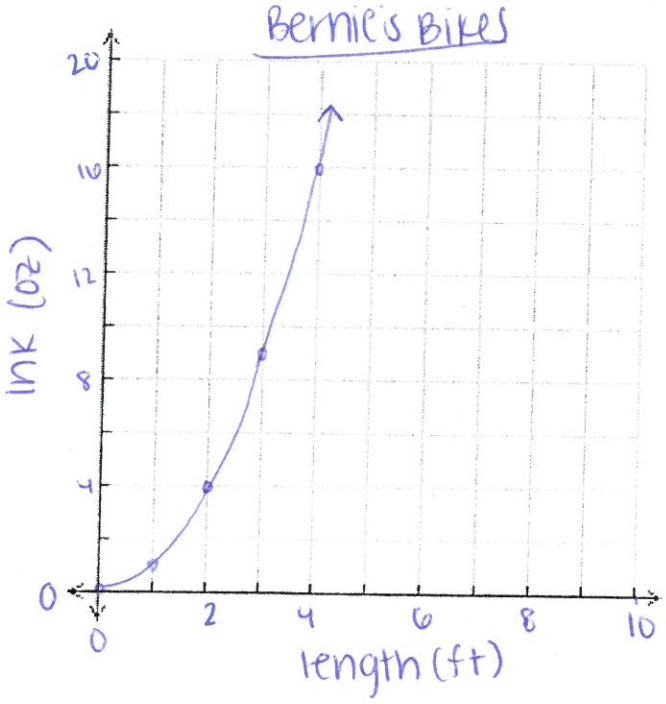
GS 2
Module 4.6 Notes

Name Key
Period

Bernie owns Bernie's Bike Shop and is advertising his company by taking his logo and placing it around town on different-sized signs. After creating a few signs, he noticed a relationship between the amount of ink he needs for his logo and the size of the sign.

1. The table below represents some of the signs Bernie has created and the relationship between the amount of ink needed versus the size of the sign. Complete the information below to help Bernie see this relationship (don't forget to label your graph).

Length of sign (in feet)	Ink needed (in ounces)
3	9
4	16
2	4
15	225
x	x^2



Function: $f(x) = x^2$

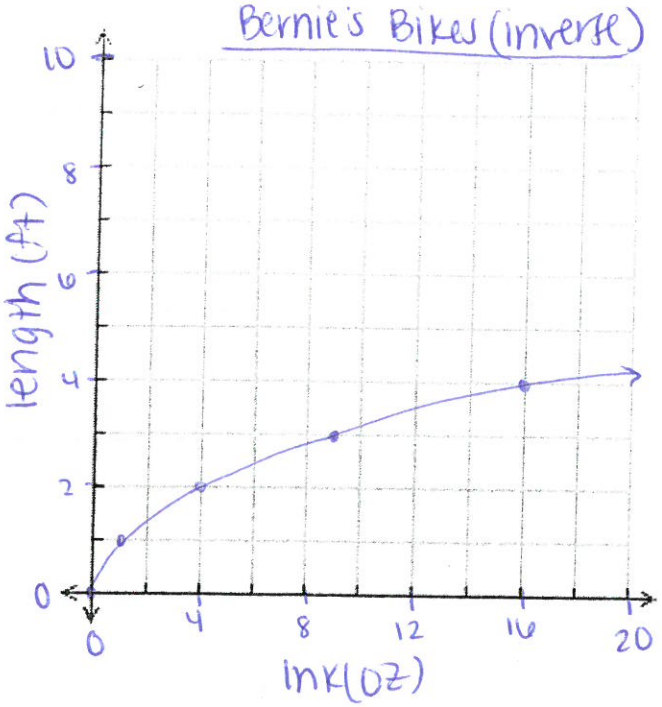
x Domain: $[0, +\infty)$ $x \geq 0$

y Range: $[0, +\infty)$ $y \geq 0$

2. Using question 1, complete the information below for the ***inverse*** of this function (don't forget to label your graph).

ink needed (oz)	length (ft)
9	3
16	4
4	2
225	15
x	$\pm\sqrt{x}$

$f(x) = x^2$
$y = x^2$
$\pm\sqrt{x} = \sqrt{y^2}$
$y = \pm\sqrt{x}$
$f^{-1}(x) = \pm\sqrt{x}$



