Algebra RH

Essential Question: What is the closure property?

do ☑ now

Consider the set of whole numbers. Choose two whole numbers: __2__ and __5__

a) add the whole numbers = __7__. Is the result a whole number? _yes_
Will the result *always* be a whole number for any pair of whole numbers? _yes_

b) subtract the whole numbers = __-3__. Is the result a whole number? _no_
Will the result *always* be a whole number for any pair of whole numbers? _no_

c) multiply the whole numbers = __10__. Is the result a whole number? _yes_
Will the result *always* be a whole number for any pair of whole numbers? _yes_

d) divide the whole numbers = __$\frac{2}{5}$__. Is the result a whole number? _no_
Will the result *always* be a whole number for any pair of whole numbers? _no_

Closure Property

A set is ***closed*** (under an operation) if and only if the operation on two elements of the set produces another element of the set. If an element outside the set is produced, then the operation is ***not closed***. ✻ elements of a set can be used twice ✻

a set is closed when the result is *always* in the set

Tell whether the set is closed under the operation. If it is not closed, justify your answer using an example.

Set	Operation	Closed/Not Closed	Example
1) Rational numbers	subtraction	closed	
2) {-1, 0, 1, 2}	addition	not closed	1 + 2 = ③ ← not in the set
3) Even integers	division	not closed	6 ÷ 2 = ③
4) Positive irrational numbers	addition	closed	
5) Integers	multiplication	closed	

6) Under what operation(s) is the set of rational numbers NOT closed? __division__

ex. $\frac{17}{0}$

undefined

Set	Operation	Closed/Not Closed	Example
7) Negative integers	addition	closed	
8) Negative integers	multiplication	not closed	-4 (-2) = (8) not in the set
9) {-2, 0, 2}	subtraction	not closed	-2 - 2 = -4
10) {½, 1, 2}	division	not closed	2 ÷ ½ = 4
11) Rational numbers	division	not closed	7/0 is undefined

12) Under what operation(s) is the set of irrational numbers NOT closed? ___all operations___

13) Consider a set of numbers that is closed under addition and subtraction. What number must be in such a set? Explain. _____

_____0___because___of___the___additive___inverse___property_____

14) Consider a set of numbers that is closed under multiplication and division. What number must be in such a set? Explain. _____

_____one___because___of___the___multiplicative___inverse___property_____

How do we determine if a set of numbers is closed?

flowchart

question

Combine any 2 elements of a set using an operation. → Is the result always in the set? — NO → NOT CLOSED under that operation → Prove it with an example!

action

YES ↓

CLOSED under that operation

final result

final result