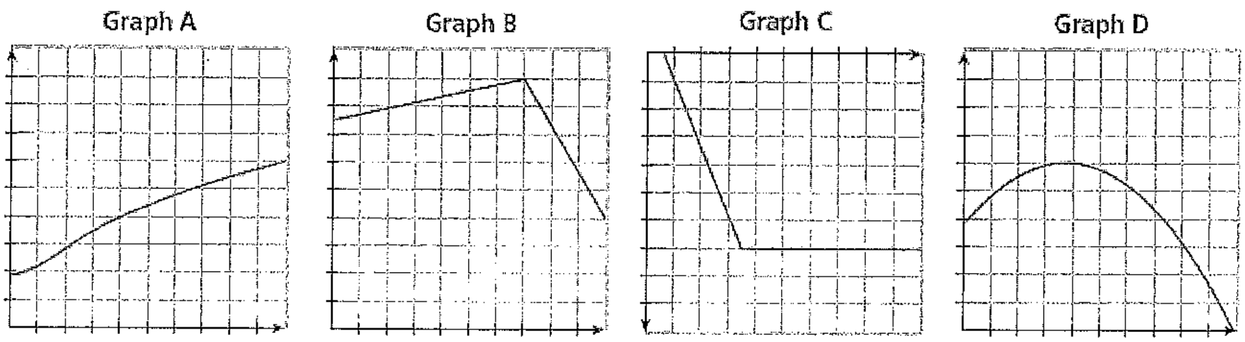
CP Algebra 2

Name Key

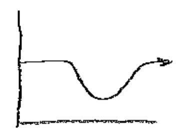
Date ____________ Block ________

Ch.6 Test Review

For #1-4, match each situation to its corresponding graph. Sketch a possible graph of the situation if the situation does not match any of the given graphs.



1. A state senator's high approval rating is rising steadily but then drops sharply after a scandal. B
2. The value of an antique chair increases steadily. A
3. Sales of a valuable stock dip and then recover.



Something like this

4. A scuba diver descends to 60 ft below sea level and swims around at that depth. C

5. Create an equation that fits the table below:

x	0	1	2	3	4
y	25	22	19	16	13

Equation: $f(x) = -3x + 25$

6. An Olympic regatta is 2000 meters long. Sterling and his crew can row their boat at an average speed of approximately 300 meters per hour. Create a table, graph, and an equation that models the distance Sterling and his crew have <u>left in the race.</u> Then, using the equation you found, estimate the time it takes for the team to finish the race.

Table:

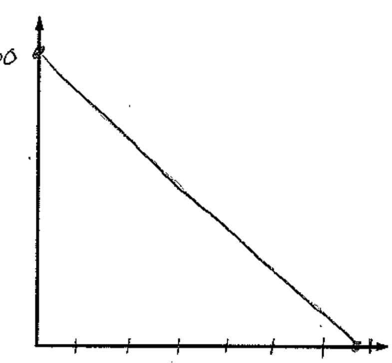
Time	0	1	2	3	4	5
Distance Left	2000	1700	1400	1100	800	500

...

x = Time

f(x) = Distance left

Graph:



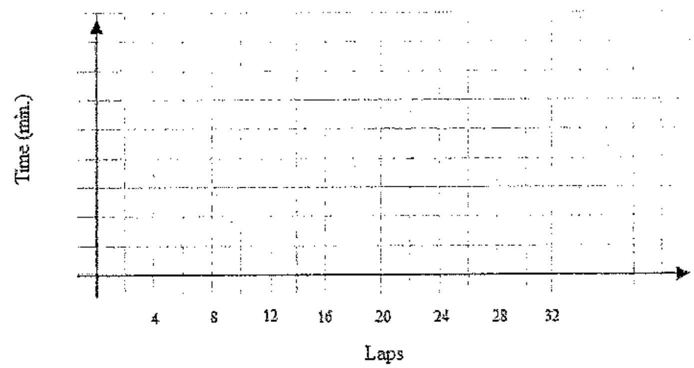
Equation: $f(x) = -300x + 2000$

Answer: $6\frac{2}{3}$ hours

7. The graph and table below shows the time NASCAR drivers Jeff Gordon and Jimmie Johnson each takes to finish their laps in Darlington Raceway. Compare their average rates and explain what the difference in the rate of change represents.

