Summative Assessment

1. B.S.P.1 Construct and interpret scatter plots by bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association and nonlinear association.

2. B.F.1 Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output.

3. B.F.2 Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a linear function represented by a table of values and linear function represented by an algebraic expression, determine which function has the greater rate of change.

4. B.F.3 Interpret the equation y = mx + b as defining a linear function whose graph is a straight line; give examples of functions that are not linear. For example, the function A = s^2 giving the area of a square as a function of its side length is not linear because its graph contains the points (1,1), (2,4), and (3,9) which are not on a straight line.

5. B.F.4 Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x,y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models and in terms of its graph or a table of values.

6. B.F.5 Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.

7. 8.EE.5 Graph proportional relationships interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. For example, compare a distance-time graph to a distance-time equation to determine which of the two moving objects has greater speed.

Calculations

Unit 3 Pre-Test & Study Guide

Calculator Allowed

For questions 1-3, identify the unit rate or slope in each question. Show work. (8.EE.5)

1.

<table>
<thead>
<tr>
<th>x</th>
<th>-2</th>
<th>-1</th>
<th>0</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>y</td>
<td>-8</td>
<td>-4</td>
<td>0</td>
<td>4</td>
<td>8</td>
</tr>
</tbody>
</table>

\[
\begin{align*}
&\text{Rate} = \frac{-8}{-2} = 4 \\
&\text{Rate} = \frac{4}{1} = 4
\end{align*}
\]
For questions 1-3, identify the unit rate or slope in each question. Show work. (8.EE.5)

1pt
2. \( y = \frac{4}{5}x \)

1pt
3. 

1pt

Determine if the following information is a function or not. (8.F.1) Explain your reasoning.

1pt
4. INPUT OUTPUT

Yes, each input has exactly one output.
a. Create a scatter plot that shows the numbers of hybrid vehicles sold in a city from 2009 to 2014 using the following data: (2009, 200), (2010, 250), (2011, 275), (2012, 325), (2013, 400), (2014, 425). Be sure to include all necessary labels. (8.SP.1)

![Graph showing hybrid vehicles sold over years]

b) In what year were 400 hybrid vehicles sold? (8.SP.1)

2013

c) About how many hybrid vehicles were sold in 2012? (8.SP.1)

325

d) Describe the relationship shown by the data. (8.SP.1)

positive, linear, strong relationship between the year and # vehicles sold

Describe the relationship between the data. Identify any outliers or clusters. (8.SP.1)

6. Relationship: negative linear

Outliers, if any: (24, 20)

Clusters, if any:
Find the slope of the following data. (8.F.4) Be sure to show work.

7. \((3,2) (5,7)\) 
\[
\frac{7-2}{5-3} = \frac{5}{2}
\]

8. \((8,2) (3,6)\) 
\[
\frac{6-2}{3-8} = \frac{-4}{-5}
\]

Write the equation that the ordered pairs go through. All answers should be in slope intercept form. (8.F.4)

9. \((3,6) (-3,-6)\)
\[
\frac{-6-6}{-3-3} = \frac{-12}{-6} = 2
\]
\(0 = 3(2) + b\)
\(6 = 6 + b\)
\(b = 0\)
\(y = 2x\)

10. \((3,2) (5,7)\)
\[
\frac{7-2}{5-3} = \frac{5}{2}
\]
\(2 = \frac{5}{2} (\frac{3}{2}) + b\)
\(2 = \frac{15}{4} + b\)
\(-\frac{5}{2} = b\)
\(y = \frac{5}{2}x - \frac{5}{2}\)

Write the following equations in slope intercept form. (8.F.4)

11. \(2x - 3y = -7\)
\[
\frac{-2x}{-3} + \frac{-7}{-3} = \frac{2}{3}x + \frac{7}{3}
\]
\(y = \frac{2}{3}x + \frac{7}{3}\)

12. \(y - 12x = 25\)
\[
\frac{12x}{12} + \frac{25}{12x} = y
\]
\(y = 12x + \frac{25}{12}\)

