Answer Key

1 B

2 A

3 B

4 B

1. characteristics of the square root parent function

2 $(x, y) \rightarrow$ (input, output)

$\rightarrow$ (domain, range)

~~Ex~~ $\{(0,-1), (2,-3), (3,-2)\}$

$D: \{(0, 2, 3)\}$

3 The relation fails the vertical line test

4 $g^{-1}(x)$ is the inverse for $g(x)$

$$g(x) = \frac{3}{5}x - 9$$

$$y = \frac{3}{5}x - 9$$

$$9 + x = \frac{3}{5}y - 9 + 9$$

$$\frac{5}{3}(x + 9) = \frac{3}{5}y \cdot \frac{5}{3}$$

$$\frac{5}{3}x + 15 = y$$

$$\frac{5}{3}x + 15 = g^{-1}(x)$$

Answer Key

5 C

6. B

7. C

8. D

9. B

5. $(f \cdot g)(x) = f(x) \cdot g(x)$

$= (x^2+2)(2x)$

Distribute g(x) to f(x)

$= 2x \cdot x^2 + 2 \cdot 2x$

$(f \cdot g)(x) = 2x^3 + 4x$

6. $\frac{f}{g}(x) = \frac{f(x)}{g(x)} = \frac{x^2-1}{x-1} = \frac{\cancel{(x-1)}(x+1)}{\cancel{(x-1)}}$

$= (x+1),\ x \neq 1$

7. $f(x) = 2x+6$, $f^{-1}(x)$?

$y = 2x+6$

$-6\ x = 2y+6-6$

$\frac{x-6}{2} = \frac{2y}{2}$

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

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

9. characteristic of parent functions,

8 $f(x) = 3x^2 - 2x$

$f(-4) = 3(-4)^2 - 2(-4)$

$= 3 \cdot 16 - 2(-4)$

$= 3 \cdot 16 + 8$

$f(-4) = 56$

10.C
11.D
12.C
13.C
14 B
15.D

10. using the horizontal line test, C is the only function that passes

11. $f^{-1}(x)$? if $f(x)=11-10x$

$f(x)=11-10x$

$y=11-10x$

$-11+x=11-10y-11$

$\frac{x-11}{-10}=\frac{-10y}{-10}$

$\frac{x}{-10}-\frac{11}{-10}=y$

$\frac{x}{-10}+\frac{11}{10}=y$

$\frac{11-x}{10}=f^{-1}(x)$

12. $f(x)=4x-11$

$f(5)=4(5)-11$

$=20-11$

$f(5)=9$

13. $f(x)=2x^2-3x$

$f(5)=2(5)^2-3(5)$

$f(5)=2\cdot25-15$

$=50-15$

$f(5)=35$

14. $f(x)$ is a constant function

Domain has all real numbers

Range is only $\{3\}$

$f(-7)=3$

Answer Key

16. C

17. D

18. free response

16. $(f \cdot g)(x) = f(x) \cdot g(x)$

$= (x^2 + 2x - 5)(2x + 4)$

By commutative property of multiplication, rewrite the expression

$= (2x + 4)(x^2 + 2x - 5)$

By distributive property

$= 2x(x^2 + 2x - 5) + 4(x^2 + 2x - 5)$

$= 2x \cdot x^2 + 2x \cdot 2x - 2x \cdot 5 + 4x^2 + 4 \cdot 2x - 4 \cdot 5$

$= 2x^3 + 4x^2 - 10x + 4x^2 + 8x - 20$

combine like terms

$= 2x^3 + 8x^2 - 2x - 20$

17. $(g - f)(x) = g(x) - f(x)$

$= (9x^3 - 4x^2 + 10x - 55) - (4x^3 + 3x^2 - 5x + 20)$

$= 9x^3 - 4x^2 + 10x - 55 - 4x^3 - 3x^2 + 5x - 20$

$= 5x^3 - 7x^2 + 15x - 75$

18.

$f(x) = \frac{x-6}{6}$

$y = \frac{x-6}{6}$

$6 \cdot x = \frac{y-6}{6} \cdot 6$

$6 + 6x = y - 6 + 6$

$6 + 6x = y$

$6 + 6x = f^{-1}(x)$

Goal:

$f(f^{-1}(x)) = x$

$f^{-1}(f(x)) = x$

$f(6 + 6x) = \frac{(6 + 6x) - 6}{6} = x$ ✓

$f^{-1}\left(\frac{x-6}{6}\right) = 6 + 6\left(\frac{x-6}{6}\right) = x$ ✓

By taking the composition of the function and it's inverse we can check if the expression does represent the inverse of $f(x)$

19. $f(x) = 5x - 3$

$g(x) = x^2 + 10$

$h(x) = -2x + 7$

$f(g(x)) = ?$

$f(x^2+10) = 5(x^2+10) - 3$

$= 5x^2 + 50 - 3$

$f(g(x)) = 5x^2 + 47$ false

$f(h(x)) = f(-2x+7)$

$= 5(-2x+7) - 3$

$= -10x + 35 - 3$

$= -10x + 32$ ✓

$g(h(x)) = g(-2x+7)$

$= (-2x+7)^2 + 10$

$= 4x^2 - 28x + 49 + 10$

$g(h(x)) = 4x^2 - 28x + 59$ ✓

$h(f(x)) = h(5x-3)$

$= -2(5x-3) + 7$

$= -10x + 6 + 7$

$h(f(x)) = -10x + 13$ ✓

19. B, C, D

20. B

21. free response

21. $f(x) = \frac{x}{2} + 9$

$g(x) = 2x - 18$

$f(g(x))$ $g(f(x))$

$f(2x-18)$

$= \frac{(2x-18)}{2} + 9$

$= x - 9 + 9$

$= x$

$f(g(x)) = x$

$g(f(x)) = g(\frac{x}{2} + 9)$

$= 2(\frac{x}{2} + 9) - 18$

$= x + 18 - 18$

$= x$

f(x) and g(x) are inverse of each other because when you take the composition of function for inverses, they "undo" each other.