

9. Record the multiplication table for the group  $\frac{\mathbb{Z}_6 \times \mathbb{Z}_4}{\langle (2,2) \rangle}$ .

The elements are

$$N = \langle (2,2) \rangle = \{ (2,2), (4,0), (0,2), (2,0), (4,2), (0,0) \}$$

$$(1,0)+N = \{ (3,2), (5,0), (1,2), (3,0), (5,2), (1,0) \}$$

$$(0,1)+N = \{ (2,3), (4,1), (0,3), (2,1), (4,3), (0,1) \}$$

$$(1,1)+N = \{ (3,3), (5,1), (1,3), (3,1), (5,3), (1,1) \}$$

	$N$	$(1,0)+N$	$(0,1)+N$	$(1,1)+N$
$N$	$N$	$(1,0)+N$	$(0,1)+N$	$(1,1)+N$
$(1,0)+N$	$(1,0)+N$	$N$	$(1,1)+N$	$(0,1)+N$
$(0,1)+N$	$(0,1)+N$	$(1,1)+N$	$N$	$(1,0)+N$
$(1,1)+N$	$(1,1)+N$	$(0,1)+N$	$(1,0)+N$	$N$

10. Is  $\frac{\mathbb{Z}}{3\mathbb{Z}} \rightarrow \frac{\mathbb{Z}}{9\mathbb{Z}}$ , given by  $n + 3\mathbb{Z} \mapsto 2n + 9\mathbb{Z}$ , a group homomorphism? Explain your answer.

No

$$\begin{array}{l}
 1 + 3\mathbb{Z} \mapsto 2 + 9\mathbb{Z} \\
 \parallel \\
 4 + 3\mathbb{Z} \mapsto 8 + 9\mathbb{Z}
 \end{array}
 \begin{array}{l}
 \leftarrow \\
 \leftarrow
 \end{array}
 \text{Not equal}$$

This thing isn't even a function.