem
## Junior Mathematician

Name:________________________________

Class:_________________________ (___________)__

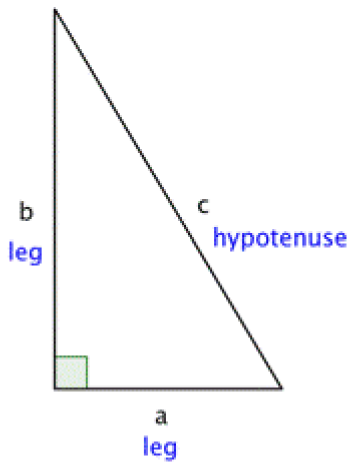
Group:_______________________________

# Contents

# Interesting Trivia: Pythagoras' Theorem used in Architecture

**Figure 1 Clifton Suspension Bridge in South West England**

## Pythagoras' Theorem used in Architecture




Pythagoras' Theorem: $a^2 + b^2 = c^2$

**Figure 2 Parts of a right-angled triangle**

Pythagoras' Theorem is an equation that many architects use while designing famous buildings. This theorem states that "In a right-angled triangle, the sum of the squares of the lengths of the legs equals the square of the length of the hypotenuse."

If an architect is building a square structure, he or she can split the square into two triangles. They can then easily figure out the length of the third side when the architect knows those of the other two sides.

Life is made easier for architect in terms of determining measures of different side lengths with using the Pythagoras' Theorem.

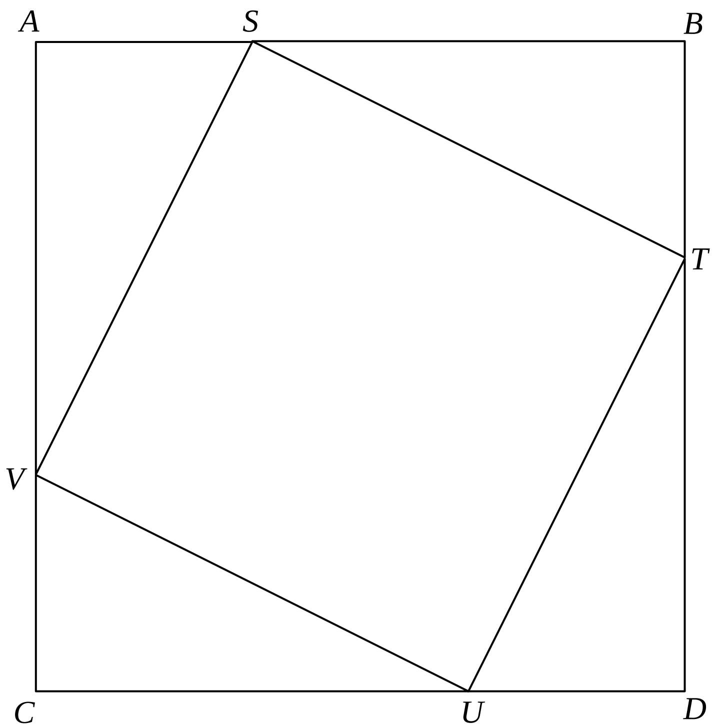
## <u>A. Tips</u>


Pay attention to the tips below during the process:

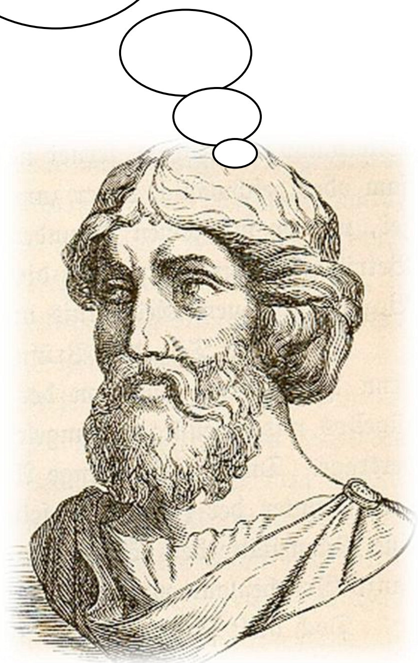
- Use a ruler and a pencil to construct the graph;
- Be careful with the naming of corresponding congruent triangles;

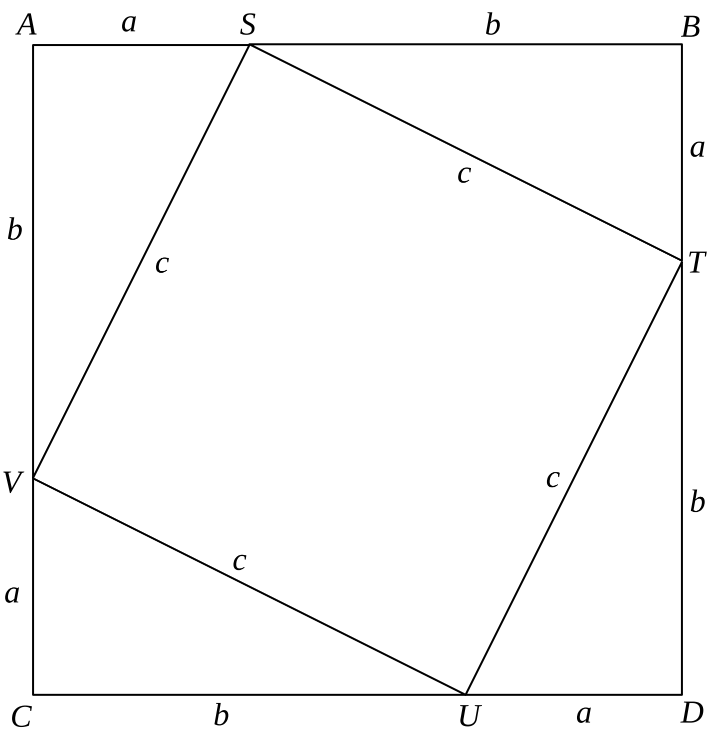
## Mission：Be a junior mathematician and develop the Pythagoras' Theorem by YOURSELF

