# Mathematics SL / HL : Exploration

| Name: | Date set: |
|---|---|
| **Stimulus/Title: Example 2: Euler's totient theorem** | **Date submitted:** |

The following points could be useful to consider.

- Syllabus topics covered

- Background information

- Purpose of the task

- Previous exposure to relevant concepts/skills

- Previous exposure to relevant terminology

- Available technology

- Teacher expectations regarding technology

**General comments**

**Background information from the teacher:**

**"The student is a further mathematician and as such has been taught the 'Discrete' and 'Sets, relations and groups' options. He is therefore familiar with the language of modular arithmetic and had encountered Fermat's little theorem in class. The proof of this theorem, although not required in the syllabus, was set as a homework. In his research of this, he also encountered Euler's totient theorem. He then asked to do a pure mathematics exploration. He absolutely did understand everything he wrote. If only all students were like him!"**

**The teacher's comment provides evidence that the student was personally engaged in the exploration and explains why some of the terms were not fully defined, as they were fully understood by the student and his class, which was his intended audience.**

**A Communication (4)**

A3—The work is concise, as it proves the conjecture in fewer than seven pages. It fulfills the aims, is well organized and complete. The exploration would benefit from more complete explanations (refer to page 7 annotation).

**B Mathematical presentation (3)**

B3—Condone use of "N" rather than "n" in the table on page 4. The class was familiar with the modular arithmetic, so definitions were not needed.

**C Personal engagement (4)**

C2—There was evidence of sufficient personal interest to award a level 2.

**D Reflection (3)**

D2—It links areas of maths. There is reflection on the elegance of the mathematics (page 7).

**E Use of mathematics (6)**

E6—It is commensurate with the level of the course, precise and demonstrates thorough knowledge, insight, sophistication and the rigour expected for mathematics HL.