

$$[\text{intersection}] \frac{\langle E_1, \sigma \rangle \rightarrow \langle I_1, \sigma' \rangle}{\langle \text{intersection}(E_1 \ E_2), \sigma \rangle \rightarrow \langle \text{intersection}(I_1 \ E_2), \sigma' \rangle}$$

$$[\text{difference}] \frac{\langle E_1, \sigma \rangle \rightarrow \langle I_1, \sigma' \rangle}{\langle \text{difference}(E_1 \ E_2), \sigma \rangle \rightarrow \langle \text{difference}(I_1 \ E_2), \sigma' \rangle}$$

$$[\text{sequenceDone}] \langle \text{seq}(\text{done } C), \sigma \rangle \rightarrow \langle C, \sigma \rangle$$

$$[\text{sequence}] \frac{\langle C_1, \sigma \rangle \rightarrow \langle C_1', \sigma' \rangle}{\langle \text{seq}(C_1 \ C_2), \sigma \rangle \rightarrow \langle \text{seq}(C_1' \ C_2), \sigma' \rangle}$$

$$[\text{initialise}] \langle \text{init}, \sigma \rangle \rightarrow \langle \text{user}(\text{string}(\text{init}) \ -- \ --), \sigma \rangle$$

$$[\text{ne}] \frac{n_1 \triangleright \text{int32}(-) \quad n_2 \triangleright \text{int32}(-)}{\langle \text{ne}(n_1 \ n_2), \sigma \rangle \rightarrow \langle \text{ne}(n_1 \ n_2), \sigma \rangle}$$

$$[\text{neRight}] \frac{n \triangleright \text{int32}(-) \quad \langle E_2, \sigma \rangle \rightarrow \langle I_2, \sigma' \rangle}{\langle \text{ne}(n \ E_2), \sigma \rangle \rightarrow \langle \text{ne}(n \ I_2), \sigma' \rangle}$$

$$[\text{neLeft}] \frac{\langle E_1, \sigma \rangle \rightarrow \langle I_1, \sigma' \rangle}{\langle \text{ne}(E_1 \ E_2), \sigma \rangle \rightarrow \langle \text{ne}(I_1 \ E_2), \sigma' \rangle}$$

$$[\text{paint}] \langle \text{paint}, \sigma \rangle \rightarrow \langle \text{user}(\text{string}(\text{paint}) \ -- \ --), \sigma \rangle$$

$$[\text{sub}] \frac{n_1 \triangleright \text{int32}(-) \quad n_2 \triangleright \text{int32}(-)}{\langle \text{sub}(n_1 \ n_2), \sigma \rangle \rightarrow \langle \text{sub}(n_1 \ n_2), \sigma \rangle}$$

$$[\text{subRight}] \frac{n \triangleright \text{int32}(-) \quad \langle E_2, \sigma \rangle \rightarrow \langle I_2, \sigma' \rangle}{\langle \text{sub}(n \ E_2), \sigma \rangle \rightarrow \langle \text{sub}(n \ I_2), \sigma' \rangle}$$

$$[\text{subLeft}] \frac{\langle E_1, \sigma \rangle \rightarrow \langle I_1, \sigma' \rangle}{\langle \text{sub}(E_1 \ E_2), \sigma \rangle \rightarrow \langle \text{sub}(I_1 \ E_2), \sigma' \rangle}$$

$$[\text{clear}] \langle \text{clear}, \sigma \rangle \rightarrow \langle \text{user}(\text{string}(\text{clear}) \ -- \ --), \sigma \rangle$$

$$[\text{translate}] \frac{Z \triangleright \text{int32}(-) \quad x \triangleright \text{real64}(-) \quad y \triangleright \text{real64}(-) \quad z \triangleright \text{real64}(-)}{\langle \text{translate}(Z \ x \ y \ z), \sigma \rangle \rightarrow \langle \text{user}(\text{string}(\text{translate}) \ Z \ x \ y \ z), \sigma \rangle}$$

$$[\text{translateExpr}] \frac{x \triangleright \text{real64}(-) \quad y \triangleright \text{real64}(-) \quad z \triangleright \text{real64}(-) \quad \langle E_1, \sigma \rangle \rightarrow \langle V_1, \sigma \rangle}{\langle \text{translate}(E_1 \ x \ y \ z), \sigma \rangle \rightarrow \langle \text{translate}(V_1 \ x \ y \ z), \sigma \rangle}$$

$$[\text{ifTrue}] \langle \text{if}(\text{bool}(\text{True}) \ C_1 \ C_2), \sigma \rangle \rightarrow \langle C_1, \sigma \rangle$$

$$[\text{ifFalse}] \langle \text{if}(\text{bool}(\text{False}) \ C_1 \ C_2), \sigma \rangle \rightarrow \langle C_2, \sigma \rangle$$

