

### **Question *Acceptable proof of Pythagoras***

*Please find a PDF attached, which shows two different methods for proving Pythagoras' Theorem. Are both methods acceptable at Junior Cert higher level? And if not, which one is not acceptable and why is it not acceptable? Thanking you in advance.*

### **Answer**

When the selection of theorems for post-primary maths was being made, the ordering of the theorems was deliberate. The syllabus says that, when it comes to formal proof of any theorem, axioms or theorems which come later in the logical sequence cannot be used to establish its proof. The particular issue of an 'area' proof for the Theorem of Pythagoras (theorem 14) is a case in point. The definition of area of a triangle (Defn 38, in Section 6.10) follows Theorem 16 which established that base times height for a triangle does not depend on the choice of base. This follows both Theorem 14 and its converse and so arises later in the sequence as set out in the syllabus.

The syllabus has been set out so that the order of proofs encourages the development of logical thinking. Therefore proofs should be based on the preceding theorems, so a proof for Pythagoras is one which draws on similar triangles (theorems 11, 12, 13 lay the foundations for the proof of Pythagoras's theorem), the first in the attached pdf which you sent.

Kind Regards,

### **Question *Acceptable Proofs required for examination***

*In relation to the proofs of theorems at JC and LC higher level, I am wondering if the proofs given in the Geometry for Post Primary Mathematics section of the syllabus are the only acceptable versions?*

### **Answer**

The geometry course is based on what's called "level 2", the semi-formal level as opposed to level 1 which is the fully rigorous level. The syllabus has been set out so that the order of proofs encourages the development of logical thinking. Therefore any proofs should be based on the preceding theorems

As outlined on page 42, no proof should be allowed at level 2 that uses axioms or theorems that come later in the logical sequence.

### **Question Proofs for examination**

*I am confused as to which theorems on the JC Higher Maths Course (Exam 2013) students may be required to prove.*

*The syllabus mentions nos. 4,6,9,14 and 19.*

*However there is a reference also to 11,12,13 and 19 (in bold print) as being examinable.*

### **Answer**

Students at **JCHL** are expected to study the proofs of theorems 1,2,3,4,5,6,9,10,11,12,13,14,15,19 but they may be examined on the formal proofs of theorems 4,6,9,14,19. (You'll see this in the Geometry Course section on page 81.)

In other words at higher level they should be familiar with the proofs of the other theorems 11,12, 13 and be able to apply the knowledge of these theorems where necessary. It is envisaged that students would engage with the proof of the theorems in class, they should be able to follow the proofs and understand them and use the results to solve problems but the only proofs examinable are at **HL** and are the ones mentioned above.