Name: _____ **Class:** _____ **Date:** _____ **ID: A**

Algebra 2 Honors Final Exam 2012-2013

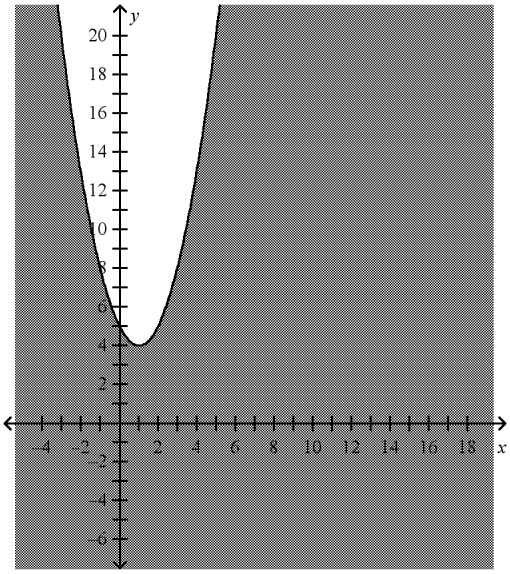
Multiple Choice

Identify the choice that best completes the statement or answers the question.

Graph the quadratic inequality.

____ 1. $y > x^2 - 2x + 5$

a.



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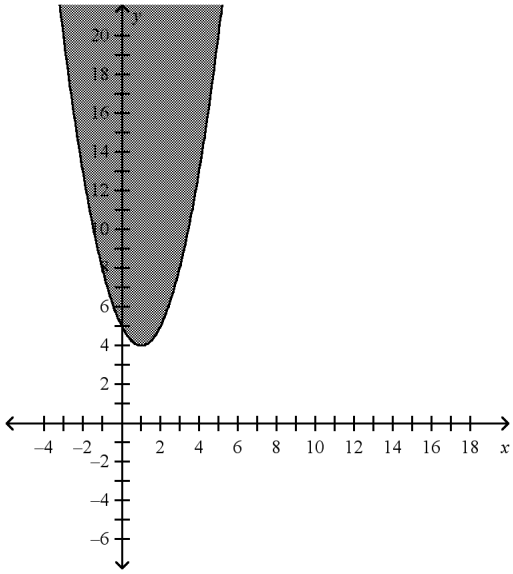

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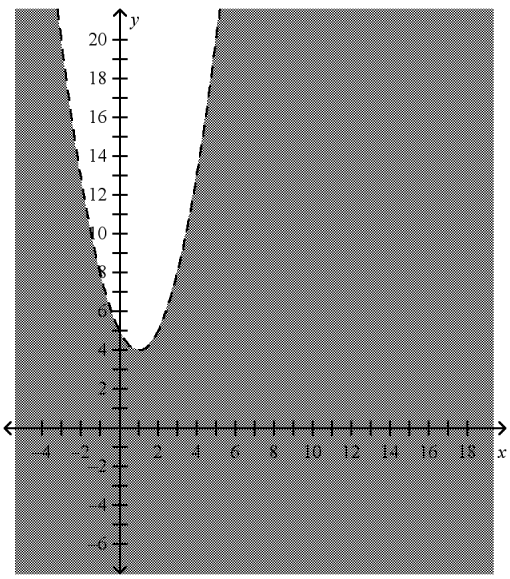
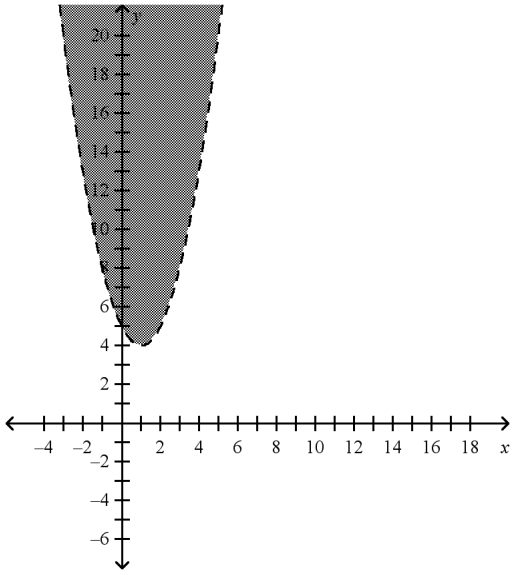


d.



Find the exact solution of the following quadratic equation by using the Quadratic Formula.

____ 2. $x^2 - 5x = 14$

a. {14, 19}
c. {–2, 7}
b. {–4, 14}
d. {–7, 2}

Estimate the x-coordinates at which the relative maxima and relative minima occur for the function.

____ 3. $f(x) = 2x^3 - 5x^2 + 8$

a. The relative maximum is at $x = 0$, and the relative minimum is at $x = -1.67$.
b. The relative maximum is at $x = 1$, and the relative minimum is at $x = 1.67$.
c. The relative maximum is at $x = 0$, and the relative minimum is at $x = 1.67$.
d. The relative maximum is at $x = 1$, and the relative minimum is at $x = -1.67$.

____ 4. List all of the possible rational zeros of the following function.
$f(x) = x^6 - 10x^5 - 20x^4 + 68x^3 + 36x^2 - 22x + 100$

a. –1, –2, –4, –5, –10, –20, –25, –50, –100
b. ±1, ±2, ±4, ±5, ±10, ±20, ±25, ±50, ±100
c. 1, 2, 4, 5, 10, 20, 25, 50
d. ±1, ±2, ±4, ±5, ±10, ±20, ±25, ±50

Write a quadratic equation with the given roots. Write the equation in the form $ax^2 + bx + c = 0$, where a, b, and c are integers.

____ 5. –10 and 1

a. $x^2 - 11x + 10 = 0$
c. $x^2 + 11x + 10 = 0$
b. $x^2 - 9x + 10 = 0$
d. $x^2 + 9x - 10 = 0$

Solve the following system of equations by graphing.

____ 6. $2y + 11x = 54$
$y - x = 14$

a. (4, 15)
c. (1, 16)
b. (16, 2)
d. (2, 16)

Factor the polynomial completely.

