**Chapter 1 : Pythagoras theorem**

Note : The longest side of the triangle is called the "hypotenuse".

Theorem : In a right-angled triangle : the square of the hypotenuse is equal to the sum of the squares of the other two sides.

**Why Is This Useful?**

If we know the lengths of two sides of a right-angled triangle, we can find the length of the third side. (But remember it only works on right-angled triangles!)

**How Do I Use It ?**

* **Example 1 :** In this right-angled triangle ABC, find the length of AC !

**12**

**C**

**B**

**?**

**5**

**?**

**?**

**A**

B

Start with : AC² = AB² + BC²

Put in what we know : AC² = 5² + 12²

Calculate square : AC² = 25 + 144

AC² = 169

Square roots of both sides :

Calculate : AC = 13

* **Example 2 :** In this right-angled triangle MLK, find the length of ML !

**K**

**?**

15

9

**?**

**M**

**L**

Start with : KM² = LM² + KL²

Put in what we know : 15² = LM² + 9²

Calculate square : 225 = LM² + 81

Subtract 81 LM² = 225 – 81 so LM² = 144

Square roots of both sides :

Calculate : LM = 12

**In The Other Way ?**

It works the other way around, too: when the three sides of a triangle make a2 + b2 = c2, then the triangle is right angled.

* **Example 3 :** Does this triangle have a right angle?

**?**

**U**

**26**

**10**

**Does OU² = OP² + UP² ?**

**O**

**P**

**24**

On the one hand : OU² = 26² = 676

On the other hand : OP² + UP² = 24² + 10²   
 = 576 + 100  
 = 676

So **OU² = OP² + UP²**

They are equal, so this triangle has a right angle !

* **Example 4 :** Does an 8, 15, 16 triangle have a right angle?

**?**

On the one hand : 16² = 256

On the other hand : 8² + 15² = 64 + 225  
 = 289

So, and

No, this triangle does not has a right angle !

C