Name __Key__   Date _____ Pd ____

5.6 Inverse Functions DAY ONE CYU

CONCEPTS	BASIC	INTERMEDIATE	ADVANCED
Solving for x	1	2	3
Finding inputs given an output	1	2	3
Inverse of functions	4, 10	5, 11	6, 12, 13
Graphing functions & Inverses	4	5	6
Graphing with domain restrictions	7	8	9
Determine if functions are inverses			14, 15
Horizontal Line Test	10	11	12, 13
Real-World Application	16		

Solve y = f(x) for x. Then find the input(s) when the output is − 3.

1. $f(x) = 3x^3$

$x = \sqrt[3]{\frac{y}{3}} j - 1$

2. $f(x) = 2x^4 - 5$
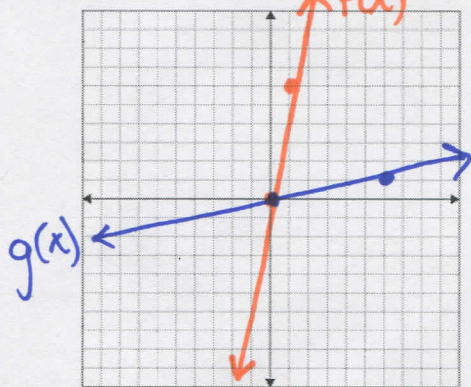
$x = \pm \sqrt[4]{\frac{y+5}{2}} j \pm 1$

3. $f(x) = (x-5)^3 - 1$

$x = \sqrt[3]{y+1} + 5$

$(\sqrt[3]{-2} + 5 ; -3)$

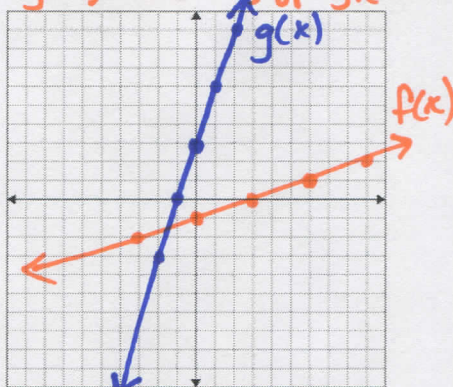*Find the inverse of the function. Then graph the function and its inverse.*

4. f(x) = 6x
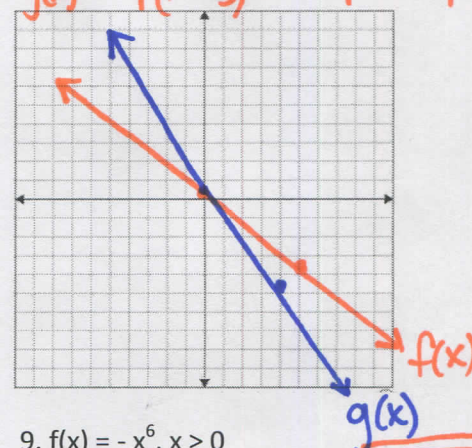
$g(x) = \frac{1}{6}x$

5. $f(x) = \frac{1}{3}x - 1$

$g(x) = 3(x+1)$ or $3x+3$
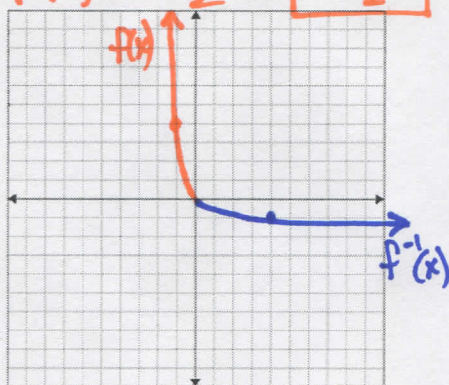

6. $f(x) = -\frac{4}{5}x + \frac{1}{5}$

$g(x) = -\frac{5}{4}(x - \frac{1}{5})$ or $-\frac{5}{4}x + \frac{1}{4}$

Find the inverse of the function. Then graph the function and its inverse.

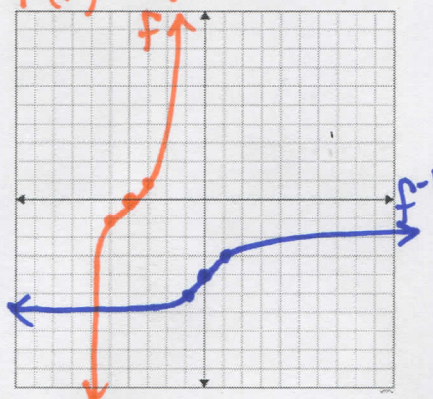**7.** $f(x) = 4x^2, x \le 0$

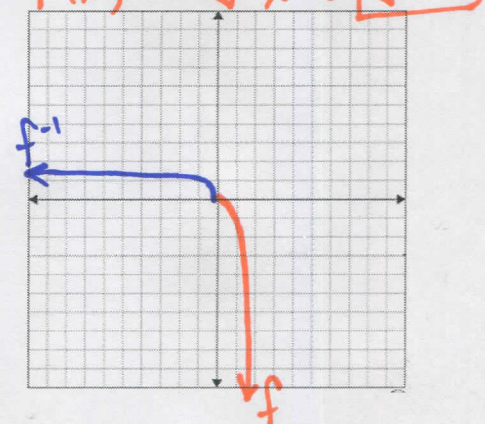$f^{-1}(x) = \pm \frac{\sqrt{x}}{2}$ so $\boxed{-\frac{\sqrt{x}}{2}}$

8. $f(x) = (x+4)^3$

$f^{-1}(x) = \sqrt[3]{x} - 4$

9. $f(x) = -x^6, x \ge 0$

$f^{-1}(x) = \pm \sqrt[6]{-x}$ so $\boxed{\sqrt[6]{-x}}$

Determine whether the inverse f is a function. Then find the inverse.

10. $f(x) = \sqrt{x+4}$ yes

$g(x) = x^2 - 4; \ x \geq 0$
$[0, \infty)$

11. $f(x) = -3\sqrt[2]{\dfrac{4x-7}{3}}$ yes

$f^{-1}(x) = \dfrac{x^2 + 21}{12}; \ x \leq 0$
$(-\infty, 0]$

12. $f(x) = \dfrac{1}{2}x^5$ yes

$g(x) = \sqrt[5]{2x}$

13. $f(x) = -\sqrt[3]{\dfrac{2x+4}{3}}$ yes

$f^{-1}(x) = \dfrac{-3x^3 - 4}{2}$

Determine whether the functions are inverses.

14. $f(x) = 2x - 9$ & $g(x) = \dfrac{x}{2} + 9$

not
inverses

15. $f(x) = \sqrt[5]{\dfrac{x+9}{5}}$ & $g(x) = 5x^5 - 9$

yes
inverses

16. **MODELING WITH MATHEMATICS** The maximum hull speed v (in knots) of a boat with a displacement hull can be approximated by $v = 1.34\sqrt{l}$, where l is the waterline length (in feet) of the boat. Find the inverse function. What waterline length is needed to achieve a maximum speed of 7.5 knots?

$l = \left(\dfrac{v}{1.34}\right)^2; \ \approx 31.3 \text{ft}$

Waterline length

CYU Reflection: *How far can you go: basic, intermediate, or advanced?*
Rate your mastery level!
How confident are you with the skills this CYU covered? Circle the score you would give yourself.

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Basic | | Intermediate | | | Advanced | | Solved ALL! |