____ 7. $2x^2 - 13x + 11$

a. $2x^2 - 2x - 11x + 11$
c. $(2x - 11)(x - 1)$
b. $2x^2 - x - 12x + 11$
d. $2x(x - 1) - 11(x - 1)$

____ 8. $24x^2 + 10x - 25$

a. $(6x + 5)(4x - 5)$
c. $(6x - 5)(4x + 5)$
b. $(6x - 5)(4x - 5)$
d. $(6x + 5)(4x + 5)$

____ 9. ***Solve:*** $2\log_3(x+4) = \log_3 9 + 2$

a. x = 8
c. solution is extraneous
b. x = 4
d. x = 5

____ 10. Write an equation in slope-intercept form for the line that satisfies the following condition.
passes through (14, –6), perpendicular to the graph of $y = \frac{3}{7}x + 15$

a. $y = -\frac{7}{3}x + (-\frac{7}{3})$
c. $y = \frac{3}{7}x + \frac{80}{3}$
b. $y = -\frac{7}{3}x + \frac{80}{3}$
d. $y = \frac{80}{3}x + \frac{3}{7}$

____ 11. Find $(\frac{f}{g})(x)$ for the following functions.

$f(x) = 2x^3 - 12x^2 + 2x - 11$

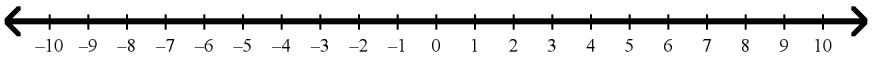
$g(x) = -5x^2 - 6$

a. $\frac{2x^3 - 12x^2 + 2x - 11}{-5x^2 - 6}, x \neq -\frac{6}{5}$
c. $\frac{2x^3 - 12x^2 + 2x - 11}{-5x^2 - 6}, x \neq \frac{6}{5}$
b. $\frac{2x^3 - 12x^2 + 2x - 11}{-5x^2 - 6}, x^2 = \frac{6}{5}$
d. $\frac{2x^3 - 12x^2 + 2x - 11}{-5x^2 - 6}, x^2 \neq -\frac{6}{5}$

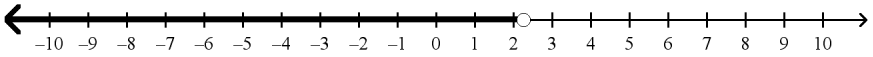
Solve the given inequality. Graph the solution set on a number line.

____ 12. $4m - 2 < 7$ or $6m + 2 \geq 4$

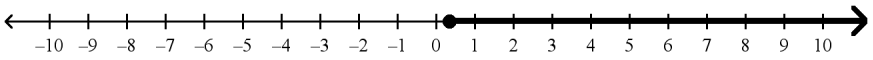
a. $\{m \mid m \in R\}$



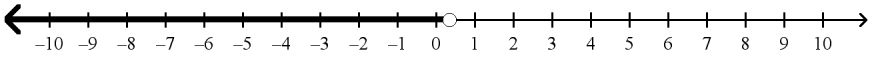
b. $\{m \mid m < 2.25\}$



c. $\{m \mid m \geq 0.\overline{3}\}$



d. $\{m \mid m < 0.\overline{3}\}$



Simplify the given expression. Assume that no variable equals 0.

____ 13. $12(6xy^{12})(-4x^{-7}y^{9})$

a. $\dfrac{-288y^{21}}{x^{6}}$

b. $\dfrac{14y^{21}}{x^{6}}$

c. $-288x^{-6}y^{21}$

d. $-288x^{-8}y^{-63}$

____ 14. $\left(\dfrac{12x^{18}y^{12}}{24x^{14}y^{16}}\right)^{4}$

a. $\dfrac{x^{16}y^{-16}}{16}$

b. $\dfrac{x^{16}}{16y^{16}}$

c. $\dfrac{x^{4}}{16y^{4}}$

d. $\dfrac{x^{16}}{2y^{16}}$

As a receptionist for a hospital, one of Elizabeth's tasks is to schedule appointments. She allots 60 minutes for the first visit and 30 minutes for a follow-up. The doctor cannot perform more than eight follow-ups per day. The hospital has eight hours available for appointments. The first visit costs $120 and the follow-up costs $70. Let x be the number of first visits and y be the number of follow-ups.

____ 15. What is the maximum income that the doctor receives per day?

a. $1040

b. $960

c. $1920

d. $970

____ 16. Determine the number of first visits and follow-ups to be scheduled to make the maximum income.

a. 8 first visits and 0 follow-ups

b. 4 first visits and 8 follow-ups

c. 4 first visits and 7 follow-ups

d. 16 first visits and 0 follow-ups

____ 17. Write a system of inequalities to represent the number of first visits and the number of follow-ups that can be performed.

a. $30x + 60y \le 420$ and $y \le 8$
$x \ge 0$ and $y \ge 0$

b. $60x + 30y \le 420$ and $y \le 8$
$x \ge 0$ and $y \ge 0$

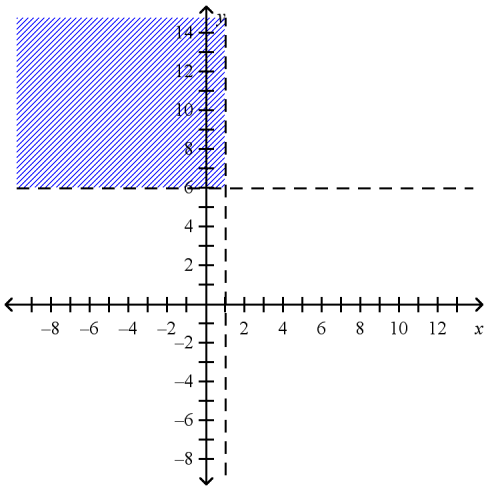
c. $60x + 30y \le 480$ and $y \le 8$
$x \ge 0$ and $y \ge 0$

d. $60x - 30y \le 480$ and $y \ge 8$
$x \ge 0$ and $y \ge 0$

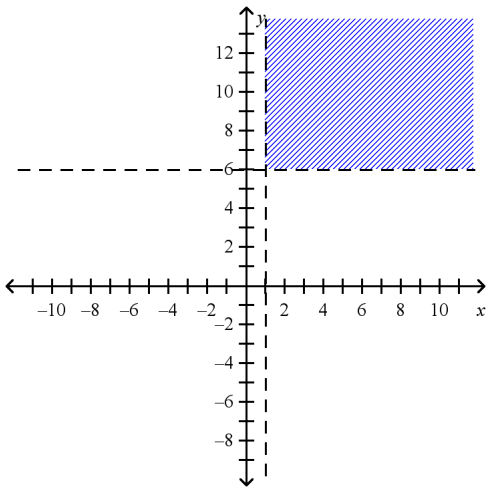
Solve the system of inequalities by graphing.