## <u>B. Instruction of developing Pythagoras' Theorem</u>



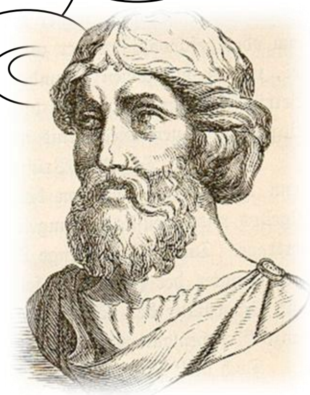

**<u>Step 1</u>**
Construct an inner square *STUV* as shown, in which
$AS = BT = UD = VC$ ;
$VA = BS = DT = CU$ ;
and $VS = ST = UT = UV$.






**Step 2**

Let the length of $AS$ be $a$,
i.e. $AS = BT = UD = VC = a$
Let the length of $VA$ be $b$,
i.e. $VA = BS = DT = CU = b$
Let the length of $VS$ be $c$,
i.e. $VS = ST = UT = UV = c$



## C. Discussion

1. Provide the reason for proving that $\Delta VAS \cong \Delta SBT \cong \Delta TCU \cong \Delta UDV$.

Ans: $\Delta VAS \cong \Delta SBT$ ( )

$\Delta SBT \cong \Delta TCU$ ( )

$\Delta TCU \cong \Delta UDV$ ( )

$\Delta TCU \cong \Delta UDV$ ( )

2. Find the area of $\Delta VAS$, $\Delta SBT$, $\Delta TCU$ and $\Delta UDV$ in terms of $a$ and $b$ respectively.

Ans: Area of the $\Delta VAS$ = Area of the $\Delta UDV$ =

Area of the $\Delta SBT$ = Area of the $\Delta TCU$ =

3. Find the area of the inner square *STUV* in terms of *c*.

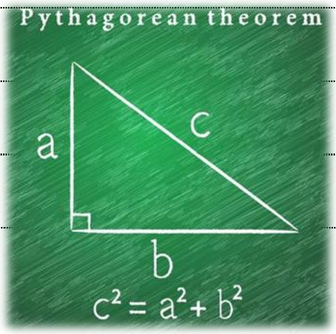
Ans: Area of the inner square *STUV*=

4. What is the relationship between the area of square *ABCD*, $\Delta VAS$, $\Delta SBT$, $\Delta TCU$, $\Delta UDV$ and inner square *STUV*? (Hints: find the relationship in terms of *a*, *b* and *c*.)

Ans: Area of the square *ABCD* =

$(a+b)^2 =$

From the above induction, you know how the Pythagoras' Theorem is proved!!



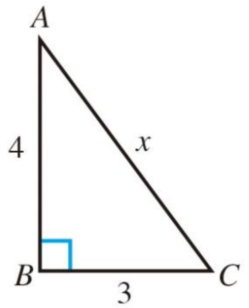
## D. Consolidation

1. According to the previous activity, what is the required condition if you want to use Pythagoras' Theorem? (Hints: Which the type of triangle $\Delta VAS$, $\Delta SBT$, $\Delta TCU$ and $\Delta UDV$ are?)

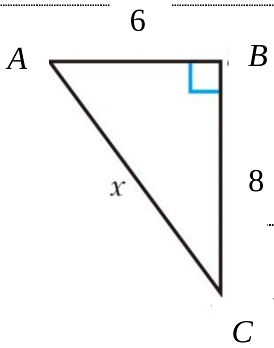
Ans: Pythagoras' Theorem can only be used with triangle.

Find the unknown in each of the following triangles.

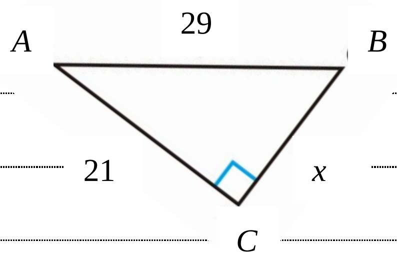
2.



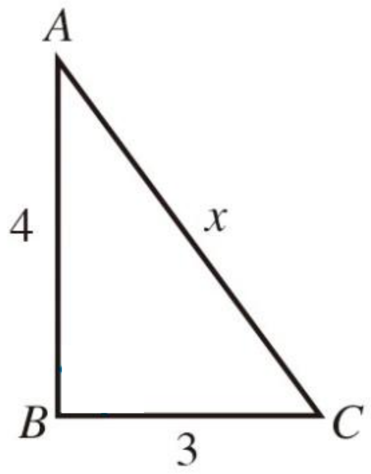

3.




4.



## E. Thinking Time




In $\Delta ABC$, Keanu claims that "$x$ MUST be 5."

Do you agree? Why? or why not?