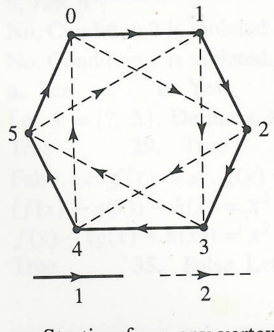
25. 1, 2, 3, 6 **27.** 1, 2, 3, 4, 6, 12 **29.** 1, 17
33. The Klein 4-group **35.** $\mathbb{Z}_2$ **37.** $\mathbb{Z}_8$
39. $\frac{1}{2}(1 + i\sqrt{3})$ and $\frac{1}{2}(1 - i\sqrt{3})$
41. $\frac{1}{2}(\sqrt{3} + i), \frac{1}{2}(\sqrt{3} - i), \frac{1}{2}(-\sqrt{3} + i), \frac{1}{2}(-\sqrt{3} - i)$
51. $(p - 1)(q - 1)$

SECTION 7

1. 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11 **3.** 0, 2, 4, 6, 8, 10, 12, 14, 16
5. $\ldots, -24, -18, -12, -6, 0, 6, 12, 18, 24, \cdots$
7. **a.** a^3b **b.** a^2 **c.** a^2
9.

	e	a	b	c	d	f
e	e	a	b	c	d	f
a	a	e	c	b	f	d
b	b	d	e	f	a	c
c	c	f	a	d	e	b
d	d	b	f	e	c	a
f	f	c	d	a	b	e

11. Choose a pair of generating directed arcs, call them *arc1* and *arc2*, start at any vertex of the digraph, and see if the sequences *arc1*, *arc2* and *arc2*, *arc1* lead to the same vertex. (This corresponds to asking if the two corresponding group generators commute.) The group is commutative if and only if these two sequences lead to the same vertex for *every pair* of generating directed arcs.
13. It is not obvious, since a digraph of a cyclic group might be formed using a generating set of two or more elements, no one of which generates the group.
15.


17. **a.** Starting from any vertex a, every path through the graph that terminates at that same vertex a represents a product of generators or their inverses that is equal to the identity and thus gives a relation.
b. $a^4 = e, b^2 = e, (ab)^2 = e$

SECTION 8

1. $\begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 \\ 1 & 2 & 3 & 6 & 5 & 4 \end{pmatrix}$ **3.** $\begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 \\ 3 & 4 & 1 & 6 & 2 & 5 \end{pmatrix}$