____ 18. $x > 1$
$y > 6$

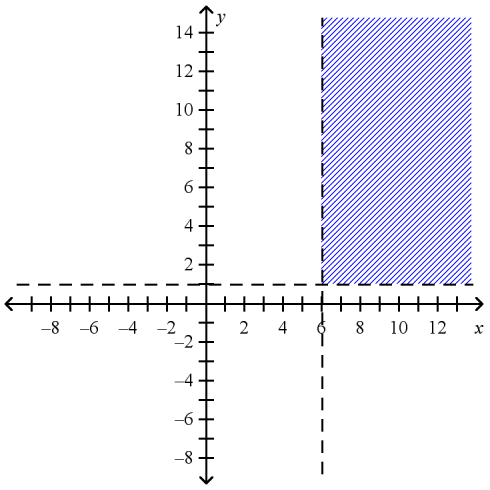
a.



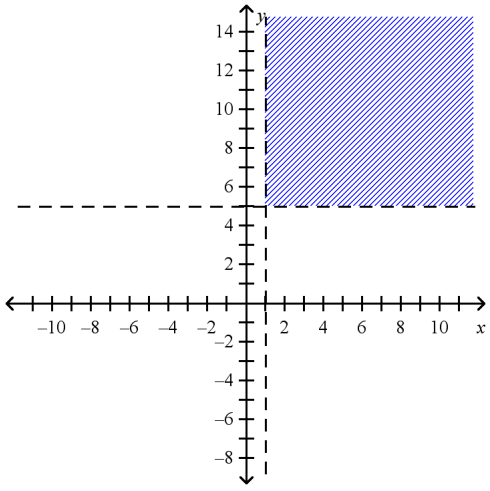
c.



b.



d.



Simplify.

____ 19. $\sqrt[4]{16a^{24}b^{12}}$

Asume that all absolute value symbols are present

a. $4a^6b^3$
b. $2a^{24}b^{12}$
c. $4a^{24}b^{12}$
d. $2a^6b^3$

____ 20. $\frac{11-3i}{12-5i}$

a. $\frac{11}{169}-\frac{3}{169}i$

b. $\frac{147}{169}+\frac{19}{169}i$

c. $\frac{147}{169}-\frac{19}{169}i$

d. $\frac{117}{119}+\frac{19}{119}i$

Evaluate the logarithmic expression.

____ 21. $\log_4 16$

a. 2

b. 2^4

c. 4^{16}

d. 16

Given a polynomial and one of its factors, find the remaining factors of the polynomial. Some of the factors may not be binomials.

____ 22. $4x^3 - 12x^2 - 81x + 243; x - 3$

a. $(4x^2 - 81)$

b. $(2x-9)(2x+9)$

c. $(2x-9)(2x-9)$

d. $(2x-9)$

____ 23. Find the value of $f(9)$ and $g(5)$ if $f(x) = -7x + 1$ and $g(x) = 10x + 21x^{-2}$.

a. $f(9) = -35$
$g(5) = 90.26$

b. $f(9) = -62$
$g(5) = 50.84$

c. $f(9) = -6$
$g(5) = 71.04$

d. $f(9) = -64$
$g(5) = 49.16$

Expand the given power by using Pascal's triangle.

____ 24. $(10a-11m)^6$

a. $1000000a^6 - 6600000am^5 + 36300000a^2m^4 - 108900000a^3m^3 + 43923000a^4m^2 - 9663060a^5m + 1771561m^6$

b. $1000000a^6 - 6600000a^5m + 18150000a^4m^2 - 26620000a^3m^3 + 21961500a^2m^4 - 9663060am^5 + 1771561m^6$

c. $10a^6 - 60a^5m + 1650a^4m^2 - 2200a^3m^3 + 1650a^2m^4 - 60am^5 + 10m^6$

d. $1000000a^6 + 6600000a^5m + 18150000a^4m^2 + 26620000a^3m^3 + 21961500a^2m^4 + 9663060am^5 + 1771561m^6$

____ 25. Find all of the zeros of the function $f(x) = 3x^3 - 50x^2 + 184x - 192$.

a. $-\frac{8}{3}, -2, 12$

b. $\frac{8}{3}, 12$

c. $\frac{8}{3}, 2, 12$

d. $-\frac{8}{3}, 2, 12$

____ 26. Consider the quadratic function $f(x) = -2x^2 - 3x + 2$. Find the y-intercept and the equation of the axis of symmetry.

a. The y-intercept is $\frac{3}{4}$.

The equation of the axis of symmetry is $x = -2$.

b. The y-intercept is -2.

The equation of the axis of symmetry is $x = \frac{3}{4}$.

c. The y-intercept is $-\frac{3}{4}$.

The equation of the axis of symmetry is $x = 2$.

d. The y-intercept is + 2.

The equation of the axis of symmetry is $x = -\frac{3}{4}$.

Solve the given equation.

____ 27. $9^{10n-13} = \frac{1}{6,561}$

a. $n = 9$

b. $n = \frac{17}{10}$

c. $n = \frac{9}{10}$

d. $n = 1$

____ 28. $\begin{bmatrix} x + 2y \\ y \end{bmatrix} = \begin{bmatrix} 20 \\ x - 3 \end{bmatrix}$

a. The solution set is $(\frac{17}{3}, \frac{26}{3})$.

b. The solution set is $(\frac{14}{3}, \frac{5}{3})$.

c. The solution set is (10, 10).

d. The solution set is $(\frac{26}{3}, \frac{17}{3})$.

Find the value of the given trigonometric function.

