My dear Lady Lovelace

I have made some additional notes on your papers.

[diagram in original] The meaning of $\frac{a}{\sin \theta}$ is as follows

$\theta : 1$ and $1 : \sin \theta$ compounded

give it in arithmetic

In fact $\frac{a}{b}$ in arithmetic is another way of writing $a : b$.

In geometry $AB : AO$ is $\theta : 1$

and $AO$ or $OB : BM$ is $\sin \theta$

The compounded ratio is that of $AB : BM$

which approaches without limit to the ratio of 1 to 1 as $AB$ is diminished

Your notion of the ratio approximating to unity is correct. The term ‘ratio approximating to $a$’ is a mixture of the geometrical and arithmetical mode of speaking, it should be ‘ratio approximating to $a : 1$.

I think you have got over the difficulty of that part of the subject.

I was sorry to have been out when Lord Lovelace called, and could not get down to St James’ Square till you had gone. With best remembrances I am

Yours very truly

A De Morgan