Precalculus
Review 1.6-1.10

Name Key
Period_____ Date_____

1. Which of the following does not represent a function of x? can't have "y^2"

a) $3x^2+y=9$ b) $x+4y=22$ c) $x+2y^2=6$ d) $y=5x^2+3$ e) $3x^2+3|x|=y$

2. Which of the following does not represent a function of x?

a) $x^2+y^2=9$ b) $x+4y=-4y$ c) $x^2+2y=6$ d) $y=|x+3|$ e) $\frac{1}{2}|x|=y$

3. A function is a reflection over the x-axis and a vertical shift of 5 units up of the graph of $f(x)=|x|$. Write an equation for the function. $-f(x)$

$f(x)=-|x|+5$

4. A function is a reflection in the y-axis and a vertical shift of 4 units down of the graph of $f(x)=\sqrt{x}$. Write an equation for the function. $f(-x)$

$f(x)=\sqrt{-x}-4$

5. Given: $f(x)=2\sqrt{x+3}-4$. Write the equation of the reflection of f across the $y-axis$.

$f(x)=2\sqrt{-x+3}-4$ or $f(x)=2\sqrt{3-x}-4$

6. Given: $f(x)=x$ and $g(x)=x^2-7$, find $(f+g)(3)$.

$f(3)+g(3)=3+2=\boxed{5}$

7. Given $f(x)=x$ and $g(x)=x^2-7$, find $(fg)(3)$. multiply

$f(3)\cdot g(3)$

$3\cdot 2=\boxed{6}$

8. Given $f(x)=x$ and $g(x)=x^2$, find $\left(\frac{f}{g}\right)(-2)$. divide

$\frac{f(-2)}{g(-2)}=\frac{-2}{4}=\boxed{-\frac{1}{2}}$

9. Given $f(x)=x^2$ and $g(x)=\sqrt{x-6}$, find $(gof)(-3)$. composition $g(f(-3))$

$g(9)=\sqrt{9-6}=\boxed{\sqrt{3}}$

10. Given $f(x)=x^2$ and $g(x)=\sqrt{x-6}$, find $(fog)(10)$. $f(g(10))$

$f(2)=\boxed{4}$

11. Using $f(x)=\frac{x}{2}+\frac{2}{x}$ $g(x)=4x^2+2x-3$ Find $(fog)(2)$ $f(g(2))$

$4(2)^2+2(2)-3$
$16+4-3$
17

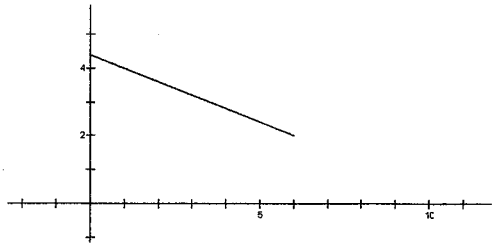
$f(17)=\frac{17}{2}+\frac{2}{17}=\boxed{\frac{293}{34}}$

12. Use the graphs of f and g to evaluate $(f \circ g)(0)$. $f(g(0))$

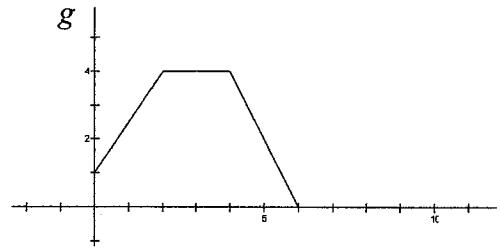
$f(g(0))$

$f(1) = \boxed{4}$

f

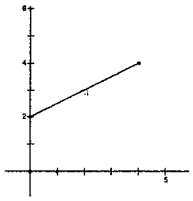


g



13. Use the graphs of f and g to evaluate $(f \circ g)(2)$

f



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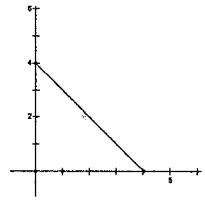


