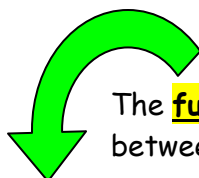


9.6 Functions

A brown bat can eat 600 mosquitoes in an hour.

1. Write an expression to represent the number of mosquitoes a brown bat can eat in 2 hours.
2. Write an expression to represent the number of mosquitoes a brown bat can eat in 5 hours.
3. Write an expression to represent the number of mosquitoes a brown bat can eat in t hours.

The number of mosquitoes eaten by a bat is a **function** of the number of hours. The results can be organized in a **function table**.


 The **function rule** describes the relationship between each input and output.

| <u>Input</u> | <u>Function Rule</u> | <u>Output</u> |
|-------------------------|----------------------|------------------|
| ↓ | ↓ | ↓ |
| Number of Hours (t) | $600t$ | Mosquitoes Eaten |
| 1 | $600(1)$ | 600 |
| 2 | $600(2)$ | 1,200 |
| 3 | $600(3)$ | 1,800 |

Example: Complete a Function Table

1. Complete the function table.
 - ✓ The function rule is $x+4$. Add 4 to each input.

| <u>Input</u> (x) | <u>Output</u> ($x+4$) |
|----------------------|-------------------------|
| -2 | |
| 1 | |
| 4 | |

➔

| <u>Input</u> (x) | <u>Output</u> ($x+4$) |
|----------------------|-------------------------|
| -2 | 2 |
| 1 | 5 |
| 4 | 8 |

**** Your Turn: Complete each function table.**

a)

| <u>Input</u> (x) | <u>Output</u> ($x-2$) |
|----------------------|-------------------------|
| -2 | |
| 1 | |
| 4 | |

b)

| <u>Input</u> (x) | <u>Output</u> ($2x$) |
|----------------------|------------------------|
| -1 | |
| 0 | |
| 3 | |

Example: Find the Rule for a Function Table

2. Find the rule for the function table.

✓ Study the relationship between each input and output.

| <u>Input</u> | | <u>Output</u> |
|--------------|----------------------|---------------|
| -3 | $\times \frac{1}{3}$ | -1 |
| 1 | $\times \frac{1}{3}$ | $\frac{1}{3}$ |
| 6 | $\times \frac{1}{3}$ | 2 |

| <u>Input</u> (x) | <u>Output</u> () |
|----------------------|-------------------|
| -3 | -1 |
| 1 | $\frac{1}{3}$ |
| 6 | 2 |

The output is one-third of the input. So, the function rule is $\frac{1}{3}x$,
or $\frac{x}{3}$.

****Your Turn:** Find the rule for each function table.

c)

| <u>Input</u> (x) | <u>Output</u> () |
|----------------------|-------------------|
| -3 | -12 |
| 1 | 4 |
| 4 | 16 |

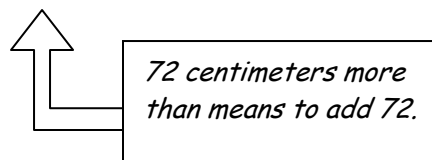
d)

| <u>Input</u> (x) | <u>Output</u> () |
|----------------------|-------------------|
| 4 | -1 |
| 8 | 3 |
| 10 | 5 |

Example: Solve a Problem Using a Function

3. A criminalist knows that an adult male's height, in centimeters, is about 72 centimeters more than 2.5 times the length of his tibia, t (shin bone). How tall is a man whose tibia is 30 centimeters?

- ✓ First, determine the function rule.
- ✓ Let t = length of tibia.
- ✓ The function rule is $2.5t + 72$.



✓ Then, replace t in the rule $2.5t + 72$ with the length of the tibia, 30.

$$\begin{aligned}
 2.5t + 72 &= 2.5(30) + 72 && \text{Replace } t \text{ with 30.} \\
 &= 75 + 72 && \text{Multiply 2.5 and 30.} \\
 &= 147 && \text{Add 75 and 72.}
 \end{aligned}$$

The man is about 147 centimeters tall.