KEY

Algebra 2 Final Exam Review: Chapter 1

For #1-2, solve each equation.

1. $3(x+2)+2(x-4)+1=-26$

$x=-5$

2. $3(2x-1)=5(x+2)-2$

$x=11$

For #3-4, simplify each expression.

3. $\frac{24x^4y^3}{20x^2y^5}$

$\frac{6x^2}{5y^2}$

4. $\frac{30a^4b^3c^5}{15a^3c}$

$2ab^3c^4$

For #5-6, solve each inequality. Graph your answer and write your answer in interval notation.

5. $2(6+4x)\geq 12-8x$

$x\geq 0$

6. $-5(2x+7)+x<-x-11$

$x>-3$

For #7-8, solve each system of equations.

7. $-3x+2y=17$
   $x-5y=-10$

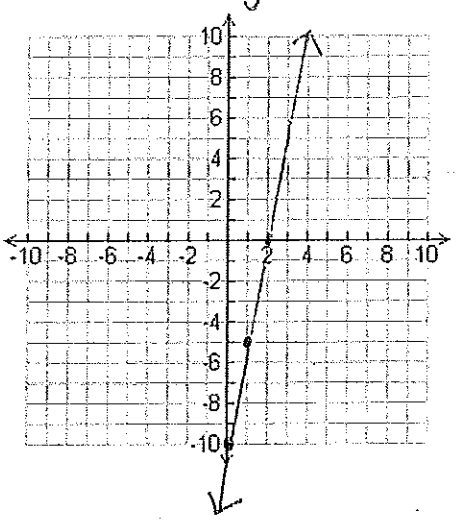
$x=-5$
$y=1$

8. $4x+6y=22$
   $-2x+4y=10$

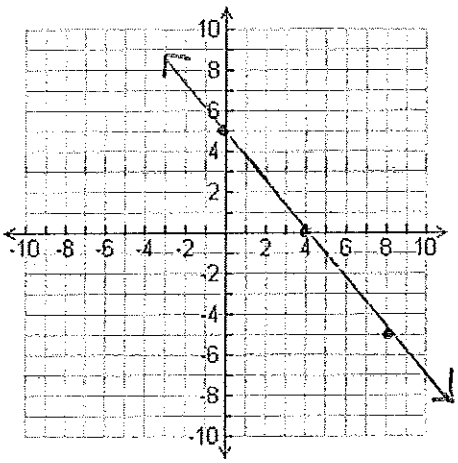
$x=1$
$y=3$

For #9-10, graph each line.

9. $5x-y=10$ $y=5x-10$

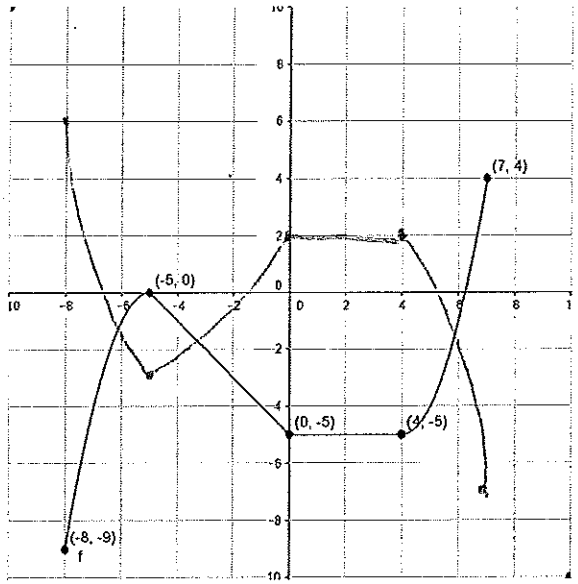


10. $5x+4y=20$ $y=\frac{-5}{4}x+5$

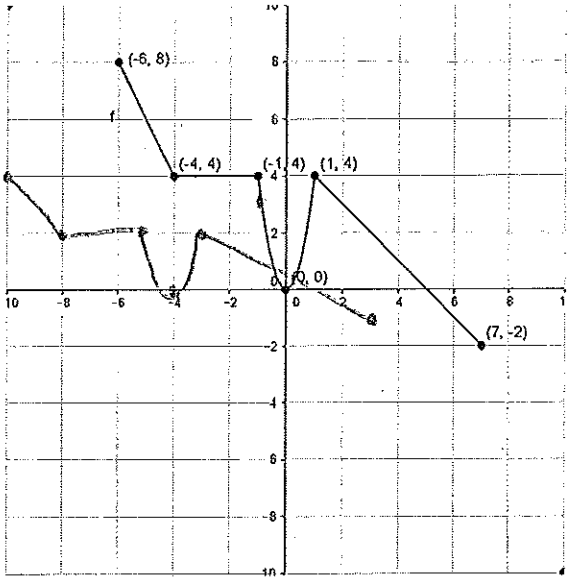


For #11-12, use a table to perform each transformation of $y = f(x)$. Graph your answers on the same coordinate plane as the original function.

