No Quiz-work on these problems as a starter.

Find the inverse of each function algebraically:

1) $g(n) = 2 + n^5$ 2) $g(x) = -\dfrac{2}{x+3} - 2$ 3) $g(n) = \dfrac{3n - 12}{4}$ 4) $g(x) = -2x^3 + 1$

5) $g(x) = -2x - 8$ 6) $g(x) = -x - 3$ 7) $y = \log_4 (x - 4)$ 8) $y = \log_x 4 + 6$

9) $y = 6^x - 7$ 10) $y = \dfrac{10^x}{3}$

1.3 HW will be checked off today.

1- switch x & y.

2- solve for y.

1) $g(n) = 2 + n^5$

$g^{-1}(n) = \sqrt[5]{n-2}$

② $x = \dfrac{-2}{y+3} - 2$ ← 2) $g(y) = \dfrac{2}{x+3} - 2$

$(y+3)(x+2) = \dfrac{-2}{y+3}(y+3)$

$g^{-1}(x) = -\dfrac{2}{x+2} - 3$

$\dfrac{(y+3)(x+2)}{(x+2)} = \dfrac{-2}{(x+2)}$

3) $g(n) = \dfrac{3n-12}{4}$

$g^{-1}(n) = \dfrac{12+4n}{3}$

$y + 3 = \dfrac{-2}{x+2} - 3$
$ -3$

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

4) $g(x) = -2x^3 + 1$

$g^{-1}(x) = \sqrt[3]{\dfrac{-x+1}{2}}$

$org^{-1}(x) = \sqrt[3]{\dfrac{x-1}{-2}}$

5) $g(y) = -2x - 8$

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

⑤ $x = -2y - 8$

$\dfrac{x+8}{-2} = \dfrac{-2y}{-2}$

$\dfrac{x+8}{-2} = f^{-1}(x)$

$\boxed{\dfrac{x+8}{-2} = f^{-1}(x)}$

6) $g(x) = -x - 3$

$g^{-1}(x) = -x - 3$

or

$g^{-1}(x) = -(x+3)$

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7) $y = \log_4(x-4)$

$y = 4^x + 4$

8) $y = \log_x 4 + 6$

$y = 4^{\frac{1}{x-6}}$

9) $y = 6^x - 7$

$y = \log_6(x+7)$

10) $y = \dfrac{10^x}{3}$

$y = \log 3x$ $\log_4 b$ 4^x

⑦ $x = \log_4(y-4)$ $y = \log_a x$

$4^x = y - 4$ $x = a^y$

$4^x + 4 = y$ −OR− $4^x = 4^{\log_4(y-4)}$

$\boxed{4^x + 4 = f^{-1}(x)}$ $4^x = y - 4$

⑨ $x = 6^y - 7$ −OR− $x + 7 = 6^y$

$x + 7 = 6^y$ $\log_6(x+7) = \log_6 6^y$

$\log_6(x+7) = y$ $\log_6(x+7) = y$

⑩ $x = \dfrac{10^y}{3}$ −OR− $3x = 10^y$

$3x = 10^y$ $\log_{10}(3x) = \log_{10} 10^y$

$\log_{10}(3x) = y$ $\log_{10}(3x) = y$

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ers in exponential form with only positive exponents.

5   2. $2^3 \cdot 2^7$ 3. $7^2 \cdot 7^6$

$\cdot 10^7$ 5. $5^9 \cdot 5^{-6}$ 6. $p^2 p^5$ 7. $2^6 \cdot 2^{-3} \cdot 2$ 8. $b^{11} b^{-5}$

$$3^{5-8} = 3^{-3} = \frac{1}{3^3}$$

10. $\dfrac{9^8}{9}$ 11. $\dfrac{3^5}{3^8} = \dfrac{1}{3^3}$ 12. $\dfrac{7^{-4}}{7^{-8}} = \dfrac{7^8}{7^4} = 7^4$ 13. $\dfrac{p^{-3}}{p^5} = \dfrac{1}{p^3 p^5}$ 14. $\dfrac{x^7}{x^{-4}} = x^{11}$

$$\frac{3 \cdot 3 \cdot 3 \cdot 3 \cdot 3}{3 \cdot 3 \cdot 3 \cdot 3 \cdot 3 \cdot 3 \cdot 3 \cdot 3}$$

$$= \frac{1}{p^8}$$

nverse functions

Given the functions $f(x) = \sqrt{x} - 1$ and $g(x) = x^2 + 7$:

a.   Calculate $f(16)$ and $g(3)$.

