

I

NAME _____

*a	b	c	d	e	f	g
a	f	a	e	g	b	d
b	a	b	c	d	e	f
c	e	c	d	a	g	b
d	g	d	a	e	f	c
e	b	e	g	f	c	a
f	d	f	b	c	a	g
g	c	g	f	b	d	e

A. The above table is to be used like a multiplication table. Use the table to give a single letter for each of the following:

1. $a * c$
e

2. $e * g$
d

3. $(d * e) * a$
f a
d

4. $d * (e * a)$
d b
d

B. There is an element in the set $S = \{a, b, c, d, e, f, g\}$ which behaves when used in the "*" operation given by the table similar to the way "0" behaves when real

numbers are added, "1" behaves when real numbers are multiplied and $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

behaves when 2X2 matrices are multiplied. What is that element? IDENTITY

b

here is an element in set $S = \{a, b, c, d, e, f, g\}$ that behaves when "starred" with "e" the way -3 behaves when added to 3. What is that element?

$-3 + 3$ INVERSE

a

D. What property of the "*" operation presented in the table guarantees that both $c * (f * g)$ and $(c * f) * g$ represent the same element in the set $S = \{a, b, c, d, e, f, g\}$? ASSOCIATIVE

$c * e = b * g$
g = g

E. What is the identity element for the operation "*" presented in the table?

b

II.

*	a	b	c	d	e	f	g
a	f	a	e	g	b	d	c
b	a	b	c	d	e	f	g
c	e	c	d	a	g	b	f
d	g	d	a	e	f	c	b
e	b	e	g	f	c	a	d
f	d	f	b	c	a	g	e
g	c	g	f	b	d	e	a

A. complete this table of inverses for the $\{S, *\}$ operational system:

element	*-inverse of that element
a	e
b	b
c	f
d	g
e	a
f	c
g	d

B. complete the four numbered equations on the right so that they "mimic" the four numbered equations on the left.

	$4 + x = 11$	$e * x = d$
#1	$\underline{-4} + (4 + x) = \underline{-4} + 11$	$\underline{a} * (e * x) = \underline{a} * d$
#2	$(\underline{-4} + \underline{4}) + x = \underline{7}$	$(\underline{a} * \underline{e}) * x = \underline{g}$
#3	$\underline{0} + x = \underline{7}$	$\underline{b} * x = \underline{g}$
#4	$x = \underline{7}$	$x = \underline{g}$

C. fill in the blanks so that all five equations are equivalent:

$g * x = d$

#1 $\underline{d} * (g * x) = \underline{d} * d$

#2 $(\underline{d} * \underline{g}) * x = \underline{e}$

#3 $\underline{b} * x = \underline{e}$

#4 $x = \underline{e}$

D. "Solve" the following open sentence by writing a sequence of four equivalent open sentences ending with one of the form "x = 'the solution'."

AWV.