11. Reflect over the x-axis, down 3



12. Vertical shrink by ½, left 4



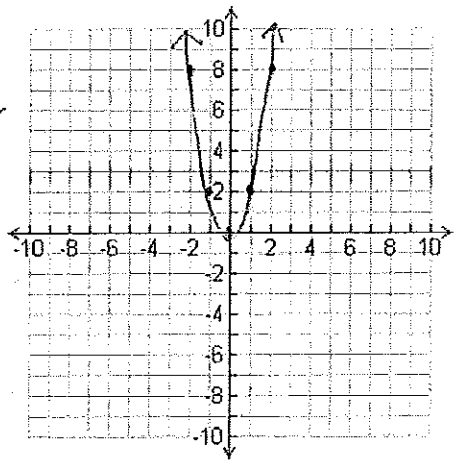
For #13-14, graph the data. Determine the parent function and transformation.

13.

x	-2	-1	0	1	2
y	8	2	0	2	8

parent: x^2 quadratic

trans: vert. stretch by 2

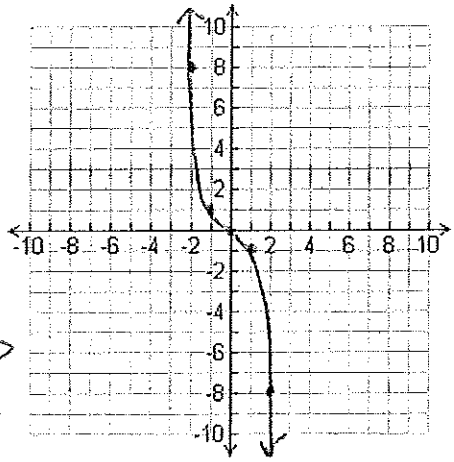


14.

x	-2	-1	0	1	2
y	8	1	0	-1	-8

parent: x^3 cubic

trans: reflect. across y-axis or x-axis



For #15-16, graph the following on your graphing calculator. Determine (a) the parent function (b) any transformations (c) domain and (d) range.

15. $g(x) = (x-2)^3 - 3$

a. cubic b. horiz. trans. right 2 vert. trans. down 3

c. $\mathbb{R}$ d. $\mathbb{R}$

16. $g(x) = (x+4)^2 - 6$

a. quadratic b. horiz. trans. left 4 vert. trans. down 6

c. $\mathbb{R}$ d. $[-6, \infty)$

For #17, solve the application problem.

17. The success of a shopping center can be represented as a function of the distance (in miles) from the center of the population and the number of clients (in hundreds of people) who will visit. The data is given in the table below:

# of costumers (x)	8	7	6	4	2	1
Distance (y)	5	19	25	23	34	40

14 6 -2 11 6
-8 -8 13 -5
0 21 18

a. State the type of correlation negative

b. Find the equation of the line of best fit.
$y = -0.42x^3 + 5.5x^2 - 23.82x + 60.12$

c. Find the correlation coefficient.
0.97

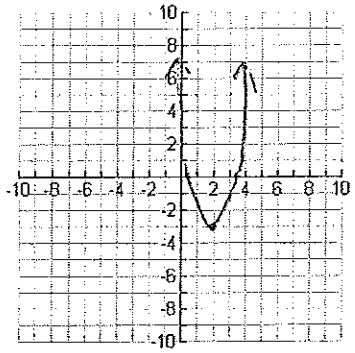
d. If the mall is located 2 miles from the center of the population, how many customers should the shopping center expect?

e. To receive 500 customers, at what distance from the center of the population should the shopping centre be located?

