Example Project Work:

Here the students are asked to prove that $a^r a^s = a^{r+s}$ for integers r, s. In this example, the students do one line of the proof at a time, with a new step on each line. This is the final product of what the group ends up with, but the students have already discussed each of the steps below on the discussion board.

1) **Prover: Maria Perez**	**Explainer: Sean Woods**
$a^r a^s = \underbrace{(a \cdots a)}_{r \text{ times}} \cdot \underbrace{(a \cdots a)}_{s \text{ times}}$	*a^r means that we should multiply r −many a's together and a^s means that we should multiply s −many a's together.*
$= \underbrace{a \cdots a}_{(r+s) \text{times}}$	*We can remove the parentheses because everything on the right side is multiplication - with multiplication, the way we group things does not change the outcome. In addition, r −many a's and s −many a's being multiplied together means that we are multiplying a total of $(r+s)$ −many a's together.*
$= a^{r+s}$	*A product of of $(r+s)$ −many a's is just the power a^{r+s}.*

Some examples of posts on the group discussion board that were used to revise this problem and write the final version above:

Original first step by the prover, Maria Perez:

$$a^r a^s = (a \cdots a) \cdot (a \cdots a)$$

Comment on this work by another group member:

I suggest that we rewrite the first Prover step in problem 1) here to show that a is being multiplied r times on the left and s times on the right, like this:

$$a^r a^s = \underbrace{(a \cdots a)}_{r \text{ times}} \cdot \underbrace{(a \cdots a)}_{s \text{ times}}$$

Original first explanation made by the explainer, Sean Woods, on the second step of the problem:

We can remove the parentheses because everything on the right side is multiplication - with multiplication, the way we group things does not change the outcome.

Comment on this work by another group member:

I suggest adding the following sentence to the end of the explanation in step two of problem 1), to make it clearer and provide more detail:

In addition, r −many a's and s −many a's being multiplied together means that we are multiplying a total of $(r+s)$ −many a's together.