$f(g(2))$

$f(2) = \boxed{3}$

14. Find the inverse function of $f(x) = \frac{3x+6}{x-2}$.

$x = \frac{3y+6}{y-2}$

$xy - 2x = 3y + 6$

$xy - 3y = 2x + 6$

$y(x-3) = 2x + 6$

$y = \frac{2x+6}{x-3}$

$f^{-1}(x) = \frac{2x+6}{x-3}$ or $\frac{-2x-6}{-x+3}$, $x \neq 3$

15. Find the inverse of the function $f(x) = \frac{x-4}{2x+1}$

$x = \frac{y-4}{2y+1}$

$2xy + x = y - 4$

$2xy - y = -x - 4$

$y(2x-1) = -x - 4$

$y = \frac{-x-4}{2x-1}$

$f^{-1}(x) = \frac{-x-4}{2x-1}$ or $\frac{x+4}{-2x+1}$, $x \neq \frac{1}{2}$

16. Find the inverse of the function $f(x) = \frac{5x+7}{2x-9}$

$x = \frac{5y+7}{2y-9}$

$2xy - 9x = 5y + 7$

$2xy - 5y = 9x + 7$

$y(2x-5) = 9x + 7$

$y = \frac{9x+7}{2x-5}$

$f^{-1}(x) = \frac{9x+7}{2x-5}$ or $\frac{-9x-7}{-2x+5}$, $x \neq \frac{5}{2}$

17. Transform the given function by a vertical stretch by a factor of 2: $f(x) = x^3 - 4x$

$2f(x) \rightarrow \quad f(x) = 2(x^3 - 4x)$

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

18. Transform the given function by a vertical shrink by a factor of $\frac{1}{2}$: $f(x) = 3x^2 - 4x + 6$

$\frac{1}{2}f(x) \rightarrow \quad f(x) = \frac{1}{2}(3x^2 - 4x + 6)$

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

19. Transform the given function by a horizontal shrink by a factor of $\frac{1}{2}$: $f(x) = x^2 - 4$

$f(2x) \rightarrow \quad f(x) = (2x)^2 - 4$

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

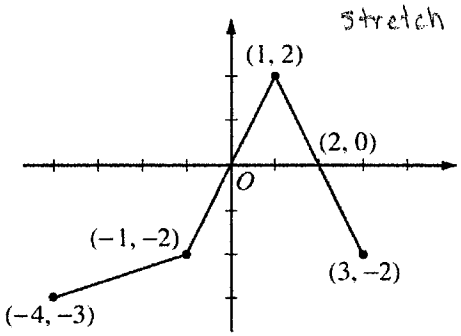
20. Transform the given function by a horizontal stretch by a factor of 3 : $f(x) = x^2 - 6x + 4$

$f(\frac{1}{3}x) \rightarrow \quad f(x) = (\frac{1}{3}x)^2 - 6(\frac{1}{3}x) + 4$

$f(x) = \frac{1}{9}x^2 - 2x + 4$

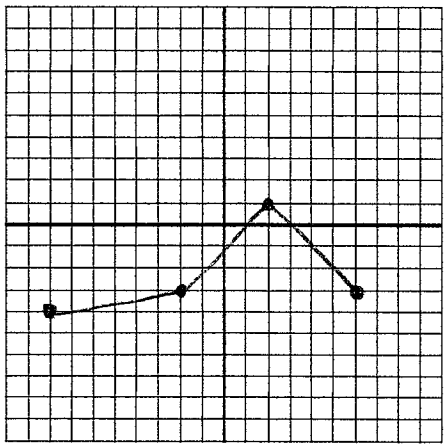
21. Graph $y = f\left(\frac{x}{2}\right) - 1$ ← down 1

↖ horizontal stretch by 2



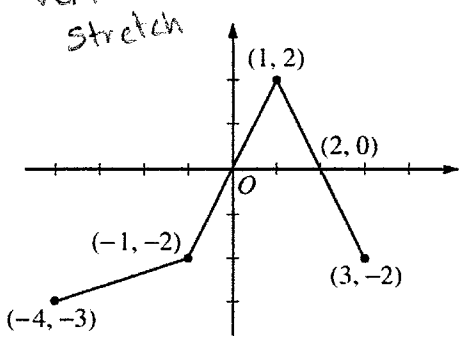
Graph of f

original	$f(\frac{x}{2})$	down 1
(-4,-3)	(-8,-3)	(-8,-4)
(-1,-2)	(-2,-2)	(-2,-3)
(1,2)	(2,2)	(2,1)
(3,-2)	(6,-2	(6,-3)



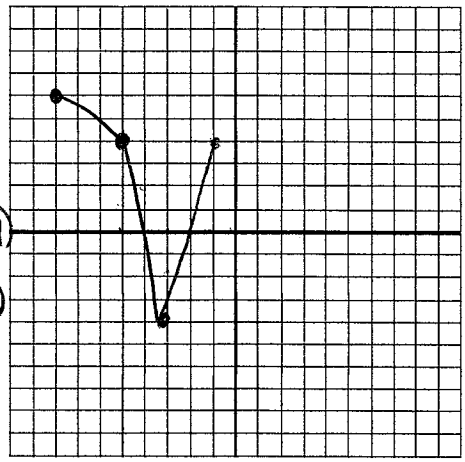
22. Graph $y = -2f(x + 4)$

vertical stretch → ↖ left 4



Graph of f

original	$-2f(x)$	left 4
(-4,-3)	(-4,6)	(-8,6)
(-1,-2)	(-1,4)	(-5,4)
(1,2)	(1,-4)	(-3,-4)
(3,-2)	(3,4)	(-1,4)



Find the inverse of the following functions. State the domain restrictions when necessary.

