RLP-ALG1B · RLP Algebra 1B — Functions, Exponential and Quadratic Models

Unit 1: Functions

Practice Workbook. The same problems, in the same order, as the Practice sections of the online lessons.

Name _____ Period _____

Lesson 1.1 — One Input, One Output: What Makes a Function

FLUENCY

1. If $f(x) = x^2 + 4x$, find $f(1)$.

2. If $f(x) = -4x - 1$, find $f(-2)$.

3. If $f(x) = -x^2 + 5x + 9$, find $f(5)$.

4. If $f(x) = 2x^2 - 5x$, find $f(5)$.

5. If $f(x) = 3x^2 - 3x + 5$, find $f(-3)$.

6. If $f(x) = x^2 + 3x + 3$, find $f(2)$.

7. For B(t) = 100 − 12.5t, find B(5) and solve B(t) = 25.

8. For C(n) = 4 + 1.5n, find C(3) and solve C(n) = 11.5.

APPLICATION

9. A transit fare card starts with $40 and each ride costs $2.50 (illustrative): f(r) = 40 − 2.5r. Find f(6), and state a sensible domain and range.

10. Does the table {(1, 3), (2, 5), (1, 7), (4, 9)} represent y as a function of x? Explain.

11. T(h) is the temperature in °F in Kansas City h hours after midnight on a July day. Interpret T(14) = 96, and say what T(h) = 80 asks.

CHALLENGE

12. For f(x) = 3x − 7, find a so that f(a) = f(2a) − 12, and check.

REVIEW

13. Solve: $-7x + 12 = -4x + 6$

14. For the data 22, 30, 32, 33, 34, 36, 40: find the mean, median, range and interquartile range. (Find the quartiles as the medians of the lower and upper halves, leaving out the overall median when the count is odd.)

Lesson 1.2 — Reading Graphs and Tables: Features and Average Rate of Change

FLUENCY

1. If $f(x) = 3x^2 - 6x + 5$, find $f(3)$.

2. If $f(x) = -2x^2 + 5x - 8$, find $f(-4)$.

3. If $f(x) = -x^2 + 9$, find $f(1)$.

4. Find the average rate of change of $f(x) = x^2$ from $x = 2$ to $x = 5$.

5. Find the average rate of change of $h(t) = -16t^2 + 64t$ from $t = 0$ to $t = 1$.

6. Find the average rate of change of $f(x) = 4x - 3$ from $x = -2$ to $x = 6$.

7. Where is $f(x) = (x - 3)^2$ increasing, and what is its minimum?

APPLICATION

8. A reservoir's storage (million acre-feet, illustrative) at the start of months 0 to 4 is 2.1, 2.4, 2.9, 3.1, 3.0. Find the average rate of change from month 0 to 2 and from month 3 to 4, with units.

9. For the hike in Lesson 1.2 (4,200 ft at hour 1, 6,000 ft at hour 4), find the average rate of change from hour 1 to hour 4.

10. A car's value is V(t) = 24,000(0.85)^t dollars after t years. Find the average rate of change over the first 3 years.

CHALLENGE

11. For $f(x) = x^2$, find the average rate of change from $x = a$ to $x = a + 2$ in terms of a, and check your formula with $a = 1$.

REVIEW

12. Find the slope of the line through $(7, -7)$ and $(-1, 8)$.

13. Solve and graph on a number line: $-7x + 2 > 58$

Lesson 1.3 — Pieces, Steps and Corners: Piecewise and Absolute Value Functions

FLUENCY

1. Solve: $|x - 3| = 9$

2. Solve: $|x + 4| = 8$

3. Solve: $|x + 3| = 4$

4. The garage charges $3 per hour or part of an hour, maximum $15. Find P(0.75), P(3.2) and P(7).

5. For $g(x) = |x - 2|$, find $g(-3)$, $g(2)$ and $g(9)$.

6. $f(x) = 2x + 1$ for $x < 1$ and $f(x) = 5 - x$ for $x \geq 1$. Find $f(-2)$, $f(1)$ and $f(4)$.

