

NUMBERS OPERATIONS AND PROPERTIES: Binary Operations

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NAME: \_\_\_\_\_

1. 060224a, P.I. A.N.1

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

2. 080112a, P.I. A.N.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?

- [A] *c* [B] *a*, only  
[C] *b*, only [D] *a* and *b*

3. 080514a, P.I. A.N.1

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>

- [A] *t* [B] *u* [C] *s* [D] *r*

4. 080222a, P.I. A.N.1

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

5. 080010a, P.I. A.N.1

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>

- [A] *s* [B] *v* [C] *r* [D] *p*

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[2] 0, and an appropriate explanation is given, such as 0 is the number that when added to any number results in that number or does not change it, or  $1 + 0 = 1$ ,  $2 + 0 = 2$ , and  $3 + 0 = 3$ .

[1] 0, but no explanation or an incorrect explanation is given.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[1] incorrect procedure.

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[2] B

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[3] C

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[2] 1, and an appropriate explanation is given, such as when 1 is added to 3, the result is the identity element, 4; therefore 1 is the inverse of 3.

[1]  $1 + 3 = 4$ , but the identity element is not identified.

or [1] 4 is identified as the inverse because the identity element and inverse element are confused.

or [1] 1, but no explanation or an incorrect explanation is given.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[4] incorrect procedure.

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[5] B

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