Exercise 218

A function that converts dress sizes in the United States to those in Europe is given by $D(x) = 2x + 24$.

a. Find the European dress sizes that correspond to sizes 6, 8, 10, and 12 in the United States.

b. Find the function that converts European dress sizes to U.S. dress sizes.

c. Use part b. to find the dress sizes in the United States that correspond to 46, 52, 62, and 70.

Solution

Part (a)

Plug in $x = 6$, $x = 8$, $x = 10$, and $x = 12$ in the given function for $D(x)$.

$$\begin{aligned} x = 6 \quad &\Rightarrow \quad D(6) = 2(6) + 24 = 36 \\ x = 8 \quad &\Rightarrow \quad D(8) = 2(8) + 24 = 40 \\ x = 10 \quad &\Rightarrow \quad D(10) = 2(10) + 24 = 44 \\ x = 12 \quad &\Rightarrow \quad D(12) = 2(12) + 24 = 48 \end{aligned}$$

Part (b)

Solve the given function,

$$D(x) = 2x + 24,$$

for x.

$$D(x) - 24 = 2x$$

$$\frac{D(x) - 24}{2} = x$$

Therefore, the function that converts European dress sizes to U.S. dress sizes is

$$D^{-1}(D) = \frac{D - 24}{2}.$$

Part (c)

Plug in $D = 46$, $D = 52$, $D = 62$, and $D = 70$ in the inverse function.

$$\begin{aligned} D = 46 \quad &\Rightarrow \quad D^{-1}(46) = \frac{46 - 24}{2} = 11 \\ D = 52 \quad &\Rightarrow \quad D^{-1}(52) = \frac{52 - 24}{2} = 14 \\ D = 62 \quad &\Rightarrow \quad D^{-1}(62) = \frac{62 - 24}{2} = 19 \\ D = 70 \quad &\Rightarrow \quad D^{-1}(70) = \frac{70 - 24}{2} = 23 \end{aligned}$$