____ 29. $\tan(1140°)$

a. $\frac{1}{\sqrt{2}}$

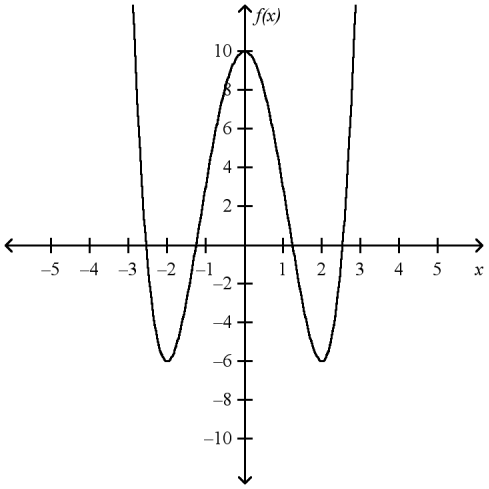
b. $\frac{\sqrt{3}}{2}$

c. $\frac{1}{\sqrt{3}}$

d. $\sqrt{3}$

For the given graph,
a. *describe the end behavior,*
b. *determine whether it represents an odd-degree or even-degree polynomial function, and*
c. *state the number of real zeros.*

____ 30.



a. The end behavior of the graph is $f(x) \to +\infty$ as $x \to +\infty$ and $f(x) \to +\infty$ as $x \to -\infty$.
It is an even-degree polynomial function.
The function has five real zeros.

b. The end behavior of the graph is $f(x) \to +\infty$ as $x \to +\infty$ and $f(x) \to -\infty$ as $x \to -\infty$.
It is an even-degree polynomial function.
The function has four real zeros.

c. The end behavior of the graph is $f(x) \to +\infty$ as $x \to +\infty$ and $f(x) \to +\infty$ as $x \to -\infty$.
It is an even-degree polynomial function.
The function has four real zeros.

d. The end behavior of the graph is $f(x) \to +\infty$ as $x \to +\infty$ and $f(x) \to +\infty$ as $x \to -\infty$.
It is an odd-degree polynomial function.
The function has four real zeros.

____ 31. Find $(f \cdot g)(x)$ for the following functions.

$f(x) = 10x^2 - 12x - 9$

$g(x) = 12x - 3$

a. $120x^3 + 30x^2 - 216x + 27$
b. $120x^3 - 174x^2 - 72x - 27$
c. $120x^3 - 174x^2 + 36x - 135$
d. $120x^3 - 174x^2 - 72x + 27$

____ 32. ***Solve:*** $\log_2(x-6) + \log_2(x+4) - \log_2 x = 2$

a. all solutions are extraneous
b. $x = 3 - \sqrt{33}$
c. $x = 3 + \sqrt{33}$
d. $x = 3 \pm \sqrt{33}$

____ 33. Write an equation for the parabola whose vertex is at $(2, 6)$ and which passes through $(4, 2)$.

a. $y = -1(x+2)^2 - 6$
b. $y = -1(x-2)^2 + 6$
c. $y = 1(x-2)^2 + 6$
d. $y = (x+2)^2 - 6$

____ 34. Solve $\log_8 n = \frac{1}{3}$.

a. 8
b. $\frac{8}{3}$
c. $\frac{1}{3}$
d. 2

Simplify the expression using long division.

____ 35. $(9x^2 - 19x + 2) \div (x - 2)$

a. quotient $9x - 1$ and remainder -4
b. quotient $9x - 1$ and remainder 0
c. quotient $9x + 1$ and remainder 4
d. quotient $9x - 19$ and remainder 2

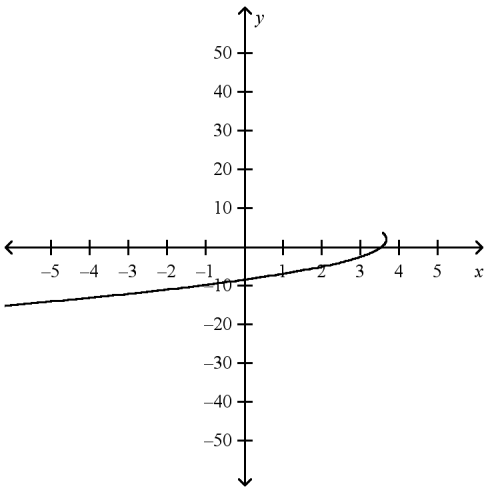
____ 36. Write an equation in slope-intercept form for the line that satisfies the following condition.
slope 10 and passes through (3, 23)

a. $y = 23x - 7$
b. $y = 10x - 7$
c. $y = 10x + 23$
d. $y = 3x + 3$

____ 37. Graph the given function. State its domain and range.

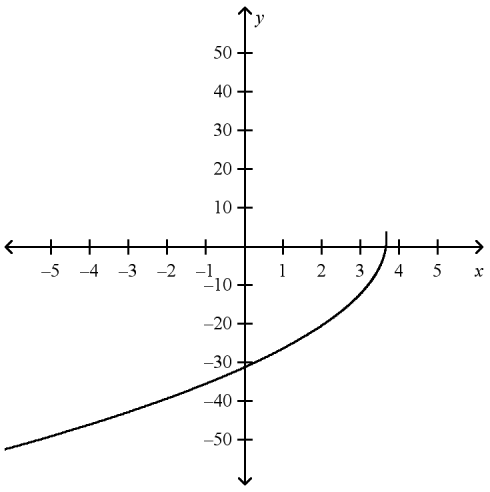
$y = -10\sqrt{11 - 3x} + 2$

a.



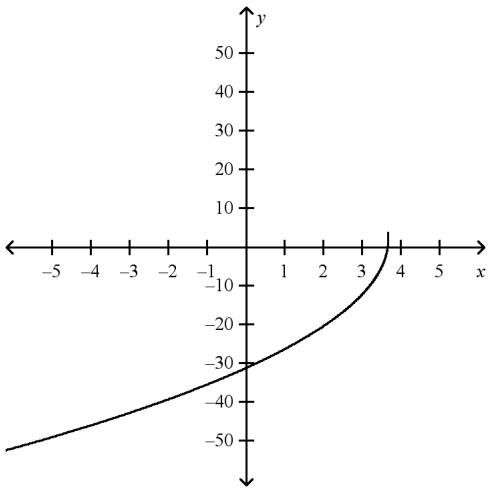
The domain is $x \le \frac{11}{3}$ and the range is $y \ge 2$.

b.



