

$$\begin{array}{c}
(\approx? [\mathbf{ab}]) \Big| \\
\langle \{\}, \{X, Y, Z\}, id, \{[b]f_n^C \langle X, Y \rangle, Z\} \approx? \langle [b]f_n^C \langle \bar{b}, (ab).X \rangle, (ab).Z \rangle, a \#? \langle [a]f_n^C \langle \bar{a}, X \rangle, Z \rangle \rangle \\
(\approx? \mathbf{pair}) \Big| \\
\langle \{\}, \{X, Y, Z\}, id, \{[b]f_n^C \langle X, Y \rangle \approx? [b]f_n^C \langle \bar{b}, (ab).X \rangle, Z \approx? (ab).Z, a \#? \langle [a]f_n^C \langle \bar{a}, X \rangle, Z \rangle \rangle \rangle \\
(\approx? [\mathbf{aa}]) \Big| \\
\langle \{\}, \{X, Y, Z\}, id, \{f_n^C \langle X, Y \rangle \approx? f_n^C \langle \bar{b}, (ab).X \rangle, Z \approx? (ab).Z, a \#? \langle [a]f_n^C \langle \bar{a}, X \rangle, Z \rangle \rangle \rangle \\
(\approx? \mathbf{C}) \swarrow \searrow \\
\langle \{\}, \{X, Y, Z\}, id, \{X \approx? (ab).X, Y \approx? \bar{b}, Z \approx? (ab).Z, a \#? \langle [a]f_n^C \langle \bar{a}, X \rangle, Z \rangle \rangle \rangle \quad \langle \{\}, \{X, Y, Z\}, id, \{X \approx? (ab).X, Y \approx? \bar{b}, Z \approx? (ab).Z, a \#? \langle [a]f_n^C \langle \bar{a}, X \rangle, Z \rangle \rangle \rangle \\
\downarrow \quad \quad \quad \downarrow \\
(\perp) \quad \quad \quad (\approx? \mathbf{inv}) \Big| \\
\langle \{\}, \{X, Y, Z\}, id, \{Y \approx? \bar{b}, Z \approx? (ab).Z, a \#? \langle [a]f_n^C \langle \bar{a}, X \rangle, Z \rangle, (ab).X \approx? X \rangle \rangle \\
\downarrow \\
(\perp)
\end{array}$$