13. For question 11 above, write a real world situation that the equation would represent. Be sure to include what the slope and y-intercept mean. (8.F.3)

You finished reading \(\frac{1}{3}\) of a book six hours ago. Today you read \(\frac{2}{3}\) of the book each hour. How many hours until you finish the whole book?
For questions 14 - 17, graph the following equations. (8.EE.5)

14. \( y = -3x + 3 \)

15. \( y = -2x + 2 \)

16. \( y = 2x - 4 \)

17. \( y = \frac{3}{2}x - 3 \)
For questions 18-19, write the equation of the lines graphed below. (8.F.4)

18. 

\[ y = -\frac{2}{3}x - 2 \]

Find slope and y-intercept (8.F.3).

19. 

\[ y = -1 \]

20. \( y = -3x + 2 \) \( m = -3, b = 2 \)

21. Graph the equation from #20. (8.EE.5)
22. Identify the parts that are increasing and decreasing of the graph. (8.F.5)

- Increasing: $(-\infty \rightarrow -2) \ (2 \rightarrow \infty)$
- Decreasing: $(-2 \rightarrow 2)$

23. Circle the correct answer: Does this graph have a minimum, a maximum, both or neither? (8.F.5)

If it has a minimum, what is it?
If it has a maximum, what is it? $(2, 1)$
24. Answer the following questions comparing function equations, graphs, tables and descriptions.

Your family is deciding which activity to participate in while on your vacation. Here is the information about the cost for admission for all of your family members. Included in the cost is the initial fee (a one-time fee regardless of the number of people in your group). (8.F.2)

<table>
<thead>
<tr>
<th>City Tour</th>
<th>City Zoo</th>
</tr>
</thead>
<tbody>
<tr>
<td>Charges $25 per person and an initial fee of $10</td>
<td>The total cost can be modeled by $y - 15 = 20x$</td>
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<tr>
<th>Family Amusement Park</th>
<th>Architecture Tour</th>
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</thead>
<tbody>
<tr>
<td>$x$-axis scale = 1</td>
<td></td>
</tr>
<tr>
<td>$y$-axis scale = 5</td>
<td></td>
</tr>
<tr>
<td>$y = 10x + 10$</td>
<td></td>
</tr>
<tr>
<td>$(0, 10)$</td>
<td></td>
</tr>
</tbody>
</table>

24a) Which activity is the cheapest for 1 person? How do you know?

When $x = 1$, $y = 20$  
That is the lowest cost in the graph.

24b) Which activity is the most expensive for 1 person? How do you know?

When $x = 1$, $y = 35$  
That is the highest cost in the graph.

24c) Which activity has the cheapest initial fee? How do you know?

$y - 10x = 5$
22. Identify the parts that are increasing and decreasing of the graph. (8.F.5)

![Graph](image)

23. Circle the correct answer: Does this graph have a minimum, a maximum, both or neither? (8.F.5)

![Graph](image)

If it has a minimum, what is it?

If it has a maximum, what is it?
24. Answer the following questions comparing function equations, graphs, tables and descriptions.

Your family is deciding which activity to participate in while on your vacation. Here is the information about the cost for admission for all of your family members. Included in the cost is the initial fee (a one time fee regardless of the number of people in your group). (8.F.2)

Write equations in \( y = mx + b \)

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<th>( y = 25x + 10 )</th>
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<th>Architecture Tour</th>
</tr>
</thead>
<tbody>
<tr>
<td># of people</td>
</tr>
<tr>
<td>Total Cost</td>
</tr>
</tbody>
</table>

\( y = 20x + 5 \)

24a) Which activity is the cheapest for 1 person? How do you know? **City Tour** and **City Zoo** - the y value is the smallest when \( x = 1 \).

24b) Which activity is the most expensive for 1 person? How do you know? **Family Amusement Park**.

24c) Which activity has the cheapest initial fee? How do you know? **Architecture Tour** - the b-value is the smallest.