

## Differenzen und Quotienten von Restklassen

### Aufgabe 3

a) Bestimme in  $\mathbb{Z}_9$ :  $[1] - [8] = \boxed{\phantom{0}}$  und  $-[4] = \boxed{\phantom{0}}$ .

b) Bestimme in  $\mathbb{Z}_{11}$  die Restklassen der angegebenen Brüche. Lies die Ergebnisse in der unten stehenden Multiplikationstabelle ab und begründe jeweils Dein Ergebnis.

b<sub>1</sub>)  $\frac{[1]}{[2]} = \boxed{\phantom{0}}$ , denn  $[2] \cdot \boxed{\phantom{0}} = \boxed{\phantom{0}}$ .

b<sub>2</sub>)  $\frac{[1]}{[4]} = \boxed{\phantom{0}}$ , denn  $\boxed{\phantom{0}}$

b<sub>3</sub>)  $\frac{[2]}{[4]} = \boxed{\phantom{0}}$ , denn  $\boxed{\phantom{0}}$

Für die Lösung dieser Aufgabe kannst du die folgenden Verknüpfungstabellen verwenden.

Addition in  $\mathbb{Z}_9$ 

| +   | [0] | [1] | [2] | [3] | [4] | [5] | [6] | [7] | [8] |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| [0] | [0] | [1] | [2] | [3] | [4] | [5] | [6] | [7] | [8] |
| [1] | [1] | [2] | [3] | [4] | [5] | [6] | [7] | [8] | [0] |
| [2] | [2] | [3] | [4] | [5] | [6] | [7] | [8] | [0] | [1] |
| [3] | [3] | [4] | [5] | [6] | [7] | [8] | [0] | [1] | [2] |
| [4] | [4] | [5] | [6] | [7] | [8] | [0] | [1] | [2] | [3] |
| [5] | [5] | [6] | [7] | [8] | [0] | [1] | [2] | [3] | [4] |
| [6] | [6] | [7] | [8] | [0] | [1] | [2] | [3] | [4] | [5] |
| [7] | [7] | [8] | [0] | [1] | [2] | [3] | [4] | [5] | [6] |
| [8] | [8] | [0] | [1] | [2] | [3] | [4] | [5] | [6] | [7] |

Multiplikation in  $\mathbb{Z}_{11}$ 

| ·    | [0] | [1]  | [2]  | [3]  | [4]  | [5]  | [6]  | [7]  | [8]  | [9]  | [10] |
|------|-----|------|------|------|------|------|------|------|------|------|------|
| [0]  | [0] | [0]  | [0]  | [0]  | [0]  | [0]  | [0]  | [0]  | [0]  | [0]  | [0]  |
| [1]  | [0] | [1]  | [2]  | [3]  | [4]  | [5]  | [6]  | [7]  | [8]  | [9]  | [10] |
| [2]  | [0] | [2]  | [4]  | [6]  | [8]  | [10] | [1]  | [3]  | [5]  | [7]  | [9]  |
| [3]  | [0] | [3]  | [6]  | [9]  | [1]  | [4]  | [7]  | [10] | [2]  | [5]  | [8]  |
| [4]  | [0] | [4]  | [8]  | [1]  | [5]  | [9]  | [2]  | [6]  | [10] | [3]  | [7]  |
| [5]  | [0] | [5]  | [10] | [4]  | [9]  | [3]  | [8]  | [2]  | [7]  | [1]  | [6]  |
| [6]  | [0] | [6]  | [1]  | [7]  | [2]  | [8]  | [3]  | [9]  | [4]  | [10] | [5]  |
| [7]  | [0] | [7]  | [3]  | [10] | [6]  | [2]  | [9]  | [5]  | [1]  | [8]  | [4]  |
| [8]  | [0] | [8]  | [5]  | [2]  | [10] | [7]  | [4]  | [1]  | [9]  | [6]  | [3]  |
| [9]  | [0] | [9]  | [7]  | [5]  | [3]  | [1]  | [10] | [8]  | [6]  | [4]  | [2]  |
| [10] | [0] | [10] | [9]  | [8]  | [7]  | [6]  | [5]  | [4]  | [3]  | [2]  | [1]  |

## Aufgabe 4

a) Fülle die Verknüpfungstabelle für die Multiplikation in  $\mathbb{Z}_4$  aus.

| $\cdot$ | [0] | [1] | [2] | [3] |
|---------|-----|-----|-----|-----|
| [0]     | [ ] | [ ] | [ ] | [ ] |
| [1]     | [ ] | [ ] | [ ] | [ ] |
| [2]     | [ ] | [ ] | [ ] | [ ] |
| [3]     | [ ] | [ ] | [ ] | [ ] |

b) Versuche, in  $\mathbb{Z}_4$  die Restklassen folgender Brüche zu bestimmen.

$$\frac{[1]}{[3]}$$

$$\frac{[1]}{[2]}$$

$$\frac{[2]}{[2]}$$