Beginning Activities for Section 6.5

Mathematical Reasoning: Writing and Proof, Version 3

Beginning Activity 1 (A Function as a Set of Ordered Pairs)

The use of correct set notation is important in this beginning activity. For functions with a small, finite domain, we can use the roster method to determine the set of ordered pairs associated with this function. For functions whose domain is an infinite set, we have to use set builder notation to describe the set of ordered pairs associated with the function.

1. $g = \{(1, a), (2, b), (3, d)\}$

2. $f = \{(m, n) \in \mathbb{Z} \times \mathbb{Z} \mid n = 3m + 5\}$, or
$f = \{\ldots, (-3, -4), (-2, -1), (-1, 2), (0, 5), (1, 8), (2, 11), (3, 14), \ldots\}$.

3. The set of ordered pairs, f, cannot be used to define a function from A to B since $(1, a) \in f$ and $(1, b) \in f$.

4. The set of ordered pairs, g, can be used to define a function from A to B. We would have $g(1) = a$, $g(2) = b$, and $g(3) = a$.

5. The set of ordered pairs, h, cannot be used to define a function from A to B since there is no ordered pair with 3 as the first coordinate.

Beginning Activity 2 (A Composition of Two Specific Functions)

2. This defines a function from B to A since each element of B corresponds to exactly one element of A.

3. The answser depends on the function is in (1).

4. For any choice of a bijection in (1), the following table should be obtained.

x	$(g \circ f)(x)$
a	a
b	b
c	c
d	d

y	$(f \circ g)(y)$
p	p
q	q
r	r
s	s

The table shows that for each x in A, $(g \circ f)(x) = x$, and for each y in B, $(f \circ g)(y) = y$.