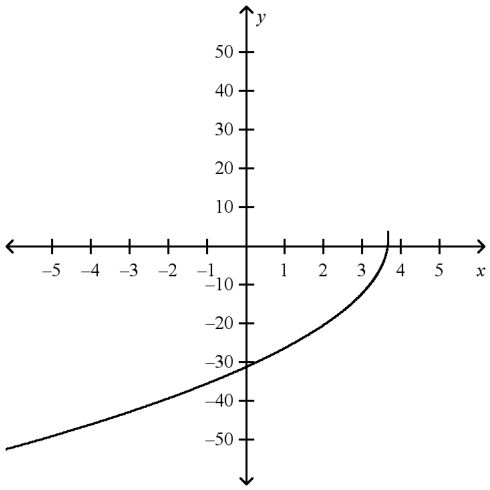
The domain is $x \le \frac{11}{3}$ and the range is $y \le 2$.

c.



The domain is $x \ge \frac{11}{3}$ and the range is $y \ge 2$.

d.



The domain is $x \le \frac{11}{3}$ and the range is $y \ge 2$.

Find the coordinates of the vertices of the figure formed by each system of inequalities.

____ 38. $y + x \ge -3$

$y \ge x - 5$

$3y + x \le 13$

a. (1, –4), (–14, 9), (–11, 8)
b. (1, 8), (–11, 2), (7, –4)
c. (1, –4), (7, 2), (–11, 8)
d. (1, 4), (7, 2), (11, 8)

Write the following quadratic function in vertex form. Then, identify the axis of symmetry.

____ 39. $y = x^2 + 10x - 2$

a. The vertex form of the function is $y = (x-5)^2 - 27$.
The equation of the axis of symmetry is $x = -5$.

b. The vertex form of the function is $y = (x+5)^2 + 27$.
The equation of the axis of symmetry is $x = -27$.

c. The vertex form of the function is $y = (x+5)^2 - 27$.
The equation of the axis of symmetry is $x = -5$.

d. The vertex form of the function is $y = (x+5)^2 - 27$.
The equation of the axis of symmetry is $x = -27$.

Simplify the given expression.

____ 40. $32x + 44y - 198x + 32y$

a. $-166y + 76x$ b. $230x + 76y$ c. $-166x + 32y$ d. $-166x + 76y$

Find the inverse of the given function.

____ 41. $f(x) = \dfrac{3x-7}{2}$

a. $f^{-1}(x) = \dfrac{2x+7}{3}$

b. $f^{-1}(x) = \dfrac{2x-7}{3}$

c. $f^{-1}(x) = \dfrac{3x-2}{7}$

d. $f^{-1}(x) = \dfrac{3x+2}{7}$

Rewrite the degree measure in radians.

____ 42. $-720°$

a. $-\dfrac{\pi}{4}$

b. -4π

c. $-\dfrac{4}{\pi}$

d. 4π

Expand the given power using the Binomial Theorem.

____ 43. $(a-5)^4$

a. $a^4 - 20a^3 + 150a^2 - 20a + 1$

b. $5a^4 + 20a^3 + 150a^2 + 500a + 625a$

c. $a^4 + 20a^3 + 150a^2 + 500a + 625$

d. $a^4 - 20a^3 + 150a^2 - 500a + 625$

____ 44. $(6a - y)^5$

a. $7776a^5 - 6480a^4y + 2160a^3y^2 - 360a^2y^3 + 30ay^4 - y^5$

b. $7776y^5 + 6480ay^4 + 2160a^2y^3 + 360a^3y^2 + 30a^4y + a^5$

c. $7776a^5 + 6480a^4y + 2160a^3y^2 + 360a^2y^3 + 30ay^4 + y^5$

d. $a^5 - 5a^4y + 10a^3y^2 - 10a^2y^3 + 5ay^4 - y^5$

Simplify the expression using synthetic division.

____ 45. $(7x^3 - 61x^2 + 154x - 120) \div (x - 5)$

a. quotient $7x^2 - 26x + 24$ and remainder 0

b. quotient $35x^2 + 114x + 724$ and remainder 3,500

c. quotient $42x^2 + 149x - 899$ and remainder 4,375

d. quotient $7x^2 - 96x - 326$ and remainder 1,510

____ 46. Find $p(-3)$and $p(5)$ for the function $p(x) = 4x^5 - 9x^4 - 8x^2 + 12x - 11$.

a. –1,772; 6,676

b. –524; –3,276

c. –1,820; 6,724

d. –1,809; 6,735

Perform the indicated matrix operation.

____ 47. $\begin{bmatrix} 7 & 1 \\ -1 & -6 \end{bmatrix} + \frac{1}{2}\begin{bmatrix} 0 & 10 \\ -6 & -4 \end{bmatrix}$

a. $\begin{bmatrix} 7 & 6 \\ -7 & -10 \end{bmatrix}$

b. $\begin{bmatrix} 3.5 & 10.5 \\ -6.5 & -7 \end{bmatrix}$

c. $\begin{bmatrix} 3.5 & 5.5 \\ -3.5 & -5 \end{bmatrix}$

d. $\begin{bmatrix} 7 & 6 \\ -4 & -8 \end{bmatrix}$

____ 48. Find $(goh)(x)$ and $(hog)(x)$.

$g(x) = 3x$

$h(x) = -8x - 12$

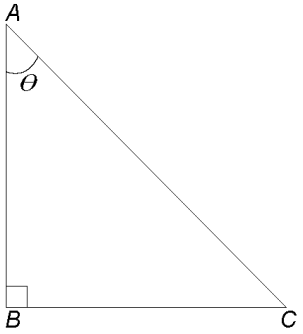
a. $[g \circ h](x) = -24x - 36$
$[h \circ g](x) = -24x - 12$

b. $[g \circ h](x) = -24x + 36$
$[h \circ g](x) = -24x + 12$

c. $[g \circ h](x) = -24x - 36$
$[h \circ g](x) = -24x - 36$

d. $[g \circ h](x) = -24x^2 - 36x$
$[h \circ g](x) = -24x^2 - 12x$

____ 49. Find the values of the six trigonometric functions for angle θ, when $AC = 50$ and $BC = 40$.



a. $\sin\theta = \frac{4}{5}$, $\cos\theta = \frac{3}{5}$, $\csc\theta = \frac{5}{4}$, $\sec\theta = \frac{5}{3}$, $\tan\theta = \frac{4}{3}$, and $\cot\theta = \frac{3}{4}$.

