Unit 1 Test Review: Functions

Matching: Write the letter of the graph next to the appropriate function rule.

A. \[ y = -2x^3 - 3 \]  \( \text{E} \)
B. \[ y = 2^x - 3 \]  \( \text{A} \)
C. \[ y = -2x^2 - 3 \]  \( \text{B} \)
D. \[ y = 2x - 3 \]  \( \text{D} \)
E. \[ y = 2x^2 - 3 \]  \( \text{F} \)
F. \[ y = 2x^{0.5} \]  \( \text{C} \)

7. The graph shows the speed a student traveled on the bus on the way to school.

a. What do the flat parts of the graph represent?

   Constant speed.

b. Circle the sections of the graph that show the speed decreasing.

8. Sketch a graph to describe the following. Explain the activity in each section of the graph. Do not forget to label your axes.

   The height of an airplane above the ground flying from Detroit to Orlando.
9. Find the domain and range of the relation.

\(\{(-3, -7), (-1, -3), (0, -1), (2, 3), (4, 7)\}\)

Domain: \([-3, -1, 0, 2, 4]\)

Range: \([-7, -3, -1, 3, 7]\)

10-12: For each of the following:
   a. Determine whether each is a function.
   b. State the domain.
   c. State the range.

10. 
   11. 
   12.

10a. no

10b. \(\mathbb{R}\)

10c. \(\mathbb{R}\)

11a. no

11b. \(-6 \leq x \leq 3\)

11c. \(\{1, 3, 5\}\)

12a. no

12b. \(-5 \leq x \leq 5\)

12c. \(-7 \leq x \leq 7\)

13. Determine whether each of the following relations is a function. If not, explain why?

   a. \(\{(4, -3), (-2, -2), (0, -1), (1, \frac{1}{2})\}\)

   yes

   b. 

   yes

   No. Failed vertical line test.
14. Evaluate the function rule for \( x = -\frac{1}{2} \).

\[
\begin{align*}
f(-\frac{1}{2}) &= -\frac{1}{2} + 3 \quad & f(-\frac{1}{2}) &= -4(-\frac{1}{2}) \quad & f(-\frac{1}{2}) &= 2\left| -\frac{1}{2} \right| - 1 \\
&= 2\frac{1}{2} \quad & &\quad &\quad & f(-\frac{1}{2}) &= 0
\end{align*}
\]

15. For a car traveling at a constant rate of 60 mi/h, the distance traveled is a function of the time traveled.

a. Express this relation as a function.
\[ d(t) = 60t \]

b. Find the range of the function when the domain is \{1, 5, 10\}.
\[ \{60, 300, 600\} \]

c. What do the domain and range represent?

Domain: hours traveled
Range: time traveled

16. Write a function rule for the table.

\[
\begin{array}{c|c}
\hline
x & f(x) \\
\hline
0 & 3 \\
2 & 5 \\
4 & 7 \\
6 & 9 \\
\hline
\end{array}
\]

\[ f(x) = x + 3 \]

17. a. Write a function rule to determine the change you would get from a $20 bill when purchasing items that cost $1.25 each.

\[ f(x) = 20 - 1.25x \]

b. Calculate the change when five of these items are purchased.

\[ f(5) = 20 - 1.25(5) = $13.75 \]

c. Can you purchase 17 of these items with a $20 bill?

\[ f(17) = 20 - 1.25(17) = -1.25 \]

No, you would be $1.25 short.
You work for a construction company that gives job foremen cellular phones to communicate with the head office from job sites. Your boss asks you to examine the cellular service your company receives. The cellular company your firm uses has cellular service with a monthly charge for each phone and a charge of $.15 per minute. You can’t find any statement about the monthly fee, but you did find last month’s bill for one of the phones, 125 minutes worth of calls and a total charge of $38.75.

a. What is the monthly fee (without talking time)? Explain how you found your answer.

\[ 0.15m + F = \text{Bill} \]

\[ 0.15(125) + F = 38.75 \]

\[ 18.75 + F = 38.75 \]

\[ F = 20 \]

b. Write in words how to find the charge based on the number of minutes.

Multiply the known minutes by .15, then subtract from the total bill (38.75) to get $20.

c. Make a table and a graph to represent this situation. Be sure to label and correctly scale the axes.

<table>
<thead>
<tr>
<th># of minutes</th>
<th>0</th>
<th>10</th>
<th>20</th>
<th>30</th>
<th>40</th>
<th>50</th>
<th>60</th>
<th>70</th>
<th>80</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Cost</td>
<td>20</td>
<td>21.5</td>
<td>23</td>
<td>24.5</td>
<td>26</td>
<td>27.5</td>
<td>29</td>
<td>30.5</td>
<td>32</td>
</tr>
</tbody>
</table>

d. To help you study this further, write an algebraic rule (equation) to compute the cost for each phone if it is used \( x \) minutes. (make sure the rule works with your table.)

\[ f(x) = 0.15x + 20 \]

e. Your boss asked you to send a memo to the foremen telling them that they have a $50 allowance for their cellular phone use. To make it easier for them, figure out how many minutes this gives them. Explain how you found your answer. Indicate on both the table and graph where the $50 allowance is located.

\[ 50 = 0.15x + 20 \]

\[ 20 = 0.15x \]

\[ 30 = 0.15x \]

\[ x = 200 \text{ minutes} \]