Phase 7 : Equality and Special Operators

Test 1 : Mu Operator

(a) $\mu\, x{:}\,\mathbb{N} \bullet x^2 = 4 \land x > 0$

(b) $\mu\, x \bullet x > 0 \land x < 10$

Test 2 : Not Equal Operator

(a) $x \neq 0$

(b) $x \neq 0 \land y \neq 0$

(c) $x \neq y \lor y \neq z$

Test 3 : Not In Operator

(a) $x \notin S$

(b) $x \in A \land x \notin B$

(c) $x \notin S \Leftrightarrow \neg\, (x \in S)$

Test 4 : One Point Rule

$$\begin{aligned} &\exists\, y{:}\,\mathbb{N} \bullet y = 0 \land x \neq y \\ &\Leftrightarrow 0 \in \mathbb{N} \land x \neq 0 \\ &\Leftrightarrow x \neq 0 \end{aligned}$$

Test 5 : Complex Reasoning

(a) $\mu\, x{:}\,\mathbb{N} \bullet x^2 = 9 \land x \neq 3$

(b) $\forall\, x{:}\,\mathbb{N} \bullet \exists\, y{:}\,\mathbb{N} \bullet x \neq y$

(c) $\forall\, x{:}\,\mathbb{N} \bullet x \in S \Rightarrow x \notin T$

Test 6 : Mixed Operators

(a) $x = y \lor x \neq y$

(b) $x \in A \lor x \notin A$

(c) $\mu\, x{:}\,\mathbb{N} \bullet x \in S \land x \neq 0 \land x^2 < 10$