# Exercise 53

A vehicle has a 20-gal tank and gets 15 mpg. The number of miles $N$ that can be driven depends on the amount of gas $x$ in the tank.

    a. Write a formula that models this situation.

    b. Determine the number of miles the vehicle can travel on (i) a full tank of gas and (ii) 3/4 of a tank of gas.

    c. Determine the domain and range of the function.

    d. Determine how many times the driver had to stop for gas if she has driven a total of 578 mi.

**Solution**

**Part a.**

Multiply the mileage per gallon (15) by the amount of gas in the tank ($x$) to get the number of miles the car can drive.

$$N(x) = 15x$$

**Part b.**

On a full tank of gas, the car can drive

$$N(20) = 15(20) = 300 \text{ miles.}$$

In a tank that is 3/4 full, there are

$$\frac{3}{4}(20) = 15 \text{ gallons,}$$

which means the car can drive

$$N(15) = 15(15) = 225 \text{ miles.}$$

**Part c.**

Because the tank can hold a minimum of 0 gallons of gas and a maximum of 20 gallons of gas, the domain of $N(x)$ is

$$\{x \mid 0 \leq x \leq 20\}.$$

The lowest distance the car can travel is

$$N(0) = 15(0) = 0 \text{ miles,}$$

and the highest distance the car can travel is

$$N(20) = 15(20) = 300 \text{ miles.}$$

Therefore, the range of $N(x)$ is

$$\{N \mid 0 \leq N \leq 300\}.$$

**Part d.**

Assuming the driver started with a full tank of gas and fills the tank completely, she had to have stopped for gas once.

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