b.   Write $f(16)$ as an ordered pair.   Write $g(3)$ as an ordered pair.

c.   What do your ordered pairs for $f(16)$ and $g(3)$ imply?

SM3H Summary

Topic & Lesson: <u>Functions & their Inverses</u>

Vocabulary:

- logarithms $\left(y = \log_a x \longrightarrow a^y = x \right)$
- inverse function $\left[f^{-1}(x) \right]$ - "undo" each other.
    $$\longrightarrow f(f^{-1}(x)) = x \text{ AND } f^{-1}(f(x)) = x$$

Key Concepts/Important Topics:

- <u>Linear Inverses</u> have reciprocal slopes $\left(\frac{5}{7} \rightarrow \frac{7}{5} \right)$
- <u>Quadratic Inverses</u> are only functions when we restrict the domain (take ½ of parabola).
- <u>Exponential inverses</u> are logarithms with the same base
    $$\rightarrow f(x) = 2^x \quad f^{-1}(x) = \log_2 x$$
- domain & range switch; x- & y-axes switch; points switch $(x,y) \rightarrow (y,x)$
- reflect across $y = x$
- Solve algebraically—switch x & y, solve for y.

1.5 Inverse Universe
A Practice Understanding Task

You and your partner have each been given a different set of cards. The instructions are:

1. Select a card and show it to your partner.
2. Work together to find a card in your partner's set of cards that represents the inverse of the function represented on your card.
3. Record the cards you selected and the reason that you know that they are inverses in the space below.
4. Repeat the process until all of the cards are paired up.

*For this task only, assume that all tables represent points on a continuous function.

Pair 1: _____   Justification of inverse relationship: _____

_____

Pair 2: _____   Justification of inverse relationship: _____

_____

Pair 3: _____   Justification of inverse relationship: _____

_____

Pair 4: _____   Justification of inverse relationship: _____

_____

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Pair 5: _____   Justification of inverse relationship: _____

_____

Pair 6: _____   Justification of inverse relationship: _____

_____

Pair 6: _____   Just~~ification of invers~~e relationship: _____

TYPO!

_____

Pair 7: _____   Justification of inverse relationship: _____

_____

Pair 8: _____   Justification of inverse relationship: _____

_____

Pair 9: _____   Justification of inverse relationship: _____

_____

Pair 10: _____   Justification of inverse relationship: _____

_____

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Answers

A1

A2

The function increases at a constant

A3

c).

Each input value, x, is squared and then 3

A4

A5

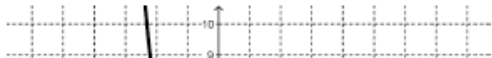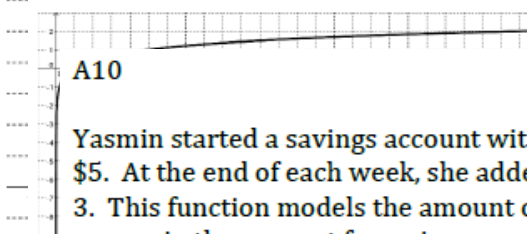| *x*	*y*

A6

A7

x	*y*

A8

A9

A10

Yasmin started a savings account with $5. At the end of each week, she added 3. This function models the amount of money in the account for a given week.

B1

B2

$\left(\; 2 \right.$

B3

B4

The y-intercept is (0,0) and the slope

x	*y*
-216	-6
64	4

B5

B6

x	*y*
3	0

B7

B8

x	*y*
-2	-3

B9

B10

The function is continuous and grows by an equal factor of 5 over equal intervals. The y-intercept is (0,1).

Homework/Classwork

Finish 1.5

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