Algebra 2 Final Exam Review: Chapter 2

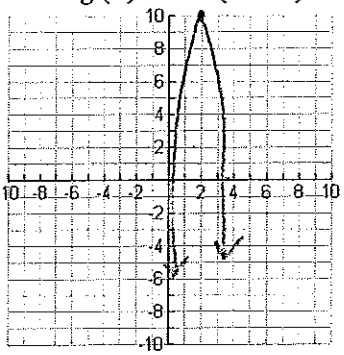
For #1-3, state if the graph has a maximum or minimum and find the axis of symmetry, vertex, and roots. Graph each function.

1. $g(x) = 2x^2 - 8x + 5$



Up/Down UP
Max/Min min
AOS $8/4 = 2$
Vertex $(2, -3)$
Roots $(0.77, 0)$ $(3.22, 0)$

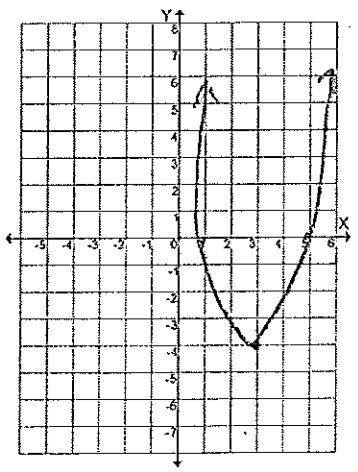
2. $g(x) = -2(x-2)^2 + 10$



Up/Down down
Max/Min max
AOS 2
Vertex $(2, 10)$
Roots $(0.17, 0)$ $(3.83, 0)$

(1) $2x^2$

3. $f(x) = (x-1)(x-5)$



Up/Down UP
Max/Min min
AOS 3
Vertex $(3, -4)$
Roots $(1, 0)(5, 0)$

For #4-6, find the zeroes of each function by factoring.

4. $f(x) = x^2 + 2x - 35$ $X = -7$ $X = 5$

5. $f(x) = x^2 - 8x - 9$ $X = 9$ $X = -1$

6. $f(x) = 2x^2 - 11x + 9$ $X = 9/2$ $X = 1$

For #7-8, write a quadratic function in standard form for each given set of zeros.

7. -5 and 1 $X^2 + 4X - 5$

8. ½ and -2 $2X^2 + 3X - 2$

For #9-10, use complete the square method to find the zeros of the following functions

9. $x^2 + 8x + 20 = 0$ $X = -4 \pm 2i$

10. $x^2 - 8x - 17 = 0$ $X = 4 \pm \sqrt{33}$

For #11-12, write in vertex form and state .

11. $f(x) = x^2 - 2x + 17$ $(X-1)^2 + 16$ V: (1, 16)

12. $f(x) = 4x^2 - 24x + 31$ $4(X-3)^2 - 5$ V: (3, -5)

For #13-15, simplify the square root.

13. $\sqrt{-48}$ $4i\sqrt{3}$

14. $-3\sqrt{-128}$ $-18i\sqrt{2}$

15. $\sqrt{-256}$ $16i$

For #16-21, perform each indicated operation and write the result in the form a+bi.

16. $(3 - 5i) + (8 - 5i)$ $11 - 10i$

17. $(9 + 7i) - (9 + 2i)$ $5i$

18. $(4 - 4i)(2 + 9i)$ $44 + 28i$

19. i^{35} $-i$

20. $\frac{2+5i}{6i}$ $5 - 2i / 6$

21. $\frac{3-5i}{3+i}$ $\frac{2 - 9i}{5}$

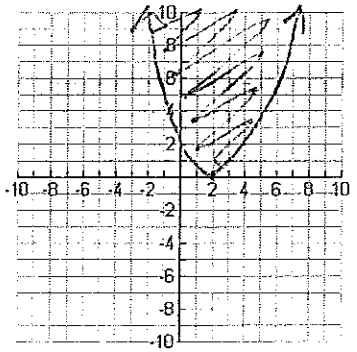
For #22-23, find the discriminant, state the type and number of solutions and solve using the Quadratic Formula.

22. $x^2 - 10x + 3$ D: 88 2 real $X = 5 \pm \sqrt{22}$

23. $2x^2 - 10x + 18 = 0$ D: -44 2 imag. $X = \frac{5 \pm i\sqrt{11}}{2}$

For #24-25, graph each inequality.

