

Math Domain

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|---|--------------------------------------|--|
| ☒ Number/Quantity | ☐ Shape/Space | ☒ Function/Pattern |
| ☐ Chance/Data | ☐ Arrangement | |

Math Actions (possible weights: 0 through 4)

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| ☐ 0 Modeling/Formulating | ☐ 2 Manipulating/Transforming |
| ☐ 2 Inferring/Drawing Conclusions | ☐ 2 Communicating |

Math Big Ideas

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|---|--|--|
| ☐ Scale | ☐ Reference Frame | ☒ Representation |
| ☐ Continuity | ☐ Boundedness | ☐ Invariance/Symmetry |
| ☒ Equivalence | ☒ General/Particular | ☐ Contradiction |
| ☐ Use of Limits | ☐ Approximation | ☐ Other |

1. Regardless of which direction students go around the ring, the computation should lead them to a final answer of 2 when they get back to the top circle.
2. Again, the result will be 2.
3. The resulting answer will be 3. [Make sure students have put the number in the **bottom** circle.]
4. Regardless of the number chosen, the side circle started with, and the direction followed, the final answer will be the same number as the student started with. If younger students have difficulty because an intervening calculation is a zero or a negative number, they may be prompted to use a larger number. Older students, however, should be able to compensate in this event.
5. Students should in some way indicate that they see the inverse properties of addition and subtraction. They may use terms like “they balance out,” or “they add up to zero.”

	partial level (1 or 2)	full level (3)
Modeling/ Formulating (weight 0)		
Transforming/ Manipulating (weight: 2)	Student arrives at a correct result for some of the computations.	Student arrives at a correct result for all of the computations, regardless of the initial number chosen and its position in the ring. If one of the additions or subtractions results in a zero answer or a negative number, the student is able to adjust strategy.
Inferring/ Drawing Conclusions (weight: 2)	Student shows some understanding of the inverse relationship that is operating in the ring.	Student demonstrates an understanding of the arithmetic generalization described by the ring, and the inverse relationship of the processes involved.
Communicating (weight: 2)	Student provides a fragmentary, incoherent or incomplete response to question 5.	Student gives a clear, complete explanation of how the ring works.