Function: $f^{-1}(x) = \pm\sqrt{x}$

Domain: $[0, \infty)$ $x \geq 0$

Range: $[0, \infty)$ $y \geq 0$

3. Explain in words what the inverse function represents.

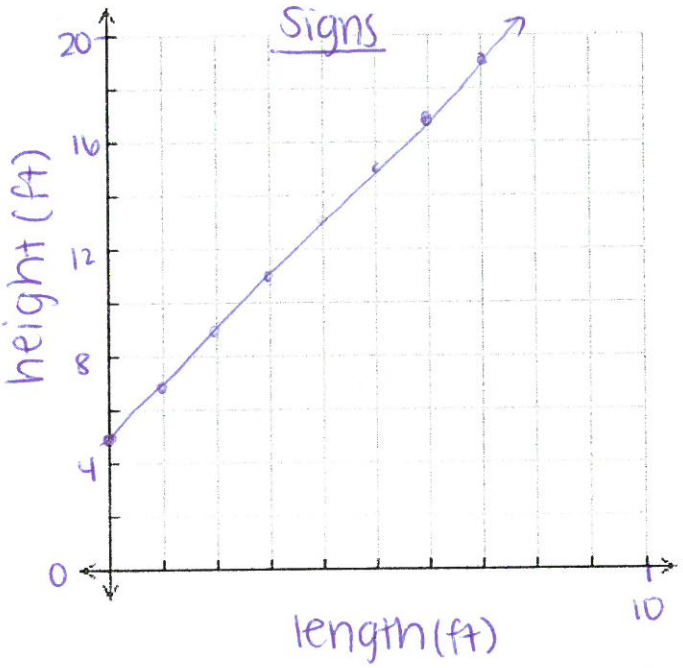
If he knows how much ink he has, it tells him how long his sign can be.

Bernie likes the look of his signs when the vertical height is 5 inches more than twice the horizontal length.

4. Complete the table and write a function for the vertical height of signs with a given horizontal length. Use Bernie's verbal rule to help you decide what numbers go in the table.

Verbal rule: The vertical height is 5 ~~inches~~ feet more than twice the horizontal length.

Length of sign (in feet)	Vertical height (in feet)
3	11
4	13
2	9
15	35
x	2x + 5



Function: $f(x) = 2x + 5$

Domain: $[0, +\infty)$ $x \geq 0$

Range: $[5, +\infty)$ $y \geq 5$

5. Create a table for the inverse function $f^{-1}(x)$. Write a verbal rule that will help Bernie understand what your inverse function does. Label the table to clearly indicate what the input variable x represents for your inverse function.

