

MATHEMATICAL EXPLANATION AS A MEANS TO UNDERSTANDING

ELLEN LEHET, UNIVERSITY OF NOTRE DAME (PH.D. CANDIDATE)

ABSTRACT

In this talk I will make two main points. First I will argue that understanding is the aim of mathematics. That is, understanding is of utmost importance for mathematical progress and development. This has become apparent with the development of mathematics in the past century. In his well-known paper, “Proof and Progress in Mathematics”, William Thurston says the following of mathematical practice: “what we are doing is finding ways for people to understand and think about mathematics”. This remark clearly suggests that understanding plays an important role in mathematical practice, but the remark is somewhat enigmatic in that it does not make clear how or why understanding is so important for mathematics. My goal will be to unpack this claim in order to give a more precise account of the importance of understanding. The general idea is that the elusive nature of mathematical concepts and entities makes gaining familiarity with these concepts and entities of utmost importance for mathematical development and progress. My account of *mathematical understanding* consists of familiarity with mathematical concepts and entities. Then insofar as familiarity with mathematical objects is necessary for mathematical progress and development, mathematical understanding is important for mathematical progress and development.

The second point I will make is about the relationship between understanding and explanation. In particular, I will argue that an account of mathematical explanation should be

informed by the the importance of understanding for mathematics. That is, I accept the view that there is a close relationship between understanding and explanation, and moreover think that the important role of understanding in mathematics should inform our account of mathematical explanation. If this condition is satisfied then a mathematical explanation will produce or at least promote mathematical understanding. So, on my picture explanation will play a significant role in achieving the aim of mathematics — i.e., in obtaining understanding.

In the process of making these two points, I will provide an account of mathematical understanding, defend the close relationship between understanding and explanation, and identify some of the important features of a mathematical explanation. The hope is that by the end of the talk I have made a convincing case for the importance of understanding for mathematical development and progress and also provided an account of how explanations contribute to the aim of understanding. Thus, I will provide a picture of how mathematical explanation can be thought of as a means of obtaining mathematical understanding.