24. $y \geq x^2 - 4x + 4$



Up/Down UP

Max/Min min

AOS $4/2 = 2$

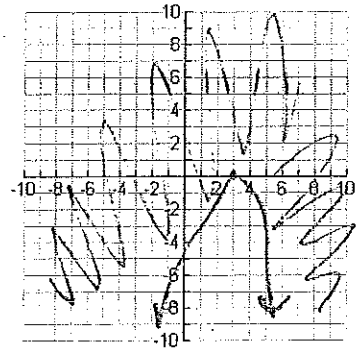
Vertex (2, 0)

Roots NONE!

Test point (0, 0)

$0 \geq 4$ X

25. $y > -(x - 3)^2$



Up/Down DOWN

Max/Min max

AOS 3

Vertex (3, 0)

Roots NONE

Test point (0, 0)

$0 > -9$ ✓

For #26-28, solve each inequality algebraically. Write your answer in interval notation.

26. $x^2 + 13x + 20 < -2$ $(-11, -2)$

27. $x^2 - 11x \geq -10$ $(-\infty, 1] \cup [10, \infty)$

28. $x^2 + 6x + 3 > 10$ $(-\infty, -7) \cup (1, \infty)$

For #29-30, let $f(x) = x^2$, describe the transformations.

29. $g(x) = -(x+3)^2$

Refl. across x-axis
Horiz. trans. left 3

30. $g(x) = 2x^2 - 5$

vert. stretch by 2
vert. trans. down 5

For #31-32, solve each system of equations.

31. $\begin{cases} y = 2x^2 - 5x - 20 \\ y = 3x + 22 \end{cases}$

(7, 43) (-3, 13)

32. $\begin{cases} y = x^2 + 2x - 4 \\ y = 2x + 5 \end{cases}$

(-3, -1) (3, 11)

For #33-34, solve the application problem.

33. Tessa is running a chemical reaction that can be models by a quadratic function. When she begins the reaction there are 20 grams of sodium chloride present. At 2 minutes there are 48 grams of sodium chloride. At 5 minutes there are 60 grams of sodium chloride. Write a quadratic model for her data. At what time will the sodium chloride be used up in the reaction?

0	20
2	48
5	60

$y = -2x^2 + 18x + 20$

10 minutes

(HINT: Make your own table!)

34. A stuntwoman jumps from a building 73 feet high and lands on an air bag that is 9 feet tall. Her height above the ground h in feet can be modeled by $h(t) = 73 - 16t^2$, where t is the time in seconds.

(a) How many seconds will the stuntwoman fall before touching the air bag?

$9 = 73 - 16t^2$

$t = 2$ seconds

(b) Suppose the stuntwoman jumps from a building that is half as tall. Will she be in the air for half as long? Explain? $9 = 36.5 - 16t^2$ NO!

$t = 1.31$

Algebra 2 Final Exam Review: Chapter 3

For #1-4, rewrite each polynomial in standard form. Then identify the leading coefficient, degree and number of terms. Name each polynomial.

1. $7x^2 + 4x^5 - 3$ $4x^5 + 7x^2 - 3$
Leading coefficient 4
Degree 5 Number of Terms 3
Name Quintic Trinomial

2. $2 + 6x^3 + 2x^2 - x$ $6x^3 + 2x^2 - x + 2$
Leading coefficient 6
Degree 3 Number of Terms 4
Name Cubic Polynomial

3. $10x - 3 - 2x^2 - 9x^3$ $-9x^3 - 2x^2 + 10x - 3$
Leading coefficient -9
Degree 3 Number of Terms 4
Name Cubic Polynomial

4. $-7x^2 - 4x$ $-7x^2 - 4x$
Leading coefficient -7
Degree 2 Number of Terms 2
Name quadratic binomial

For #5-7, add or subtract. Write your answer in standard form.

5. $(4x^2 + 3) + (5x^2 + 4)$

$9x^2 + 7$

6. $(10x^3 - 7x^2) - (3x^3 + 2x^2 + 4)$

$7x^3 - 9x^2 - 4$

7. $(2 + 2x^4 - x) - (7 + x^4 + 3x)$

$x^4 - 4x - 5$

For #8-16, find each product.

