

INTEGRAL LINE

Why

We are constantly thinking of the integers as the endpoints of equal length segments of a line.

Discussion

We commonly associate elements of the integers with the endpoints of equal-length segments of a real line. Take segment S_0 of L with endpoints p and q. Associate the point p with 0. Associate the point q with 1. Take a segment S_1 of equal length, non-overlapping with S_0 , who shares the endpoint q. Associate the second endpoint of this segment 2. Continue with the rest. We call the line so formed the *integral line* of unit S_0 .

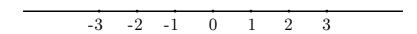


Figure 1: The integral segments.

Integral Distance

Let $f: \mathbf{Z} \to \mathbf{Z}$ be defined by f(a,b) = a - b if a > b and f(a,b) = b - a if b > a. Notice that f is symmetric: f(a,b) = f(b,a). The (geometric) interpretation of f is the distance between the points associated with the two integers $a, b \in \mathbf{Z}$ in some integral line. We call f the integral distance. Notice that f(a,b) > 0 for all $a, b \in \mathbf{Z}$.

Notation

We denote the distance between $a, b \in \mathbf{Z}$ by |a - b|.

¹Future editions will expand.