23. $f(x) = 2\sqrt{x-4} + 6$ $x = 2\sqrt{y-4} + 6$ $x - 6 = 2\sqrt{y-4}$ $\frac{x-6}{2} = \sqrt{y-4}$ $\left(\frac{x-6}{2}\right)^2 = y - 4$ $f^{-1}(x) = \left(\frac{1}{2}x - 3\right)^2 - 4, \quad x \geq 3$	24. $f(x) = \sqrt{x} + 2$ $x = \sqrt{y} + 2$ $x - 2 = \sqrt{y}$ $(x-2)^2 = y$ $f^{-1}(x) = (x-2)^2, \quad x \geq 0$

25. Are the following inverses? $f(x) = 2x - 6$ and $g(x) = \frac{1}{2}x + 3$

Verify your results by showing $f(g(x)) = x$ *and* $g(f(x)) = x$.

$f(g(x)) = x$

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

$2(\frac{1}{2}x + 3) - 6 =$

$x + 6 - 6 =$

$\boxed{x}$

$g(f(x)) = x$

$g(2x - 6) =$

$\frac{1}{2}(2x - 6) + 3 =$

$x - 3 + 3 =$

$\boxed{x}$

yes

26. Are the following inverses? $f(x) = 3x - 2$ $\quad g(x) = \frac{x+2}{3}$

Verify your results by showing $f(g(x)) = x$ *and* $g(f(x)) = x$.

$f(g(x)) = x$

$f(\frac{x+2}{3}) =$

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

$x + 2 - 2 =$

$\boxed{x}$

$g(f(x)) = x$

$g(3x - 2) =$

$\frac{3x - 2 + 2}{3} =$

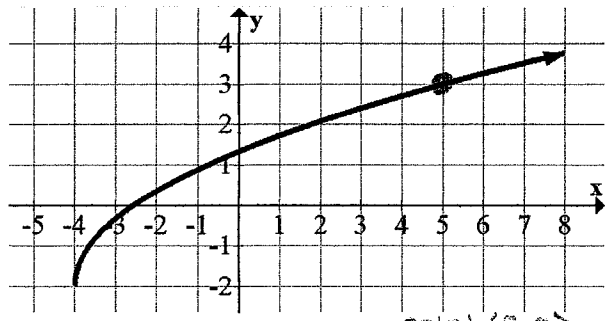
$\frac{3x}{3} =$

$\boxed{x}$

yes

Write the equation for the given functions.

27.



point (5, 3)

$y = a\sqrt{x+4} - 2$

$3 = a\sqrt{5+4} - 2$

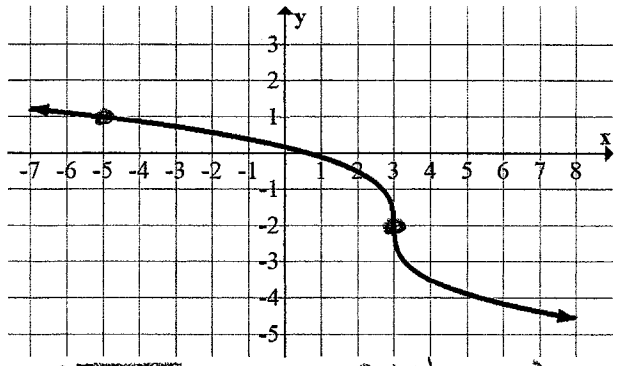
$3 = 3a - 2$

$5 = 3a$

$a = 5/3$

$\boxed{y = \frac{5}{3}\sqrt{x+4} - 2}$

28.



point (-5, 1)

$y = a\sqrt[3]{x-3} - 2$

$1 = a\sqrt[3]{-5-3} - 2$

$1 = -2a - 2$

$3 = -2a$

$a = -3/2$

$\boxed{y = -\frac{3}{2}\sqrt[3]{x-3} - 2}$

29.

$y = a(x-1)^3 - 2$

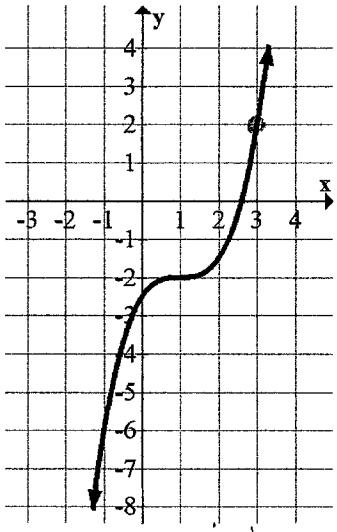
$2 = a(3-1)^3 - 2$

$2 = 8a - 2$

$4 = 8a$

$a = 1/2$

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



point (3, 2)

30.