8. $3y(2x^2 + 5xy)$

$6x^2y + 15xy^2$

9. $8(2x + 2)$

$16x + 16$

10. $(a + b)(4ab + b^2)$

$4a^2b + b^3$

11. $(8m + 2)(7m - 3)$

$56m^2 - 10m - 6$

12. $\left(3x + \frac{1}{4}\right)^2$

$144x^2 + 24x + 1$

13. $(3x - 2)(2x^3 - x^2 + 4x + 4)$

$6x^4 - 7x^3 + 14x^2 + 4x - 8$

14. $(p^2 - p + 1)(6p^2 - 8p - 3)$

$6p^4 - 14p^3 + 11p^2 - 11p - 3$

15. $(b - 5)^3$

$b^3 - 15b^2 + 75b - 125$

16. $(x + 3y)^3$

$x^3 + 9x^2y + 27xy^2 + 27y^3$

For #17-24, factor each polynomial completely.

17. $3x^3 + 6x^2 + 5x + 10$

$(3x^2 + 5)(x + 2)$

18. $21v^3 + 56v^2 - 12v - 32$

$(7v^2 - 4)(3v + 8)$

19. $12a^3 - 20a^2 + 21a - 35$

$(4a^2 + 7)(3a - 5)$

20. $21x^3 - 7x^2 + 6x - 2$

$(7x^2 + 2)(3x - 1)$

21. $125 + 8u^3$

$(5 + 2u)(25 - 10u + 4u^2)$

22. $374x^4 + 81x$

23. $125 - 27u^3$

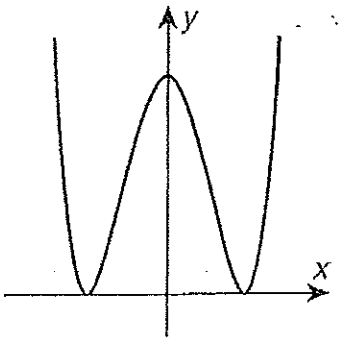
$(5 - 3u)(25 + 15u + 9u^2)$

24. $8x^4 + x$

$x(2x + 1)(4x^2 - 2x + 1)$

For #25-27, identify whether the function graphed has an even or odd degree, positive or negative leading coefficient and the end behavior of the function.

25.



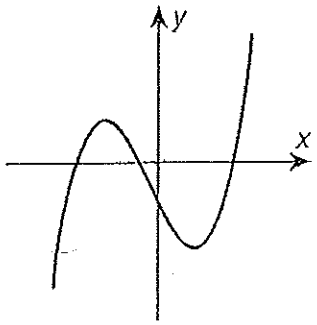
Odd or Even?

Negative or Positive?

As $x \to \infty$, $f(x) \to$ $+\infty$

As $x \to -\infty$, $f(x) \to$ $+\infty$

26.



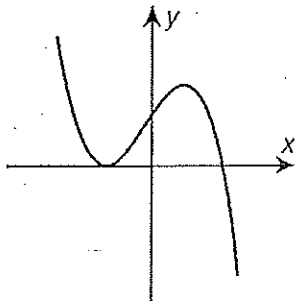
Odd or Even?

Negative or Positive?

As $x \to \infty$, $f(x) \to$ $+\infty$

As $x \to -\infty$, $f(x) \to$ $-\infty$

27.



Odd or Even?

Negative or Positive?

As $x \to \infty$, $f(x) \to$ $-\infty$

As $x \to -\infty$, $f(x) \to$ $+\infty$

For #28-29, let $f(x) = x^2 - 1$ preform the following transformations.

28. Reflect over the x-axis and shift down 3

$-x^2 - 2$

29. Shift right 1 and up 5

$(x-1)^2 - 1 + 5$

$x^2 - 2x + 5$

Algebra 2 Final Exam Review: Chapter 5

For #1-3, simplify each expression. Assume all variables are positive.

1. $\sqrt[3]{125x^9}$ $5x^3$

2. $\sqrt[4]{\frac{x^8}{81}}$ $\frac{x^2}{3}$

3. $\sqrt[3]{\frac{64x^3}{8}}$ $\frac{4x}{2} = 2x$

For #4-6, write each expression in radical form and simplify.

4. $64^{\frac{5}{6}}$ $2^5 = 32$

5. $27^{\frac{2}{3}}$ $3^2 = 9$

6. $(-8)^{\frac{4}{3}}$ $-2^4 = 16$

For #7-9, write each expression with rational exponents.

7. $\sqrt[5]{51^4}$ $51^{4/5}$

8. $\left(\sqrt{169}\right)^3$ $169^{3/2} =$

9. $\sqrt[7]{36^{14}}$ $36^{14/7} =$

For #10-15, simplify each expression.