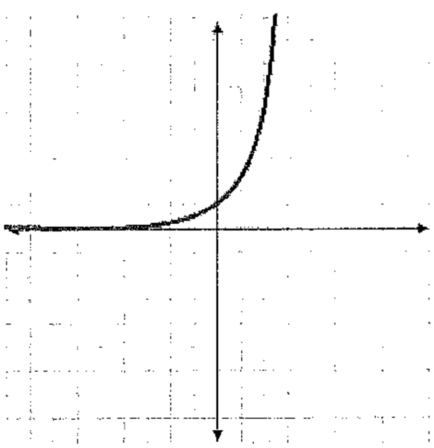
Jeff Gordon's Times	
Laps	Time (min.)
4	1.6
8	3.7
12	5.4
16	7.0
20	8.5
24	10.1
28	12.0
32	14.5

Jimmy Johnson's Times

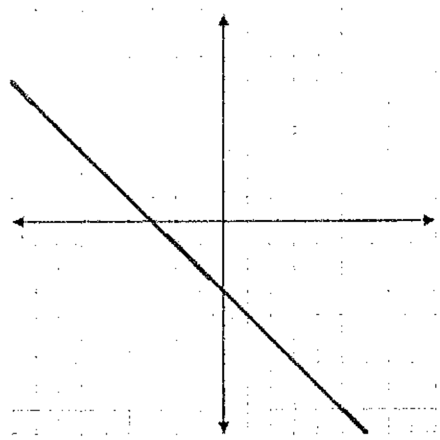


8. Compare the end behavior for the pair of functions

$f(x) = e^x$



$g(x) = -x - 3$



As $x \to \infty$, $f(x) \to$ $\underline{\infty}$ and $g(x) \to$ $\underline{-\infty}$

As $x \to -\infty$, $f(x) \to$ $\underline{0}$ and $g(x) \to$ $\underline{\infty}$

For #9 and #10, evaluate the piecewise function for $x = -2$ and $x = 3$

9. $f(x) = \begin{cases} 3x & \text{if } x < 1 \\ x^2 - 1 & \text{if } x \geq 1 \end{cases}$

$f(-2) = 3(-2) = -6$

$f(3) = (3)^2 - 1 = 8$

10. $f(x) = \begin{cases} -6 & \text{if } x < -5 \\ 2x + 3 & \text{if } -5 \leq x < 3 \\ 2x^2 & \text{if } x \geq 3 \end{cases}$

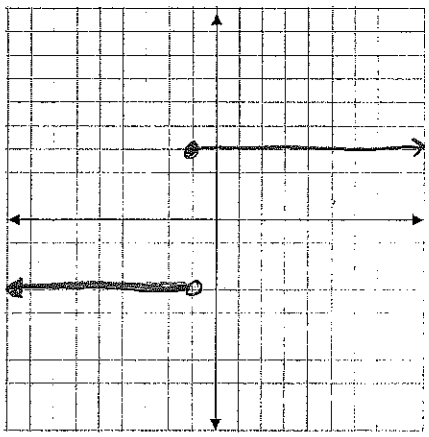
$f(-2) = 2(-2) + 3 = -1$

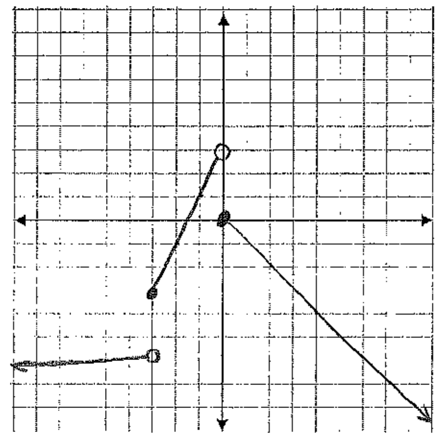
$f(3) = 2(3)^2 = 18$

For #11 and #12, graph the piecewise functions

11. $f(x) = \begin{cases} -3 & \text{if } x < -1 \\ 3 & \text{if } x \geq -1 \end{cases}$

12. $f(x) = \begin{cases} -6 & \text{if } x < -3 \\ 2x + 3 & \text{if } -3 \leq x < 0 \\ -x & \text{if } x \geq 0 \end{cases}$





Perform the following transformation for the given piecewise functions. Write your answer in Standard Form.

