

A.N.1: Binary Operations: Identify and apply the properties of real numbers (closure, commutative, associative, distributive, identity, inverse)

- 1 The operation element @ is determined by the following table:

@	<i>a</i>	<i>b</i>	<i>c</i>
<i>a</i>	<i>a</i>	<i>b</i>	<i>c</i>
<i>b</i>	<i>b</i>	<i>c</i>	<i>a</i>
<i>c</i>	<i>c</i>	<i>a</i>	<i>b</i>

What is the identity element of this operation?

- 1) *a*, only
 - 2) *b*, only
 - 3) *c*
 - 4) *a* and *b*
- 2 What is the identity element for ♣ in the accompanying table?

♣	<i>r</i>	<i>s</i>	<i>t</i>	<i>u</i>
<i>r</i>	<i>t</i>	<i>r</i>	<i>u</i>	<i>s</i>
<i>s</i>	<i>r</i>	<i>s</i>	<i>t</i>	<i>u</i>
<i>t</i>	<i>u</i>	<i>t</i>	<i>s</i>	<i>r</i>
<i>u</i>	<i>s</i>	<i>u</i>	<i>r</i>	<i>t</i>

- 1) *r*
- 2) *s*
- 3) *t*
- 4) *u*

- 3 An addition table for a subset of real numbers is shown below. Which number is the identity element? Explain your answer.

+	0	1	2	3
0	0	1	2	3
1	1	2	3	4
2	2	3	4	0
3	3	4	0	1

- 4 The operation * for the set {*p*, *r*, *s*, *v*} is defined in the accompanying table. What is the inverse element of *r* under the operation *?

*	<i>p</i>	<i>r</i>	<i>s</i>	<i>v</i>
<i>p</i>	<i>s</i>	<i>v</i>	<i>p</i>	<i>r</i>
<i>r</i>	<i>v</i>	<i>p</i>	<i>r</i>	<i>s</i>
<i>s</i>	<i>p</i>	<i>r</i>	<i>s</i>	<i>v</i>
<i>v</i>	<i>r</i>	<i>s</i>	<i>v</i>	<i>p</i>

- 1) *p*
- 2) *r*
- 3) *s*
- 4) *v*

- 5 In the addition table for a subset of real numbers shown below, which number is the inverse of 3? Explain your answer.

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

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Answer Section

1 ANS: 1

The identity element is a , because any element $@ a$ equals the original element.

PTS: 2 REF: 080112a

2 ANS: 2

The identity element is s because any element $\clubsuit s$ equals the original element.

PTS: 2 REF: 080514a

3 ANS:

The identity element is 0, because any element $+ 0$ equals the original element.

PTS: 2 REF: 060224a

4 ANS: 4

The identity element is s because any element $*s$ equals the original element. Then review the table to solve: $r*_ = s$. The inverse of r is v because $r*v = s$.

PTS: 2 REF: 080010a

5 ANS:

The identity element is 4 because any element $\oplus 4$ equals the original element. Then review the table to solve: $3\oplus_ = 4$. The inverse of 3 is 1, because $3\oplus 1 = 4$.

PTS: 2 REF: 080222a