10. $4^{\frac{3}{2}} \cdot 4^{\frac{5}{2}}$ $4^{8/2} = 4^4 =$

11. $\frac{27^{\frac{4}{3}}}{27^{\frac{2}{3}}}$ $27^{2/3} = 9$

12. $\left(125^{\frac{2}{3}}\right)^{\frac{1}{2}}$ $125^{2/6} = 5$

13. $(27 \cdot 64)^{\frac{2}{3}}$ $9 \cdot 16 =$

14. $\left(\frac{1}{243}\right)^{\frac{1}{5}}$ $\frac{1}{3}$

15. $\left(-27x^6\right)^{\frac{1}{3}}$ $-3x^2$

For #16-25, solve each equation.

16. $\sqrt{x+6} = 7$ $x = 43$

17. $\sqrt{5x} = 10$ $x = 20$

18. $\sqrt{2x+5} = \sqrt{3x-1}$ $x = 6$

19. $\sqrt{x+4} = 3\sqrt{x}$ $x = 1/2$

20. $\sqrt[3]{x-6} = \sqrt[3]{3x+24}$ $x = -15$

21. $3\sqrt[3]{x} = \sqrt[3]{7x+5}$ $x = 1/4$

22. $\sqrt{-14x+2} = x-3$ $x = -7$ $x = -1$

23. $(x+4)^{\frac{1}{2}} = 6$ $x = 32$

24. $4(x-3)^{\frac{1}{2}} = 8$ $x = 7$

25. $4(x-12)^{\frac{1}{3}} = -16$ $x = -52$

For #26-29, solve each inequality.

26. $\sqrt{3x+6} \leq 3$ $[-2, 1]$

27. $\sqrt{x-4} + 3 > 9$ $x > 40$

28. $\sqrt{x+7} \geq \sqrt{2x-1}$ $x \leq 8$

29. $\sqrt{2x-7} > 9$ $x > 44$

For #30-33, solve each equation.

30. $x - \frac{6}{x} = 1$ $x=3$ $x=-2$

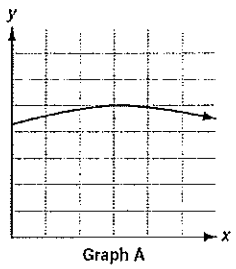
31. $\frac{4x}{x-5} = \frac{3x+5}{x-5}$ $x=5$ ext.

32. $\frac{3x}{x+2} = \frac{2x+2}{x+2}$ $x=2$ $x=-2$ ext.

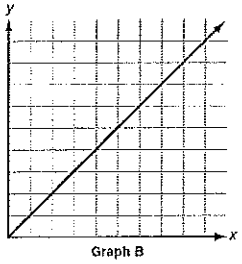
33. $\frac{x}{x+4} + \frac{x}{2} = \frac{2x}{2x+8}$ $x=0$ $x=-4$ ext

Algebra 2 Final Exam Review: Chapter 6

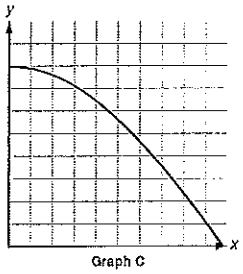
For #1-7, match each situation to its corresponding graph.



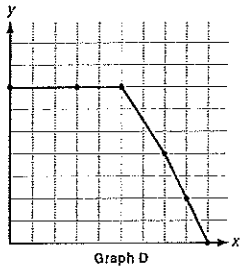
Graph A



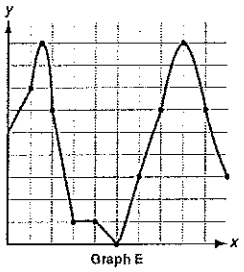
Graph B



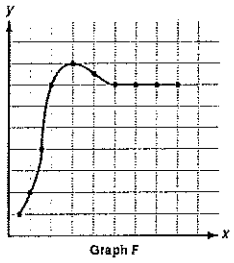
Graph C



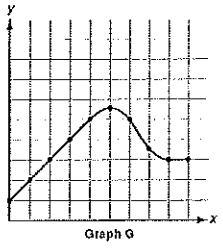
Graph D



Graph E



Graph F



Graph G

1. A bowling ball rolls down the alley and drops into a trough behind the pins.
2. As a flower vase is filled with water, the level of the water rises.
3. A football is kicked and then caught by a person who runs down the football field with it.
4. The sales of wide screen televisions increases rapidly, peaks, and then levels off.
5. Ice cream sales were steady all day at the music festival.
6. A restaurant opens late in the morning, experiences a lunchtime rush, and then empties right before the dinner rush.
7. The noise level of traffic decreases after the evening rush hour.

