

is that imagination which delights the mind with conceptions of harmony and beauty. These have an important bearing on morals. They purify and ennoble the mind, taking away the gross and the base, and enriching the mental life with faith, hope and love. A person who can recognize and appreciate beauty wherever found is not capable of acting contrary to his ideals of right. If then mathematical study brings the individual into contact with beauty, it fulfils one of the highest functions of education. This it does in various ways. There is beauty in the truths which form the subject matter of the science, whether we observe "the subtle harmonies and affinities of number and magnitude," or regard the symmetrical development of truth from a few fundamental principles, or consider the applications of them to the explanation of physical phenomena. From a few self-evident truths mathematics has developed an instrument whereby the planets may be measured and weighed, the orbit of a comet may be traced, or still more wonderful and beautiful, the motions of the particles may be determined in that invisible, intangible and imponderable medium of the transmission of light. There is beauty in the grandeur and universality of mathematical truth. There are few main principles but on these depend an almost infinite variety and complexity of details. Besides the intrinsic beauty of the objects, there is beauty in the harmony of the laws obeyed by the tiniest rain-drop that helps to form a rainbow, or by the torrent of Niagara. These laws by revealing the intention of the Creator with respect to the material universe, make known to us the Divine power, wisdom and goodness. There is beauty in the simplicity of the primary principles which the Divine will has followed in creation. And finally the effort to see truth has a beauty all its own. There is beauty in the exercise of the understanding, and

any mathematical formula does nothing less than express an operation of the understanding. There is a rare beauty in seeing from the beginning to the end, in knowing from top to bottom, and through and through, for that is how Deity sees and knows.

Thus we have tried to show that by a similarity to ethics in its mode of development, by training the mind in the discernment of analogies, by the inculcation of liberality, by affording mental discipline, and by the cultivation of the intellectual side of imagination, mathematics gives a preparation for the formation of ethical ideas, and develops to a high degree the power of putting these into practice. Further, by pointing out the beauties of nature with which the mind is brought into direct contact, along with the higher beauty of the truths of which nature, including man, is but the outward exemplification, we have indicated that mathematics has a direct influence on that form of imagination which gives rise to emotional and æsthetic life. That is, the study of mathematics gives discipline and an appreciation of beauty. And discipline and beauty are the chief, if not the only factors of culture. The essential ideal in mathematics is physical and æsthetic truth, and nothing more noble and elevated can occupy the human intelligence. By its contemplation the mind is brought into reunion with it, and is prepared thereby to enjoy the sublime truth and beauty of a higher existence. For such reasons I maintain that the study of mathematics fulfils the highest end of all education which, in the eloquent words of Sir James Mackintosh, "is to inspire the love of truth, of wisdom, of beauty—especially of goodness, the highest beauty—and of that supreme and eternal Mind which contains all truth and wisdom, all beauty and goodness. By the love, or delightful contemplation and pursuit of these transcendent aims,