

## Illustrative Mathematics

### F-IF The Parking Lot

#### Alignments to Content Standards

- [Alignment: F-IF.A.1](#)

#### Tags

- *This task is not yet tagged.*

A parking lot charges \$0.50 for each half hour or fraction thereof, up to a daily maximum of \$10.00. Let  $C(t)$  be the cost in dollars of parking for  $t$  minutes.

- a. Complete the table below.

$t$ (minutes)	$C(t)$ (dollars)
0	
15	
20	
35	
75	
125	

- b. Sketch a graph of  $C$  for  $0 \leq t \leq 480$ .
- c. Is  $C$  a function of  $t$ ? Explain your reasoning.
- d. Is  $t$  a function of  $C$ ? Explain your reasoning.

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## Commentary

The purpose of this task is to investigate the meaning of the definition of function in a real-world context where the question of whether there is more than one output for a given input arises naturally. In more advanced courses this task could be used to investigate the question of whether a function has an inverse.

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## Solutions

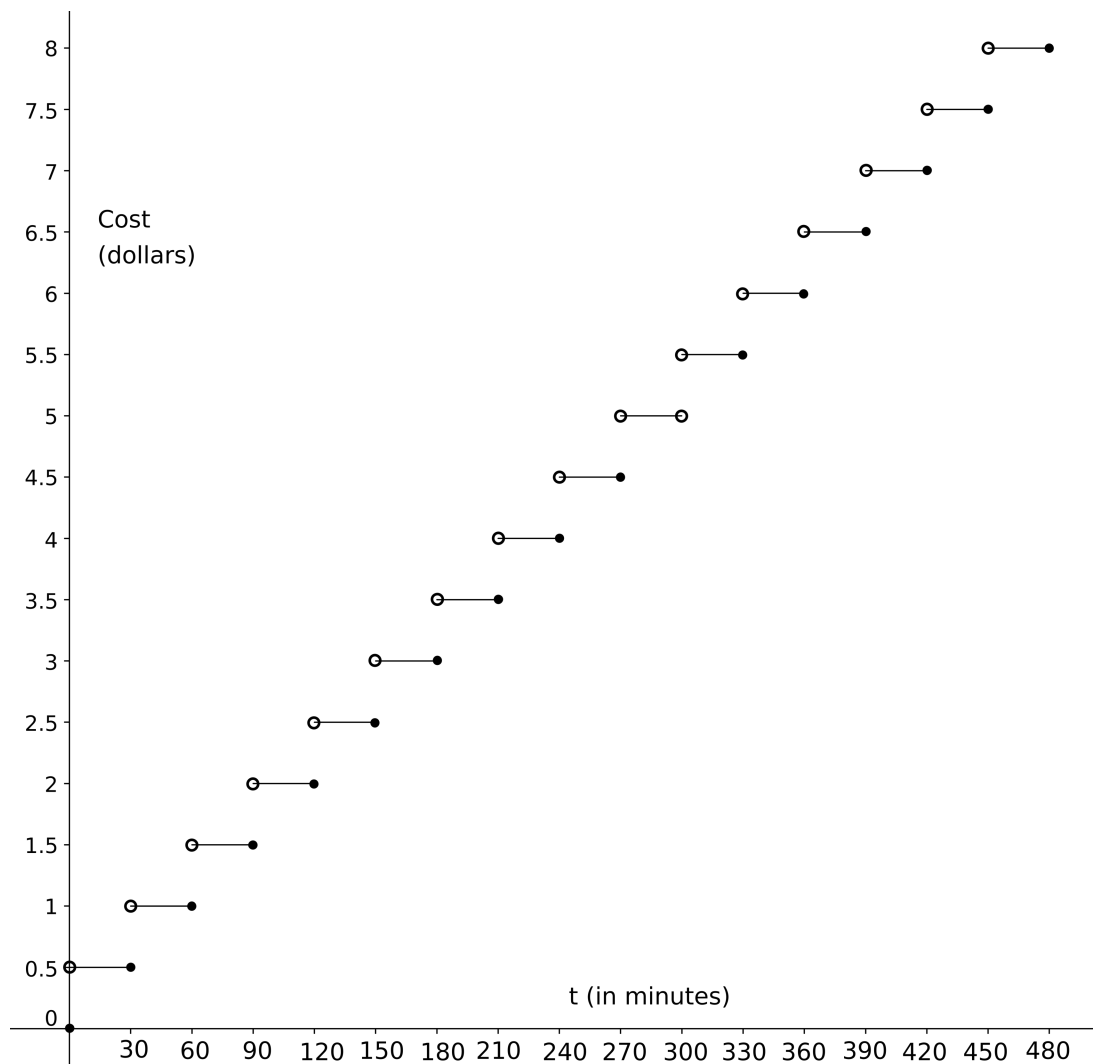
Solution: 1

a.

$t$ (minutes)	$C(t)$ (dollars)
0	0
15	0.50
20	0.50
35	1.00
75	1.50
125	2.50

As a sample calculation, we note that 125 minutes is two full hours (four half-hours) and part of another half hour. Since the ticketing scheme rounds up to the nearest half-hour, we have to pay for five half-hours, at a total cost of \$2.50.

b.



- c. Yes,  $C$  is a function of  $t$  because for a given parking time of  $t$  minutes there is exactly one charge.
- d. No,  $t$  is not a function of  $C$  because there are values of  $C$  that have many values of  $t$  associated with them. For example if you end up paying \$0.50 then you could have parked for any period of time up to half an hour, that is, when  $C = 0.50$  then  $t$  can have any value in the range  $0 < t \leq 30$ . So the "input"  $C = 0.50$  yields more than one output, which is not allowed for a function.



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