Infinite Sets and Their Cardinalities

Contemporary Math (MAT-130)

Give the cardinal number of each set.

1. {27}
2. {a, 1, b, 2, c, 3}
3. {14, 14, 14}
4. {x | x is an integer that satisfies x- 5=4}
5. {x | x is a whole number between 9 and 12}
6. {x | x is a fraction}
7. {h, i, j, … m}
8. {…, -3, -2, -1, 0 ,1, 2, 3, …}
9. Ø
10. {x | x is an irrational number}
11. $\{\frac{1}{3}, \frac{2}{4}, \frac{3}{5}, \ldots, \frac{18}{20}\}$
12. {Monday, Tuesday, … Sunday}
13. {2, 4, 6, 8, 10, …}
14. {p, a, n, a, m, a}
15. The set of real numbers

Place each pair of sets into a one-to-one correspondence.

16. {a, b, c} and {1, 2, 3}
17. {Monday, Tuesday, Wednesday} and {Jan, Feb, Mar, Apr}
18. {z, e, n, o} and {c, o, l, o, r}
19. {Spring, Summer, Fall, Winter} and {Green, Orange, Brown, White}

Determine whether each pair of sets is equal, equivalent, both, or neither.

20. {1, 2, 3} and {2, 1, 3}
21. {A, B, C} and {a, b, c}
22. {5,6,7,8} and {8,7,6}
23. {51,2} and {5,12}

Show that each set has a cardinal number $\aleph_0$ by setting up a one-to-one correspondence between the given set and the set of counting numbers.

24. The set of negative integers
25. {1, 3, 5, 7, 9, 11, …}

Solutions:

1. 1
2. 6
3. 1
4. 1
5. 2
6. $\aleph_0$
7. 6
8. $\aleph_0$
9. 0
10. c
11. 18
12. 7
13. $\aleph_0$
14. 4
15. c
16. $\begin{bmatrix} \text{a}\rightarrow 1 \\ b\rightarrow 2 \\ c\rightarrow 3 \end{bmatrix}$
17. Not possible
18. $\begin{bmatrix} z\rightarrow c \\ e\rightarrow o \\ n\rightarrow l \\ o\rightarrow r \end{bmatrix}$
19. $\begin{bmatrix} Spring\rightarrow Green \\ Summer\rightarrow Orange \\ Fall\rightarrow Brown \\ Winter\rightarrow White \end{bmatrix}$
20. Both
21. Equivalent
22. Neither
23. Equivalent
24. $\begin{bmatrix} -1\rightarrow 1 \\ -2\rightarrow 2 \\ -3\rightarrow 3 \\ \vdots \\ -n\rightarrow n \end{bmatrix}$
25. $\begin{bmatrix} 1\rightarrow 1 \\ 3\rightarrow 2 \\ 5\rightarrow 3 \\ \vdots \\ 2n-1\rightarrow n \end{bmatrix}$