b. $\sin\theta = \frac{5}{3}$, $\cos\theta = \frac{3}{4}$, $\csc\theta = \frac{3}{5}$, $\sec\theta = \frac{4}{5}$, $\tan\theta = \frac{4}{3}$, and $\cot\theta = \frac{5}{4}$.

c. $\sin\theta = \frac{5}{3}$, $\cos\theta = \frac{5}{4}$, $\csc\theta = \frac{3}{5}$, $\sec\theta = \frac{4}{5}$, $\tan\theta = \frac{3}{4}$, and $\cot\theta = \frac{4}{3}$.

d. $\sin\theta = \frac{4}{5}$, $\cos\theta = \frac{3}{5}$, $\csc\theta = \frac{5}{3}$, $\sec\theta = \frac{5}{4}$, $\tan\theta = \frac{4}{3}$, and $\cot\theta = \frac{4}{3}$.

____ 50. Find $(f-g)(x)$ for the following functions.

$f(x) = 14x + 15$

$g(x) = -16x^2 + 8x + 26$

a. $16x^2 + 6x - 11$

b. $-16x^2 - 6x - 11$

c. $30x^2 - 8x - 11$

d. $-16x^2 - 6x + 11$

Algebra 2 Honors Final Exam 2012-2013
Answer Section

MULTIPLE CHOICE

1. ANS: D
Graph the related quadratic equation. Because the inequality symbol is >, the parabola should be dashed. Test a point (x_1, y_1) inside the parabola. If (x_1, y_1) is the solution of the inequality, shade the region inside the parabola. If (x_1, y_1) is not a solution, shade the region outside the parabola.

	Feedback
A	Did you shade correctly?
B	Did you test a point inside the parabola correctly?
C	What is the inequality symbol used in the equation?
D	Correct!

PTS: 1 DIF: Advanced REF: Lesson 5-8
OBJ: 5-8.1 Graph quadratic inequalities in two variables. STA: MA.912.A.4.1.1 | MA.912.A.10.3
TOP: Graph quadratic inequalities in two variables.
KEY: Quadratic Inequalities | Graph Quadratic Inequalities

2. ANS: C
The solution of a quadratic equation of the form $ax^2 + bx + c = 0$, where $a \neq 0$, is obtained by using the formula $x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$.

	Feedback
A	Did you use the correct formula?
B	Did you substitute the values of a, b, and c correctly in the formula?
C	Correct!
D	Did you check the signs of the solution?

PTS: 1 DIF: Average REF: Lesson 5-6
OBJ: 5-6.1 Solve quadratic equations by using the Quadratic Formula.
STA: MA.912.A.7.4 | MA.912.A.7.5 | MA.912.A.10.3
TOP: Solve quadratic equations by using the Quadratic Formula.
KEY: Quadratic Equations | Solve Quadratic Equations | Quadratic Formula

3. ANS: C
Make a table of values and graph the equation.

	Feedback
A	A relative minimum is a point that has no nearby points with a lesser y-coordinate.
B	Did you obtain the correct value of the relative maximum?
C	Correct!
D	Did you obtain the correct coordinates of the function?

PTS: 1 DIF: Average REF: Lesson 6-4
OBJ: 6-4.3 Find the maxima and minima of polynomial functions.
STA: MA.912.A.2.6 | MA.912.A.4.5 TOP: Find the maxima and minima of polynomial functions.
KEY: Maxima of Polynomial Functions | Minima of Polynomial Functions

4. ANS: B
Use the Rational Zero Theorem.

	Feedback
A	You must also include the positive rational zeros in the answer.
B	Correct!
C	Did you consider the negative rational zeros?
D	Did you calculate all the zeros correctly?

PTS: 1 DIF: Average REF: Lesson 6-8
OBJ: 6-8.1 Identify the possible rational zeros of a polynomial function.
STA: MA.912.A.4.6 | MA.912.A.4.8 | MA.912.A.4.3
TOP: Identify the possible rational zeros of a polynomial function.
KEY: Polynomial Functions | Zeroes of Polynomial Functions

5. ANS: D
A quadratic equation with roots p and q can be written as $(x-p)(x-q)=0$, which can be further simplified.

	Feedback
A	Did you verify the answer by substituting the values?
B	Did you check the signs of the coefficients?
C	Did you calculate the coefficients correctly?
D	Correct!

PTS: 1 DIF: Average REF: Lesson 5-3
OBJ: 5-3.1 Write quadratic equations in intercept form. STA: MA.912.A.4.3 | MA.912.A.10.3
TOP: Write quadratic equations in intercept form.
KEY: Quadratic Equations | Roots of Quadratic Equations

6. ANS: D
Graph the equations and find their point of intersection.

	Feedback
A	Did you read the intersection of the graphs correctly?
B	Did you plot the graphs correctly?
C	What is the x-coordinate of the intersection?
D	Correct!

PTS: 1 DIF: Average REF: Lesson 3-1
OBJ: 3-1.1 Solve systems of linear equations by graphing. STA: MA.912.A.3.14 | MA.912.A.3.15
TOP: Solve systems of linear equations by graphing.
KEY: System of Linear Equations | Graphs

7. ANS: C
To find the coefficient of the x terms, find two numbers whose product is $2 \cdot 11$ or 22 and whose sum is 13.

	Feedback
A	Factor the GCF of each group.
B	The product of the coefficient of the x terms should be equal to the product of the coefficient of the x^2 term and the constant term.
C	Correct!
D	Use the Distributive Property to obtain two binomial factors.

PTS: 1 DIF: Advanced REF: Lesson 6-5
OBJ: 6-5.3 Factor polynomials with addition recognizing the FOIL method.
STA: MA.912.A.4.3
TOP: Factor polynomials with addition by recognizing the FOIL method.
KEY: Polynomials | Factor Polynomials | FOIL Method

8. ANS: C
To find the coefficient of the x terms, find two numbers such that their product is $24 \cdot 25$ or 600 and their difference is 10.

