Maths Points

Junior and Leaving Cert

FORMAL GEOMETRY PROOFS

Leaving Cert Higher level

Geometry: Formal Proofs of Theorems – Table of Contents

Leaving Cert Theorems

Theorem 11
If three parallel lines cut off equal segments on some transversal line, then they will cut off equal segments on any other transversal.

Theorem 12
Let ΔABC be a triangle. If a line l is parallel to BC and cuts [AB] in the ratio s:t, then it also cuts [AC] in the same ratio.

Theorem 13
If two triangles ΔABC and ΔA' B' C' are similar, then their sides are proportional, in order.

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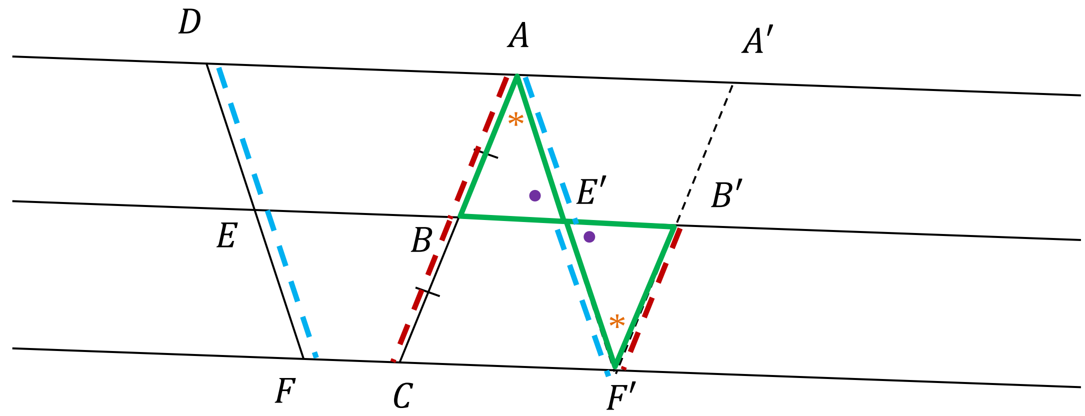
Syllabus Wording:

Students will study all the theorems and corollaries prescribed for LCOL, but will not, in general, be asked to reproduce their proofs in examination.
However, they may be asked to give proofs of the Theorems 11, 12, 13, concerning ratios, which lay the proper foundation for the proof of Pythagoras studied at JC.

Theorem 11 – If three parallel lines cut off equal segments on some transversal line, then they will cut off equal segments on any other transversal.

Diagram:



Given:

$AD \parallel BE \parallel CF$, as in the diagram, with $|AB| = |BC|$

To Prove:

$|DE| = |EF|$

Construction:

Draw $AE' || DE$, cutting EB at E' and CF at F'

Draw $F'B' || AB$, cutting EB at B', as in the diagram.

Exact wording of the 2015 Marking Scheme

Proof:

$|B'F'| = |BC|$

$= |AB|$ By Assumption

$|\angle BAE'| = |\angle E'F'B'|$

$|\angle AE'B| = |\angle F'E'B'|$

$\therefore$ $\Delta ABE'$ is congruent to $\Delta F'B'E'$

Therefore $|AE'| = |F'E'|$.

But $|AE'| = |DE|$ and $|F'E'| = |FE|$

$\therefore |DE| = |EF|$

Opposite sides in a parallelogram (Theorem 9)

* Alternate Angles (Theorem 3)

• Vertically Opposite Angles (Theorem 1)

$\Delta \nabla$ ASA (Axiom 4)

Opposite sides in a parallelogram (Theorem 9)

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