$$[\text{ifResolve}] \frac{\langle E, \sigma \rangle \rightarrow \langle E', \sigma' \rangle}{\langle \text{if}(E \ C_1 \ C_2), \sigma \rangle \rightarrow \langle \text{if}(E' \ C_1 \ C_2), \sigma' \rangle}$$

$$[\text{variable}] \frac{\text{get}(\sigma \ R) \triangleright Z}{\langle \text{deref}(R), \sigma \rangle \rightarrow \langle Z, \sigma \rangle}$$

$$[\text{cube}] \frac{a \triangleright \text{real64}(-)}{\langle \text{cube}(a), \sigma \rangle \rightarrow \langle \text{user}(\text{string}(\text{cube}) \ a), \sigma \rangle}$$

$$[\text{cylinder}] \frac{r \triangleright \text{real64}(-) \quad h \triangleright \text{real64}(-)}{\langle \text{cylinder}(r \ h), \sigma \rangle \rightarrow \langle \text{user}(\text{string}(\text{cylinder}) \ r \ h), \sigma \rangle}$$

$$[\text{while}] \langle \text{while}(E \ C), \sigma \rangle \rightarrow \langle \text{if}(E \ \text{seq}(C \ \text{while}(E \ C)) \ \text{done}), \sigma \rangle$$

$$[\text{sphere}] \frac{r \triangleright \text{real64}(-)}{\langle \text{sphere}(r), \sigma \rangle \rightarrow \langle \text{user}(\text{string}(\text{sphere}) \ r), \sigma \rangle}$$

$$[\text{assignInt}] \frac{n \triangleright \text{int32}(-)}{\langle \text{assign}(X \ n), \sigma \rangle \rightarrow \langle \text{done}, \text{put}(\sigma \ X \ n) \rangle}$$

$$[\text{assignStr}] \frac{s \triangleright \text{string}(-)}{\langle \text{assign}(X \ s), \sigma \rangle \rightarrow \langle \text{done}, \text{put}(\sigma \ X \ s) \rangle}$$

$$[\text{assignResolve}] \frac{\langle E, \sigma \rangle \rightarrow \langle I, \sigma' \rangle}{\langle \text{assign}(X \ E), \sigma \rangle \rightarrow \langle \text{assign}(X \ I), \sigma' \rangle}$$

$$[\text{cone}] \frac{r \triangleright \text{real64}(-) \quad h \triangleright \text{real64}(-)}{\langle \text{cone}(r \ h), \sigma \rangle \rightarrow \langle \text{user}(\text{string}(\text{cone}) \ r \ h), \sigma \rangle}$$

$$[\text{torus}] \frac{r \triangleright \text{real64}(-) \quad R \triangleright \text{real64}(-)}{\langle \text{torus}(r \ R), \sigma \rangle \rightarrow \langle \text{user}(\text{string}(\text{torus}) \ r \ R), \sigma \rangle}$$

$$[\text{gt}] \frac{n_1 \triangleright \text{int32}(-) \quad n_2 \triangleright \text{int32}(-)}{\langle \text{gt}(n_1 \ n_2), \sigma \rangle \rightarrow \langle \text{gt}(n_1 \ n_2), \sigma \rangle}$$

$$[\text{gtRight}] \frac{n \triangleright \text{int32}(-) \quad \langle E_2, \sigma \rangle \rightarrow \langle I_2, \sigma' \rangle}{\langle \text{gt}(n \ E_2), \sigma \rangle \rightarrow \langle \text{gt}(n \ I_2), \sigma' \rangle}$$

$$[\text{gtLeft}] \frac{\langle E_1, \sigma \rangle \rightarrow \langle I_1, \sigma' \rangle}{\langle \text{gt}(E_1 \ E_2), \sigma \rangle \rightarrow \langle \text{gt}(I_1 \ E_2), \sigma' \rangle}$$

$$[\text{pyramid}] \frac{a \triangleright \text{real64}(-) \quad h \triangleright \text{real64}(-)}{\langle \text{pyramid}(a \ h), \sigma \rangle \rightarrow \langle \text{user}(\text{string}(\text{pyramid}) \ a \ h), \sigma \rangle}$$

$$[\text{tetrahedron}] \frac{a \triangleright \text{real64}(-)}{\langle \text{tetrahedron}(a), \sigma \rangle \rightarrow \langle \text{user}(\text{string}(\text{tetrahedron}) \ a), \sigma \rangle}$$

$$[\text{union}] \frac{\langle E_1, \sigma \rangle \rightarrow \langle I_1, \sigma' \rangle}{\langle \text{union}(E_1 \ E_2), \sigma \rangle \rightarrow \langle \text{union}(I_1 \ E_2), \sigma' \rangle}$$