	Feedback
A	Rewrite the coefficients of the x term in two parts such that their difference is equal to the x coefficient in the original expression.
B	Rewrite the coefficients of the x term in two parts such that their product is equal to the product of the coefficient of the x^2 term and the constant.
C	Correct!
D	Use the Distributive Property to obtain two binomial factors.

PTS: 1 DIF: Average REF: Lesson 6-5
OBJ: 6-5.4 Factor polynomials with subtraction recognizing the FOIL method.
STA: MA.912.A.4.3
TOP: Factor polynomials with subtraction recognizing the FOIL method.
KEY: Polynomials | Factor Polynomials | FOIL Method

9. ANS: D PTS: 1

10. ANS: B

The point-slope form of the equation of a line is $y - y_1 = m\left(x - x_1\right)$, where $\left(x_1, y_1\right)$ are the coordinates of a point on the line and m is the slope of the line. The slopes of perpendicular lines are opposite reciprocals.

	Feedback
A	Did you calculate the y-intercept correctly?
B	Correct!
C	The slope value is incorrect.
D	What must the slope be if the line is perpendicular to the given line?

PTS: 1 DIF: Advanced REF: Lesson 2-4
OBJ: 2-4.3 Write an equation of a line perpendicular to a given line.
STA: MA.912.A.3.10
TOP: Write an equation of a line perpendicular to a given line.
KEY: Perpendicular Lines | Equations of Perpendicular Lines

11. ANS: D

Divide $f(x)$ by $g(x)$ to obtain the required answer.

	Feedback
A	Did you calculate correctly?
B	Did you include the correct sign in the answer?
C	What is the solution of the function?
D	Correct!

PTS: 1 DIF: Average REF: Lesson 7-1
OBJ: 7-1.4 Find the quotient of functions. STA: MA.912.A.2.7 | MA.912.A.2.8
TOP: Find the quotient of functions. KEY: Functions | Quotient of Functions

12. ANS: A

Solve the given inequality and then plot the graph.

	Feedback
A	Correct!
B	Did you solve the second equation correctly?
C	Did you use the correct inequalities in the calculation?
D	Did you verify the solution in the given inequalities?

PTS: 1 DIF: Advanced REF: Lesson 1-6
OBJ: 1-6.1 Solve compound inequalities with or. STA: MA.912.A.3.4 | MA.912.A.3.6
TOP: Solve compound inequalities with or.
KEY: Solve Inequalities | Compound Inequalities

13. ANS: A
Multiply the constants and then multiply the powers using the Power of a Product Property.

	Feedback
A	Correct!
B	Multiply the constants.
C	A simplified expression cannot contain negative exponents.
D	Multiply the powers of the same variable using the Power of a Product Property.

PTS: 1 DIF: Basic REF: Lesson 6-1
OBJ: 6-1.1 Use properties of exponents to multiply monomials.
STA: MA.912.A.4.2 TOP: Use properties of exponents to multiply monomials.
KEY: Monomials | Multiply Monomials

14. ANS: B
Simplify each base using the properties of powers. Then, write all the fractions in the simplest terms and ensure there are no negative exponents.

	Feedback
A	There should be no negative exponents.
B	Correct!
C	Raise the numerator and the denominator to the fourth power before simplifying.
D	Use the Power of a Power Property to all the terms in the monomial.

PTS: 1 DIF: Average REF: Lesson 6-1
OBJ: 6-1.2 Use properties of exponents to divide monomials.
STA: MA.912.A.4.2 TOP: Use properties of exponents to divide monomials.
KEY: Monomials | Divide Monomials

15. ANS: A
Substitute the coordinates of the vertices of the feasible region into the required function.

	Feedback
A	Correct!
B	Did you calculate correctly?
C	Did you check the values of the inequalities?
D	How many follow-up visits give you the maximum?

PTS: 1 DIF: Advanced REF: Lesson 3-4
OBJ: 3-4.2 Solve real-world problems using linear programming.
STA: MA.912.A.3.14 | MA.912.A.3.15
TOP: Solve real-world problems using linear programming.
KEY: Linear Programming | Real-World Problems

16. ANS: B
Find out the vertices of the feasible region that represents the number of the first visits and the number of the follow-ups. Then, substitute the vertices in the required function.

	Feedback
A	Does that vertex result in a maximum?
B	Correct!
C	Is (4, 7) a vertex of the feasible region?
D	Did you plot the correct inequality?

PTS: 1 DIF: Advanced REF: Lesson 3-4
OBJ: 3-4.2 Solve real-world problems using linear programming.
STA: MA.912.A.3.14 | MA.912.A.3.15
TOP: Solve real-world problems using linear programming.
KEY: Linear Programming | Real-World Problems

17. ANS: C
Form the system of inequalities using the appropriate values.

	Feedback
A	The values in the first inequality are incorrect.
B	The value for the total time is incorrect.
C	Correct!
D	Did you check the sign used in the inequalities?

PTS: 1 DIF: Average REF: Lesson 3-4
OBJ: 3-4.2 Solve real-world problems using linear programming.
STA: MA.912.A.3.14 | MA.912.A.3.15
TOP: Solve real-world problems using linear programming.
KEY: Linear Programming | Real-World Problems

18. ANS: C
Both the inequalities should be plotted and the region common to both should be shaded.

	Feedback
A	You have plotted the first inequality incorrectly.
B	You have plotted the inequalities incorrectly.
C	Correct!
D	You have plotted the second inequality incorrectly.

PTS: 1 DIF: Average REF: Lesson 3-3
OBJ: 3-3.1 Solve systems of inequalities by graphing. STA: MA.912.A.3.14 | MA.912.A.3.15
TOP: Solve systems of inequalities by graphing. KEY: System of Inequalities | Graphs

19. ANS: D
Find the principal square root of each term of the radicand.

	Feedback
A	Apply the principal square root of each term of the radicand.
B	Apply the principal root of the number under the radical sign.
C	Apply the principal root according to the sign of the radical.
D	Correct!

PTS: 1 DIF: Average REF: Lesson 7-4 OBJ: 7-4.1 Simplify radicals.
STA: MA.912.A.10.3 TOP: Simplify radicals.
KEY: Radicals | Simplify Radicals

20. ANS: B
Multiply the numerator as well as the denominator by the conjugate of the denominator. Use the FOIL method and the difference of squares to simplify the given expression.

