

Name: \_\_\_\_\_

Date \_\_\_\_\_

Topic : Binary Operations - Worksheet 1

Do the following:

	a	b	c	d
a	d	c	a	b
b	c	a	b	d
c	a	b	d	c
d	b	d	c	a

1. Is this operation commutative?
2. Name the identity element, or explain why none exists.

3. True or false:

























$$\text{paw} (c \text{ paw } b) = (d \text{ paw } c) \text{ paw } b$$

4. True or false:

$$\text{paw} (c \text{ paw } b) = (b \text{ paw } c) \text{ paw}$$

5. True or false:

$$\text{paw} (c \text{ paw } d) = (d \text{ paw } c) \text{ paw}$$

#				
				
				
				
				

6. Is this operation commutative?

7. True or false:

$$\text{flower} \# (\text{flower} \# \text{sphere}) = (\text{flower} \# \text{flower}) \# \text{sphere}$$

8. True or false:

$$\text{flower} \# (\text{flower} \# \text{sphere}) = (\text{flower} \# \text{flower}) \# \text{sphere}$$

9. True or false:

$$\text{flower} \# (\text{flower} \# \text{sphere}) = (\text{flower} \# \text{flower}) \# \text{sphere}$$

10. Name the identity element, or explain why none exists.




Name: \_\_\_\_\_

Date \_\_\_\_\_

## Topic : Binary Operations - Worksheet 2

Do the following:

	w	a	l	k
w	k	w	a	l
a	w	l	l	k
l	a	l	k	w
k	l	k	w	a

1. Is this operation commutative?

2. Name the identity element, or explain why none exists.

3. True or false:

$$\text{I} ( w \text{ I } a ) = w \text{ I} ( \text{I} a )$$


4. True or false:

$$\text{I} ( w \text{ I } k ) = w \text{ I} ( \text{I} a )$$

5. True or false:

$$\text{I} ( w \text{ I } k ) = w \text{ I} ( \text{I} a )$$

6. Is this operation commutative?

	1	2	3	4
1	4	3	2	1
2	3	1	4	2
3	2	4	1	3
4	1	2	3	4

7. True or false:

$$( 1 \text{ I } 2 ) \text{ I } 3 = 1 \text{ I} ( 2 \text{ I } 4 )$$

8. True or false:

$$( 1 \text{ I } 3 ) \text{ I } 3 = 1 \text{ I} ( 2 \text{ I } 3 )$$

9. True or false:

$$( 1 \text{ I } 2 ) \text{ I } 3 = 1 \text{ I} ( 2 \text{ I } 3 )$$

10. Name the identity element, or explain why none exists.




Name: \_\_\_\_\_

Date \_\_\_\_\_

Topic : Binary Operations - Worksheet 3

Do the following:

	t	a	l	k
t	k	t	a	l
a	t	l	l	k
l	a	l	k	t
k	l	k	t	a

1. Is this operation commutative?

2. Name the identity element, or explain why none exists.

3. True or false:


$$\text{house} \ l ( \text{house} \ t \ \text{house} \ k ) = t \ \text{house} \ ( l \ \text{house} \ k )$$

4. True or false:

$$\text{house} \ l ( \text{house} \ t \ \text{house} \ a ) = t \ \text{house} \ ( l \ \text{house} \ a )$$

5. True or false:

$$\text{house} \ l ( \text{house} \ t \ \text{house} \ k ) = t \ \text{house} \ ( l \ \text{house} \ a )$$

	w	h	e	n
w	n	e	h	w
h	e	w	n	h
e	h	n	w	e
n	w	h	e	n

6. Is this operation commutative?

7. True or false:

$$(w \ \text{alarm} \ h) \ \text{alarm} \ e = \ \text{alarm} \ h \ (w \ \text{alarm} \ e)$$

8. True or false:

$$(h \ \text{alarm} \ e) \ \text{alarm} \ n = \ \text{alarm} \ h \ (w \ \text{alarm} \ n)$$

9. True or false:

$$(w \ \text{alarm} \ h) \ \text{alarm} \ e = \ \text{alarm} \ h \ (w \ \text{alarm} \ n)$$

10. Name the identity element, or explain why none exists.




Name: \_\_\_\_\_

Date \_\_\_\_\_

Topic : Binary Operations - Worksheet 4

Do the following:

	c	o	d	e
c	e	d	c	o
o	d	c	o	e
d	c	o	e	d
e	o	e	d	c

1. Is this operation commutative?

2. Name the identity element, or explain why none exists.

3. True or false:


$$\text{c} (\text{o} \text{ d}) = \text{o} (\text{d} \text{ c})$$

4. True or false:

$$\text{o} (\text{d} \text{ e}) = \text{e} (\text{d} \text{ c})$$

5. True or false:

$$\text{d} (\text{e} \text{ o}) = \text{d} (\text{o} \text{ e})$$

	h	o	m	e
h	e	m	h	o
o	m	h	o	e
m	h	o	e	m
e	o	e	m	h

6. Is this operation commutative?

7. True or false:

$$(\text{H} \text{ o}) \text{ m} = \text{h} (\text{o} \text{ e})$$

8. True or false:

$$(\text{o} \text{ m}) \text{ e} = \text{o} (\text{m} \text{ e})$$

9. True or false:

$$(\text{h} \text{ o}) \text{ m} = \text{h} (\text{o} \text{ e})$$

10. Name the identity element, or explain why none exists.




Name: \_\_\_\_\_

Date \_\_\_\_\_

Topic : Binary Operations - Worksheet 5

Do the following:

	t	r	u	e
t	e	u	r	t
r	u	t	e	r
u	r	e	t	u
e	t	r	u	e

1. Is this operation commutative?

2. Name the identity element, or explain why none exists.

3. True or false:


$$\text{rose } t (r \text{ rose } u) = t \text{ rose } (r \text{ rose } u)$$

4. True or false:

$$\text{rose } r (u \text{ rose } e) = r \text{ rose } (t \text{ rose } e)$$

5. True or false:

$$\text{rose } t (u \text{ rose } e) = t \text{ rose } (u \text{ rose } e)$$

	c	a	k	e
c	e	k	a	c
a	k	c	e	a
k	a	e	c	k
e	c	a	k	e

6. Is this operation commutative?

7. True or false:

$$(c \text{ candy } a) \text{ candy } k = \text{candy } c (a \text{ candy } k)$$

8. True or false:

$$(k \text{ candy } e) \text{ candy } c = \text{candy } k (e \text{ candy } a)$$

9. True or false:

$$(a \text{ candy } k) \text{ candy } e = \text{candy } a (k \text{ candy } e)$$

10. Name the identity element, or explain why none exists.