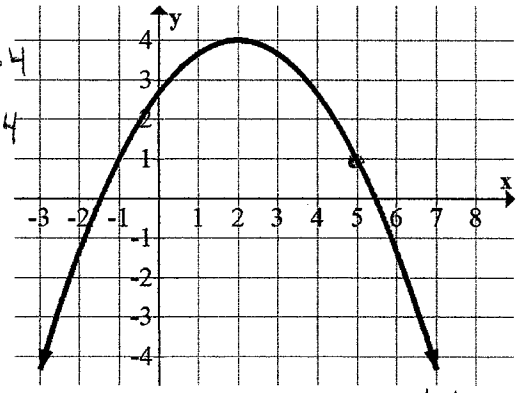
$y = a(x-2)^2 + 4$

$1 = a(5-2)^2 + 4$

$1 = 9a + 4$

$-3 = 9a$

$a = -\frac{1}{3}$



point (5, 1)

$\boxed{y = -\frac{1}{3}(x-2)^2 + 4}$

31.

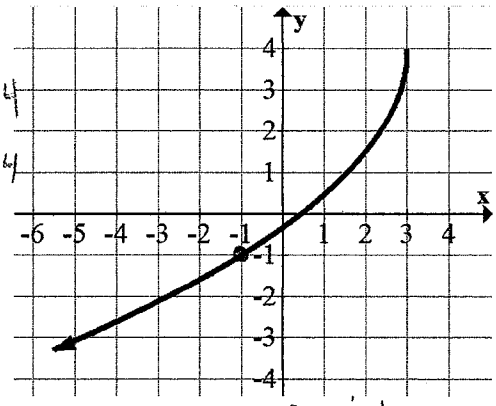
$y = a\sqrt{3-x} + 4$

$-1 = a\sqrt{3+1} + 4$

$-1 = 2a + 4$

$-5 = 2a$

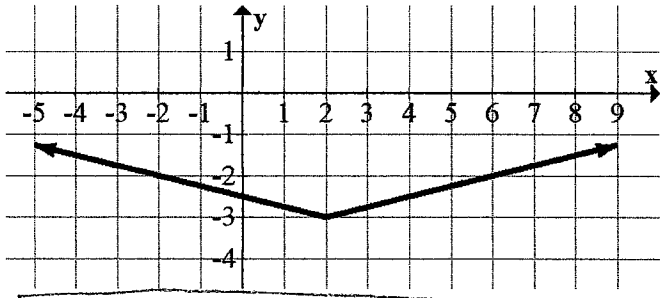
$a = -\frac{5}{2}$



point (-1, -1)

$\boxed{y = -\frac{5}{2}\sqrt{3-x} + 4}$

32.



$\boxed{y = \frac{1}{4}|x-2| - 3}$

33. Write the linear function that passes through $f(3) = 7$ and $g(1) = -8$.

$y = \frac{15}{2}(x-3)+7$

or

$y = \frac{15}{2}(x-1)-8$

or

$y = \frac{15}{2}x - \frac{31}{2}$

$(3,7)$ $(1,-8)$ $m = \frac{7--8}{3-1} = \frac{15}{2}$

$y = \frac{15}{2}(x-3)+7$

$y = \frac{15}{2}x - \frac{45}{2} + 7$

$y = \frac{15}{2}x - \frac{45}{2} + \frac{14}{2}$

34. If $f(x) = x + 3$ and $g(x) = \sqrt{8-x}$, then what is the domain of $\frac{f}{g}$?

$\frac{f(x)}{g(x)} = \frac{x+3}{\sqrt{8-x}}$ $x < 8$ or $(-\infty, 8)$

35. If $f(x) = \begin{cases} -4x + 7 \; if \; x > 3 \\ (x-3)^2 \; if \; x \leq 3 \end{cases}$, then find $f(3)$ *and* $f(-2)$.

$f(3) = 0$

$f(-2) = 25$

36. Given: $f(x) = 2x^2 - 3x$ and $g(x) = -x + 7$, find $(f \circ g)(x)$.

$f(g(x))$

$f(-x+7) = 2(-x+7)^2 - 3(-x+7)$

$= 2(-x+7)(-x+7) + 3x - 21$

$= 2(x^2 - 14x + 49) + 3x - 21$

$= 2x^2 - 28x + 98 + 3x - 21$

$= 2x^2 - 25x + 77$

37. State the type of transformation demonstrated.

a) $4f(x)$ vertical stretch by a factor of 4

b) $f(4x)$ horizontal shrink by a factor of 1/4

c) $f\left(\frac{x}{4}\right)$ horizontal stretch by a factor of 4

d) $\frac{1}{4}f(x)$ vertical shrink by factor by a factor of 1/4