

HONORS ALGEBRA 2
Chapters 7 and 9
Test A – Spring, 2009

Name _____
 Date _____
 Period _____

The solutions are in blue for each problem on the test. Calculators were allowed.

Use the functions at the right to evaluate the following. Show the steps that lead to your conclusions.

$f(x) = 3x + 2$	$g(x) = \frac{x-1}{x+1}$	$h(x) = x^2 - 3$
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1. $(f + g - h)(-3)$
 $= f(-3) + g(-3) - h(-3)$
 $= (-7) + (2) - (6)$
 $= -11$

2. $(gf)(x)$
 $= g(x)f(x)$
 $= \frac{x-1}{x+1} \cdot (3x+2)$
 $= \frac{3x^2 - x - 2}{x+1}$

3. $(h \circ f)(x)$
 $= h(f(x))$
 $= (3x+2)^2 - 3$
 $= 9x^2 + 12x + 1$

4. $(g \circ h)(4)$
 $= g(h(4))$
 $= g(13)$
 $= 6/7$

5. $f^{-1}(x)$
 $x = 3y + 2$
 $3y = x - 2$
 $y = \frac{x-2}{3}$

6. $g^{-1}(-1)$
 $\frac{x-1}{x+1} = -1$
 $x-1 = -(x+1)$
 $2x = 0$
 $x = 0$

State the domain and range for each function.

7. $y(x) = 2 - 4\sqrt{x+3}$
 D: $[-3, \infty)$
 R: $(-\infty, 2]$

8. $y(x) = \frac{2}{3-x}$
 D: $(-\infty, 3) \cup (3, \infty)$
 R: $(-\infty, 0) \cup (0, \infty)$

Answer the following.

9. Suppose A varies inversely as B . If $A = 2$ when $B = 16$, find B when $A = 64$.

$$A = \frac{k}{B} \Rightarrow 2 = \frac{k}{16} \Rightarrow k = 32$$

$$A = \frac{32}{B} \Rightarrow 64 = \frac{32}{B} \Rightarrow B = \frac{1}{2}$$

10. Centrifugal force, C , of a body moving in a circle is jointly proportional with the radius of the circular path, r , and the body's mass, m , and inversely proportional to the square of the time, t , it takes to move about one full circle. Write a model equation that represents the centrifugal force of the moving body.

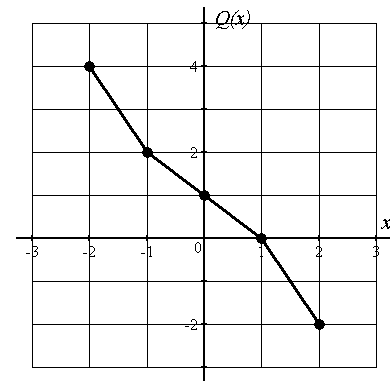
$$C = \frac{krm}{t^2}$$

11. Suppose $(f \circ g)(x) = (g \circ f)(x) = x$. What can you conclude about f and g ?

f and g are inverse functions of each other.

Use the table of values for function P below and the graph of function Q at the right to evaluate the following functions. Show your calculations.

x	-2	-1	0	1	2
$P(x)$	4	0	-3	-1	-3



12. $(P \circ Q)(2)$

$$= P(Q(2)) = P(-2) = 4$$

13. $(P/Q)(1)$

$$= P(1)/Q(1) = -1/0$$

undefined

14. $[3P(x) - 5x]_{x=-2}$

$$= 3P(-2) - 5(-2) = 3(4) - 5(-2) = 22$$

15. $P^{-1}(-3)$

does not exist

16. $Q^{-1}(-1)$

$$= 3/2 \text{ (since } Q(3/2) = -1)$$

The table below gives several values for functions f , g , h , k , and m .

x	1	2	3	4	5
$f(x)$	120	60	40	30	24
$g(x)$	-3	-6	-9	-12	-15
$h(x)$	48	24	12	6	3
$k(x)$	-5	3	13	25	39
$m(x)$	7	9	11	13	15

Use the table to answer the following.

17. Which of the functions is a direct variation? Explain your reasoning.

$g(x)$; it is a direct variation since $g(x)/x = k = -3$.

18. Which of the functions is an inverse variation? Explain your reasoning.

$f(x)$; it is an inverse variation since $xf(x) = k = 120$.

19. Which of the functions is linear (but not a direct variation)? Explain your reasoning.

$m(x)$; it is linear since $\Delta m/\Delta x = 2$ (but the y -intercept is not 0)

20. Which of the functions is quadratic? Explain your reasoning.

$k(x)$; it is quadratic since the second differences equal 2.

Bonus:

Suppose the function f is defined when $x \leq -2$ by the rule $f(x) = x^2 + 4x + 5$. Determine if f has an inverse function. If so, state the inverse function, $f^{-1}(x)$. If not, explain why.

Because of the domain restriction, $f(x)$ is one-to-one and has an inverse.

$$\begin{aligned}
 x &= y^2 + 4y + 5 & x - 1 &= (y + 2)^2 \\
 x &= (y^2 + 4y + 4) + 5 - 4 & \Rightarrow \sqrt{x - 1} &= y + 2 & \Rightarrow f^{-1}(x) &= \sqrt{x - 1} - 2 \\
 x &= (y + 2)^2 + 1 & \sqrt{x - 1} - 2 &= y
 \end{aligned}$$