APPLICATION

7. A bike share (illustrative) charges $1 to unlock, $0.30 a minute for the first 30 minutes and $0.45 a minute after that. Write C(m) as a piecewise function and find C(20) and C(45).

8. Solve $|x - 1| = 0.5x + 2$ piece by piece, and check both solutions.

9. Make tables of f(x) = 2x and g(x) = x + 3 for x = 0 to 5. Where does f(x) = g(x)? Explain what the matching row means on the graphs.

CHALLENGE

10. For which slopes m does the line y = mx + 3 meet the graph of y = |x − 2| exactly once?

REVIEW

11. Solve the system: $-4x - 6y = 28$ and $4x + y = 2$

12. Write the equation, in slope-intercept form, of the line through (0, −2) and (2, −7).

Lesson 1.4 — Working Backward: Tiered Rates and Inverse Functions

FLUENCY

1. Find the inverse of $f(x) = -3x + 4$.

2. Find the inverse of $f(x) = 4x + 5$.

3. Find the inverse of $f(x) = -x - 9$.

4. Find the inverse of $f(x) = 6x + 7$.

5. Find the inverse of $f(x) = -4x - 7$.

6. Find the inverse of $f(x) = -x + 8$.

7. Find the inverse of $C = 0.40k$.

8. Find the inverse of $F = 1.8C + 32$.

APPLICATION

9. A taxi charges $F(m) = 3.5 + 2.75m$ dollars for m miles (illustrative). How far can you ride for $36.50?

10. With the Lesson 1.4 tiered rate, how many kWh give a $170 bill? A $90 bill?

11. Plan A is given by a table: 200 kWh costs $90 and 400 kWh costs $180. Plan B is the tiered rate. Which is cheaper at 500 kWh, and by how much?

CHALLENGE

12. Explain why $f(x) = x^2$ (all real x) has no inverse, and give a domain on which it does, with the inverse.

REVIEW

13. Solve the system: $-4x - 5y = 9$ and $x - 2y = 14$

14. Solve and graph: $|x - 1| \geq 7$

Unit 1 checkpoint

1. For $B(t) = 100 - 12.5t$, what is $B(4)$?
   A. 50
   B. 4
   C. 87.5
   D. 12.5
2. True or false: A graph that a vertical line crosses twice is a function.
3. For the battery, a sensible domain is $0 \leq t \leq$ _____.
4. Average rate of change of the hike from hour 0 (3,000 ft) to hour 4 (6,000 ft)?
   A. 750 ft per hour
   B. 3,000 ft per hour
   C. 1,500 ft per hour
   D. 600 ft per hour
5. The parking garage charges $3 per started hour; P(2.5) = $_____.

6. Where is the vertex of $y = |x - 2|$?
   A. $(2, 0)$
   B. $(-2, 0)$
   C. $(0, 2)$
   D. $(0, -2)$

7. $y = f(x)$ and $y = g(x)$ meet at $(-1, 4)$ and $(3, 12)$. The solutions of $f(x) = g(x)$ are…
   A. $x = -1$ and $x = 3$
   B. $x = 4$ and $x = 12$
   C. $(-1, 4)$ only
   D. none

8. The inverse of $F(m) = 3.5 + 2.75m$ is…
   A. $m = (F - 3.5)/2.75$
   B. $m = 1/(3.5 + 2.75m)$
   C. $m = F/2.75 - 3.5$
   D. $m = 2.75F + 3.5$

9. With the tiered rate, $C(450) = \$$_____.

10. A \$195 bill corresponds to _____ kWh.

11. True or false: The tiered plan and the flat \$0.45 plan cost the same at 600 kWh.

12. Which function has an inverse on all real numbers?
   A. $f(x) = 2x + 1$
   B. $f(x) = x^2$
   C. $f(x) = |x|$
   D. $f(x) = 5$