13. Given $f(x) = \begin{cases} x - 2 & \text{if } x < 2 \\ x^2 & \text{if } x \geq 2 \end{cases}$, write the rule for each function.

a. $g(x)$, a vertical stretch by a factor of 2

$g(x) = 2f(x) = \begin{cases} 2(x-2) & x < 2 \\ 2(x^2) & x \geq 2 \end{cases}$

$g(x) = \begin{cases} 2x - 4 & x < 2 \\ 2x^2 & x \geq 2 \end{cases}$

b. $h(x)$, a horizontal translation 3 units right

$h(x) = f(x-3) = \begin{cases} (x-3) - 2 & (x-3) < 2 \\ (x-3)^2 & (x-3) \geq 2 \end{cases}$

$h(x) = \begin{cases} x - 5 & x < 5 \\ x^2 - 6x + 9 & x \geq 5 \end{cases}$

14. Given $f(x) = \begin{cases} \frac{1}{2}x - 2 & \text{if } x < -1 \\ 2x^2 & \text{if } x \geq -1 \end{cases}$, write the rule for each function.

a. $g(x)$, a vertical stretch by a factor of 4 and a vertical translation 3 units up

$g(x) = 4f(x) + 3 = \begin{cases} 4(\frac{1}{2}x - 2) + 3 & x < -1 \\ 4(2x^2) + 3 & x \geq -1 \end{cases}$

$g(x) = \begin{cases} 2x - 5 & x < -1 \\ 8x^2 + 3 & x \geq -1 \end{cases}$

b. $h(x)$, a horizontal translation 4 unit left and a vertical translation 1 unit down

$h(x) = f(x+4) - 1 = \begin{cases} (\frac{1}{2}(x+4) - 2) - 1 & x + 4 < -1 \\ (2(x+4)^2) - 1 & x + 4 \geq -1 \end{cases}$

$h(x) = \begin{cases} \frac{1}{2}x - 1 & x < -5 \\ 2x^2 + 16x + 15 & x \geq -5 \end{cases}$

For #15-24, use the following functions, perform the operations and STATE THE DOMAIN!

$f(x) = x - 1$ $\quad$ $g(x) = x^2 + 2x - 3$ $\quad$ $h(x) = x^2 - 4x - 21$

$j(x) = \sqrt{x+1}$ $\quad$ $k(x) = 2x + 3$ $\quad$ $p(x) = x^2 - 3$

15. $(f - k)(x) = f(x) - k(x)$

$= (x+1) - (2x+3)$

$(f-k)(x) = -x-4$

16. $(p + g)(x) = p(x) + g(x)$

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

$(p+g)(x) = 2x^2 + 2x - 6$

17. $(pk)(x) = p(x) \cdot k(x)$

$= (x^2-3)(2x+3)$ (Foil)

$(pk)(x) = 2x^3 + 3x^2 - 6x - 9$

18. $(fh)(x) = f(x) \cdot h(x)$

$= (x-1)(x^2-4x-21)$ (Foil)

$= x^3 - 4x^2 - 21x - x^2 + 4x + 21$

$(fh)(x) = x^3 - 5x^2 - 17x + 21$

19. $\left(\frac{f}{g}\right)(x) = \frac{f(x)}{g(x)}$

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

$= \frac{\cancel{(x-1)}}{(x+3)\cancel{(x-1)}}$ Domain: $x \neq -3, 1$

$\left(\frac{f}{g}\right)(x) = \frac{1}{x+3}$

20. $\left(\frac{g}{h}\right)(x) = \frac{g(x)}{h(x)}$

$= \frac{x^2+2x-3}{x^2-4x-21}$

$\left(\frac{g}{h}\right)(x) = \frac{(x+3)(x-1)}{\cancel{(x+3)}(x-7)}$ Domain: $x \neq -3, 7$

21. $g(j(3)) =$

$J(3) = \sqrt{(3)+1} = \sqrt{4} = 2$

$g(2) = (2)^2 + 2(2) - 3 = 5$

$g(j(3)) = 5$

22. $j(h(7)) =$

$h(7) = (7)^2 - 4(7) - 21 = 49 - 28 - 21 = 0$

$j(0) = \sqrt{(0)+1} = \sqrt{1} = 1$

$j(h(7)) = 1$

23. $p(f(x)) =$

$f(x) = x - 1$

$p(x-1) = (x-1)^2 - 3 = x^2 - 2x + 1 - 3$

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

24. $j(k(x)) =$

$k(x) = 2x + 3$

$j(2x+3) = \sqrt{(2x+3)+1} = \sqrt{2x+4}$

$j(k(x)) = \sqrt{2x+4}$