$$\boxed{Q3.4} \qquad 39^{453} \equiv k \pmod{12}$$

$$39 \equiv 3 \pmod{12}$$

$$3^1 \equiv 3 \pmod{12}$$
$$3^2 \equiv 9 \pmod{12}$$
$$3^3 \equiv 3 \pmod{12}$$
$$3^4 \equiv 9 \pmod{12}$$
$$3^5 \equiv 3 \pmod{12}$$
$$39^{453} \equiv 3^{453} \pmod{12} \equiv 3 \pmod{12}$$
$$\boxed{k = 3}$$