height (ft)	length (ft)
11	3
13	4
9	2
35	15
x	

$f(x) = 2x + 5$

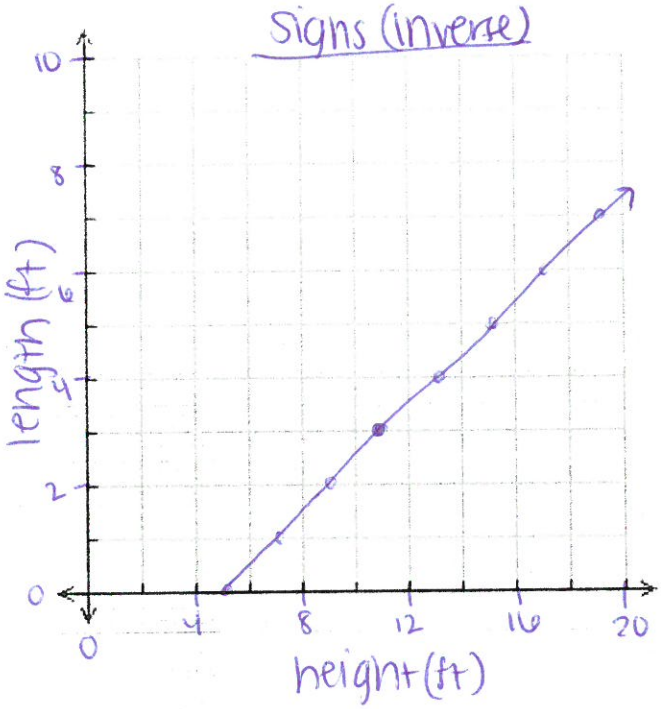
$y = 2x + 5$

$x = 2y + 5$

$-5 \quad -5$

$\frac{x-5}{2} = \frac{2y}{2}$

$y = \frac{1}{2}x - \frac{5}{2}$



Function: $f^{-1}(x) = \frac{1}{2}x - \frac{5}{2}$

Domain: $[5, +\infty)$ $x \geq 5$

Range: $[0, +\infty)$ $y \geq 0$

Verbal rule: The horizontal length is 2.5 feet less than half the vertical height.

6. In general, describe how you can find the inverse rule for a function by listing the order of operations in the original function.

we switched x and y, then we did the opposite operations in the opposite order.

Determine the inverse rule for each function, then sketch the graphs and state the domain and range for both the original function and its inverse.

7. $g(x) = 3x + 2$; $g^{-1}(x) = \frac{1}{3}x - \frac{2}{3}$

Domain: $\mathbb{R}$ Domain: $\mathbb{R}$

all real numbers

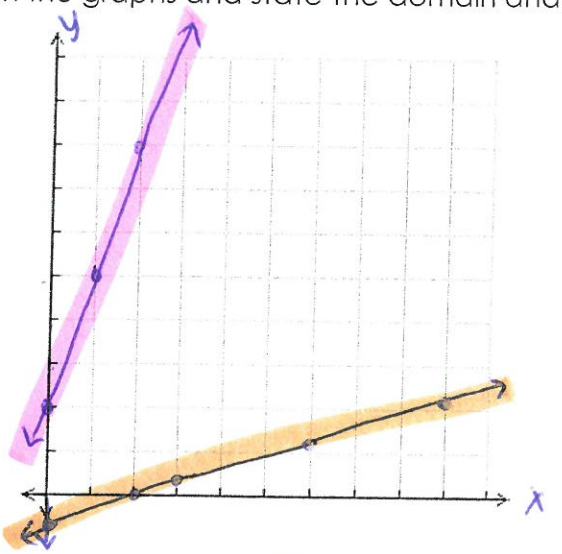
Range: $\mathbb{R}$ Range: $\mathbb{R}$

$y = 3x + 2$

$x = 3y + 2$

$-2 \quad -2$

$\frac{x-2}{3} = \frac{3y}{3}$ $y = \frac{1}{3}x - \frac{2}{3}$



8. $f(x) = x^2 - 1$; $f^{-1}(x) = \pm\sqrt{x+1}$

Domain: $\mathbb{R}$ Domain: $x \geq -1$

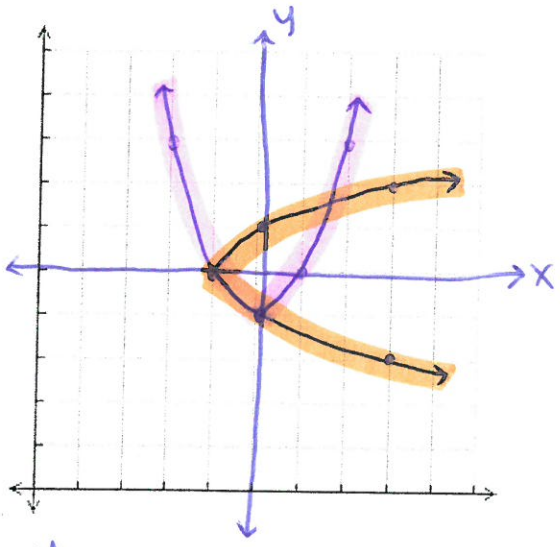
Range: $y \geq -1$ Range: $\mathbb{R}$

$y = x^2 - 1$

$x = y^2 - 1$

$+1 \quad +1$

$\pm\sqrt{x+1} = \sqrt{y^2}$



9. $h(x) = x^3$; $h^{-1}(x) = \sqrt[3]{x}$

Domain: $\mathbb{R}$ Domain: $\mathbb{R}$

Range: $\mathbb{R}$ Range: $\mathbb{R}$