For #8-11, evaluate each piecewise function for x = -8 and x = 5.

8. $f(x) = \begin{cases} 2x & \text{if } x < 0 \\ 0 & \text{if } x \geq 0 \end{cases}$

$f(-8) = -16$

$f(5) = 0$

9. $g(x) = \begin{cases} 2 - x & \text{if } x \leq 5 \\ -x^2 & \text{if } 5 < x < 8 \\ 6 & \text{if } 8 \leq x \end{cases}$

$g(-8) = 10$

$g(5) = -3$

10. $h(x)=\begin{cases}2x+4 & \text{if } x\le -8\\ -1 & \text{if } -8<x<5\\ x^2 & \text{if } 5\le x\end{cases}$

$h(-8)=-12$ $h(9)=25$

11. $k(x)=\begin{cases}15 & \text{if } x\le -5\\ x & \text{if } -5<x<1\\ 7-\frac{x}{2} & \text{if } 1<x\end{cases}$

$k(-8)=15$ $k(9)=\frac{9}{2}$

For #12-29, use the following functions.

$f(x)=\frac{1}{2x}$ $g(x)=x^2$ $h(x)=x-8$ $k(x)=\sqrt{x}$

For #12-17, find each function *and the domain.*

12. $(gk)(x)$

$x^2\sqrt{x}$ $x\ge 0$

13. $(g+h)(x)$

x^2+x-8 $\mathbb{R}$

14. $(g-h)(x)$

x^2-x+8 $\mathbb{R}$

15. $(fg)(x)$

$\frac{x}{2}$ $\mathbb{R}$

16. $(gh)(x)$

x^3-8x^2 $\mathbb{R}$

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

$\frac{1}{2x^3}$ $x\neq 0$

For #18-23, find each value.

18. $g(k(9))$

9

19. $h(g(-3))$

1

20. $g(h(-3))$

121

21. $k(h(12))$

2

22. $f(g(4))$

$\frac{1}{32}$

23. $f(h(1))$

$\frac{1}{-14}$

For #24-29, write each composite function and *state the domain.*

24. $f(g(x))$

$\frac{1}{2x^2}$ $x\neq 0$

25. $h(g(x))$

x^2-8 $\mathbb{R}$

26. $f(k(x))$

$\frac{1}{2\sqrt{x}}$ $x\ge 0$

27. $h(k(x))$

$\sqrt{x}-8$ $x\ge 0$

28. $k(g(x))$

x $\mathbb{R}$

29. $k(h(x))$

$\sqrt{x-8}$ $x\ge 8$

For #30-31, use the function $f(x)=\begin{cases}2x-1 \text{ if } x\le -1\\ x^2+1 \text{ if } x>-1\end{cases}$. Write the rule for each.

30. Reflect over the x-axis, down 3

$-2x-2$ $x\le -1$

$-x^2-4$ $x>-1$

31. Vertical stretch by 2 and right 4

$4(x-4)-2=4x-18$

$4(x-4)^2+1$

$4(x^2-8x+16)+1$

For #32, make a table, equation and graph for the situation.

32. A bicyclist begins a trip of 104 miles. The bicyclist averages 8 miles per hour including stops. Create a table, graph, and equation to represent the distance the bicyclist has left to travel with relation to time. Find the total time it takes for the bicyclist to complete the trip.

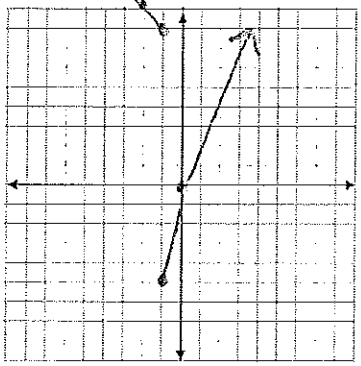
0	104
1	96
2	88
3	80

$y = -8x + 104$

13 hours

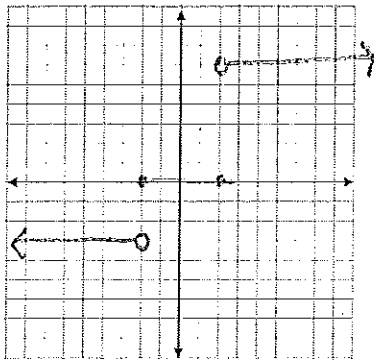
For #33-34, graph the piecewise function.

