

Piecewise and Step Functions

1. What makes a piecewise function different from other functions?

They are different functions put together to make one function.

2. Give an example where a piecewise function describes a real-world situation better than a function with a single equation.

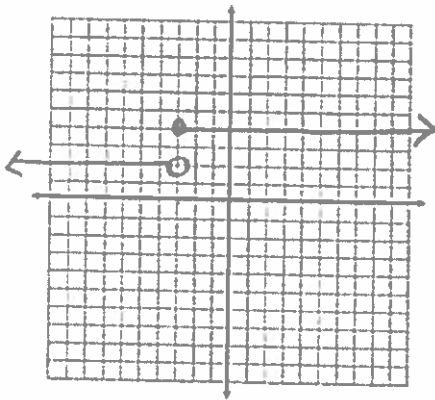
cost for admission with different prices for different ages.

3. What is a step function? How is different from other piecewise functions?

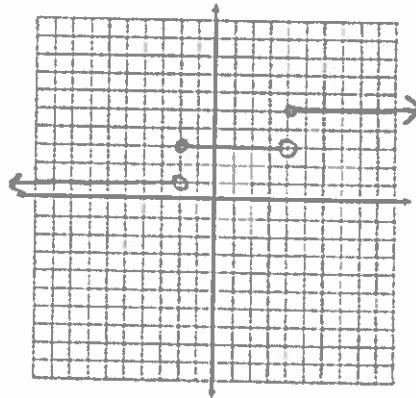
Looks like steps.

Graph the following step functions:

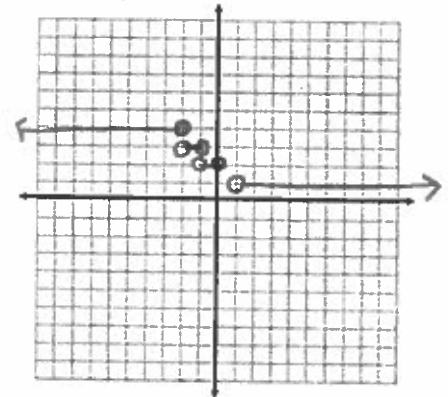
$$1. f(x) = \begin{cases} 2, & \text{if } x < -3 \\ 4, & \text{if } x \geq -3 \end{cases}$$



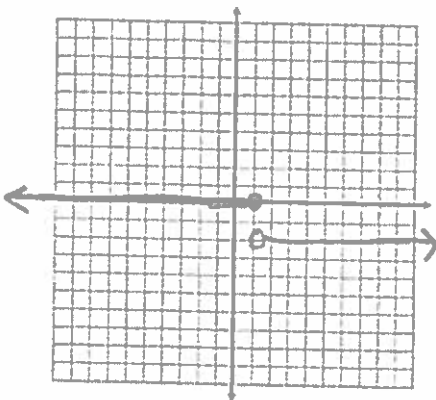
$$2. g(x) = \begin{cases} 1, & \text{if } x < -2 \\ 3, & \text{if } -2 \leq x < 4 \\ 5, & \text{if } 4 \leq x \end{cases}$$



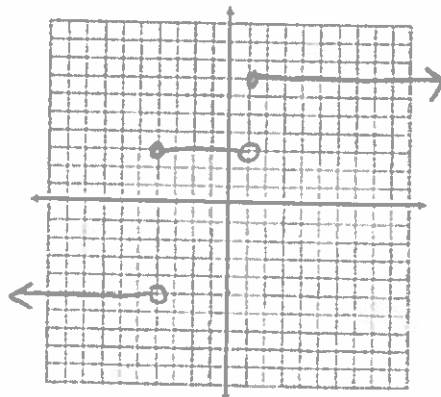
$$3. h(x) = \begin{cases} 4, & \text{if } x \leq -2 \\ 3, & \text{if } -2 < x \leq -1 \\ 2, & \text{if } -1 < x \leq 0 \\ 1, & \text{if } 0 < x \end{cases}$$



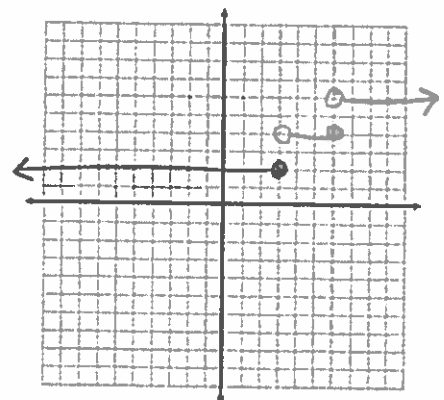
$$4. p(x) = \begin{cases} 0, & \text{if } (-\infty, 1] \\ -2, & \text{if } (1, +\infty) \end{cases}$$



$$5. q(x) = \begin{cases} -5, & \text{if } (-\infty, -4) \\ 3, & \text{if } [-4, 1) \\ 7, & \text{if } [1, +\infty) \end{cases}$$

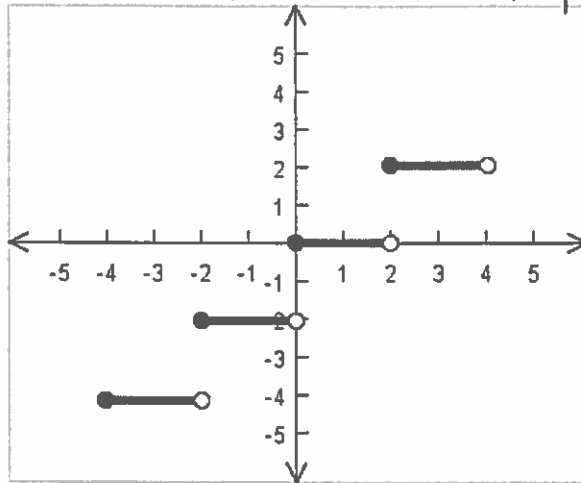


$$6. q(x) = \begin{cases} 2, & \text{if } (-\infty, 3] \\ 4, & \text{if } (3, 6) \\ 6, & \text{if } (6, +\infty) \end{cases}$$



**Exercise 19**

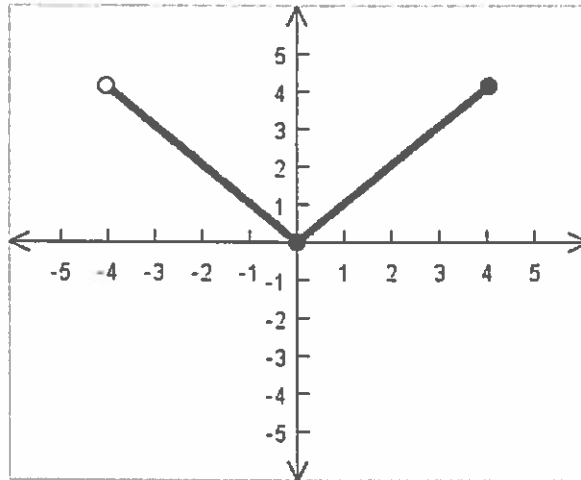
Write a function to represent each graph.



**Figure 19**

$$f(x) = \begin{cases} -4, & \text{if } -4 \leq x < -2 \\ -2, & \text{if } -2 \leq x < 0 \\ 0, & \text{if } 0 \leq x < 2 \\ 2, & \text{if } 2 \leq x < 4 \end{cases}$$

**Exercise 20**



**Figure 20**

$$f(x) = |x| \text{ if } -4 < x \leq 4$$