33. $f(x) = \begin{cases} -2x + 6, if\ x < -1 \\ -5x^2, if x \geq -1 \end{cases}$



(-1, 8) (-2, 10)
(-1, -5) (0, 0)

34. $f(x) = \begin{cases} -3, if\ x < -2 \\ 0, if -2 \leq x \leq 2. \\ 6, if\ x > 2 \end{cases}$



For #35-36, compare the functions using end behavior.

35. $f(x) = -2x^2$ & $g(x) = 2x^4 - 12x^2 + 9$

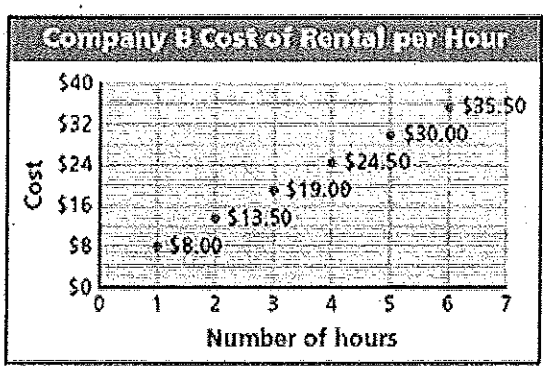
as $x \to +\infty$, $f(x) \to -\infty$, $g(x) \to +\infty$
as $x \to -\infty$, $f(x) \to -\infty$, $g(x) \to +\infty$

36. $f(x) = -3^x$ & $g(x) = x^3$

as $x \to +\infty$, $f(x) \to -\infty$, $g(x) \to +\infty$
as $x \to -\infty$, $f(x) \to 0$, $g(x) \to -\infty$

For #37, compare using average rate of change

37. The cost of renting a pedal boat is shown for Company A and Company B below. Compare the average rates of change and explain what the difference in rate of change represents.



Company A	
Number of Hours	Cost
0.5	$7.25
1.0	$8.50
1.5	$9.75
2.0	$11.00
2.5	$12.25
3.0	$13.50

$\frac{35.5 - 8}{6 - 1} = 5.5$

$\frac{13.5 - 7.25}{3 - 0.5} = 2.5$

Algebra 2 Final Exam Review: Chapter 9

Find the first 5 terms in the sequence:

1. $a_1 = 1,\ a_n = 6 - 2(a_{n-1})$

$a_1 = 1\ \ a_2 = 4\ \ a_3 = -2$
$a_4 = 10\ \ a_5 = -14$

2. $a_n = n^2 - 2n$

$a_1 = -1\ \ a_2 = 0\ \ a_3 = 3$
$a_4 = 8\ \ a_5 = 15$

Find the first five terms of each arithmetic sequence.

3. $a_1 = -5.5,\ d = -3$

$a_1 = -5.5$
$a_2 = -8.5$
$a_3 = -11.5$
$a_4 = -14.5$
$a_5 = -17.5$

Find the indicated term of each arithmetic sequence.

4. $a_1 = 40,\ d = 3,\ n = 17$

$a_{17} = 40 + 3(17-1)$
$a_{17} = 88$

Find S_n for each arithmetic series described.

5. $a_1 = 3,\ a_n = 20,\ n = 6$

$S_n = 6\left(\frac{3+20}{2}\right) = 69$

6. $\sum_{n=1}^{13}(n+2)$

$S_n = 13\left(\frac{3+15}{2}\right)$
$= 117$

Find the next two terms of each geometric sequence.

7. $-9, 27, -81, \ldots$ $243, -729$

Find the indicated term of each geometric sequence.

8. $a_1 = 5,\ r = 7,\ n = 6$

$a_6 = 5(7)^{6-1} = 84035$

Find S_n for each geometric series described.

9. $a_1 = 2,\ a_n = 486,\ r = 3$

$S_n = 2\left(\frac{1-(3)^6}{1-3}\right) = 728$

10. $\sum_{n=1}^{9} 2(-3)^{n-1}$

$S_9 = 2\left(\frac{1-(-3)^9}{1-(-3)}\right) = 9842$

11. $\sum_{k=1}^{\infty} \frac{1}{4}\left(\frac{4}{3}\right)^k$

$S = \frac{1/4}{1-4/3}$ NO SUM!