	Feedback
A	Multiply the numerator also with the conjugate of the denominator.
B	Correct!
C	Did you combine the similar terms correctly?
D	Did you multiply the conjugates correctly in the denominator?

PTS: 1 DIF: Average REF: Lesson 5-4
OBJ: 5-4.5 Perform division operations with complex numbers.
STA: MA.912.A.1.6 TOP: Perform division operations with complex numbers.
KEY: Complex Numbers | Divide Complex Numbers

21. ANS: A
Use the Property of Equality for Exponential Functions to evaluate the logarithmic expression.

	Feedback
A	Correct!
B	Use the Property of Equality for Exponential Functions.
C	The exponential and logarithmic functions are inverses.
D	Write the correct exponential form of the given expression.

PTS: 1 DIF: Basic REF: Lesson 8-3
OBJ: 8-3.1 Evaluate logarithmic expressions.
STA: MA.912.A.8.1 | MA.912.A.8.2 | MA.912.A.2.10 | MA.912.A.8.3
TOP: Evaluate logarithmic expressions.
KEY: Logarithms | Evaluate Expressions | Logarithmic Expressions

22. ANS: B
Use the Factor Theorem.

	Feedback
A	You have to factor the depressed polynomial to its simplest form.
B	Correct!
C	Did you verify the answer by multiplying the factors?
D	Did you factor correctly?

PTS: 1 DIF: Advanced REF: Lesson 6-6
OBJ: 6-6.2 Determine whether a binomial is a factor of a polynomial by using synthetic substitution.
STA: MA.912.A.4.6 | MA.912.A.4.8 | MA.912.A.4.3
TOP: Determine whether a binomial is a factor of a polynomial by using synthetic substitution.
KEY: Polynomial Functions | Synthetic Substitution

23. ANS: B
Substitute $x = 9$ in the equation $f(x)$ and $x = 5$ in the equation $g(x)$.

	Feedback
A	You have to substitute the values of $f(x)$ and $g(x)$ in the subsequent equations.
B	Correct!
C	Did you substitute the value in $f(x)$ as well?
D	You have subtracted instead of adding.

PTS: 1 DIF: Average REF: Lesson 2-1 OBJ: 2-1.2 Find functional values.
STA: MA.912.A.10.3 TOP: Find functional values.
KEY: Functional Values | Functions

24. ANS: B
Use Pascal's triangle to expand the power.

	Feedback
A	Did you check the sign between the terms of the binomial?
B	Correct!
C	Did you check the coefficients of each term?
D	Check the exponents of each term.

PTS: 1 DIF: Advanced REF: Lesson 11-6
OBJ: 11-6.1 Use Pascal's triangle to expand powers of binomials.
STA: MA.912.A.4.12 TOP: Use Pascal's triangle to expand powers of binomials.
KEY: Pascal's Triangle | Expand Powers of Binomials

25. ANS: C
Use synthetic substitution to obtain the required answer.

	Feedback
A	There is no change in sign for the coefficients of $f(-x)$.
B	Did you find all the zeros of the function?
C	Correct!
D	The function has no negative real zeros.

PTS: 1 DIF: Average REF: Lesson 6-7
OBJ: 6-7.2 Find the zeros of a polynomial function.
STA: MA.912.A.4.6 | MA.912.A.4.8 | MA.912.A.4.3 | MA.912.A.4.7
TOP: Find the zeros of a polynomial function.
KEY: Polynomial Functions | Zeroes of Polynomial Functions

26. ANS: D
For the quadratic equation $ax^2 + bx + c$, the y-intercept is c and the equation of axis of symmetry is $x = \frac{-b}{2a}$.

	Feedback
A	Did you use the correct formulas for the y-intercept and the x-coordinate of the vertex?
B	Did you check the signs?
C	Did you interchange the y-intercept and the x-coordinate of the vertex?
D	Correct!

PTS: 1 DIF: Average REF: Lesson 5-1 OBJ: 5-1.1 Graph quadratic functions.
STA: MA.912.A.2.6 | MA.912.A.7.6 | MA.912.A.10.3 TOP: Graph quadratic functions.
KEY: Quadratic Functions | Graph Quadratic Functions

27. ANS: C
Eliminate the bases and use the Property of Equality for Exponential Functions to solve the equation.

	Feedback
A	Did you check the exponent of the base on the left side of the equation?
B	Did you check the exponent of the base on the right side of the equation?
C	Correct!
D	Did you write the right side of the equation in the correct exponential form?

PTS: 1 DIF: Average REF: Lesson 8-2 OBJ: 8-2.1 Solve exponential equations.
STA: MA.912.A.8.5 | MA.912.A.10.3 TOP: Solve exponential equations.
KEY: Solve Equations | Exponential Equations

28. ANS: D
Obtain two linear equations using the definition of equal matrices.

	Feedback
A	Did you interchange the values of x and y?
B	Did you obtain two linear equations using the definition of equal matrices?
C	The values of x and y cannot be equal.
D	Correct!

PTS: 1 DIF: Average REF: Lesson 4-1
OBJ: 4-1.2 Solve equations involving matrices. STA: LA.910.1.6.1
TOP: Solve equations involving matrices. KEY: Matrices | Matrix Equations

29. ANS: D
First, find the reference angle θ'. Then, find the value of the trigonometric function for θ'. Then, using the quadrant in which the terminal side of θ lies, determine the sign of the trigonometric function value of θ.

	Feedback
A	Use a reference angle to find the value of the given trigonometric function.
B	Did you find the reference angle of the given angle?
C	Find tan of the given angle, not cot.
D	Correct!

PTS: 1 DIF: Average REF: Lesson 13-3
OBJ: 13-3.3 Find values of tangent and cotangent for general angles.
STA: MA.912.T.1.2 | MA.912.T.1.3 TOP: Find values of tangent and cotangent for general angles.
KEY: Tangent | Cotangent

30. ANS: C
The end behavior is the behavior of the graph as x approaches positive infinity $(+\infty)$ or negative infinity $(-\infty)$. The x-coordinate of the point at which the graph intersects the x-axis is called the *zero* of the function.

	Feedback
A	Did you verify the number of real zeros?
B	What is the end behavior of the graph?
C	Correct!
D	Check the degree of the polynomial function.

PTS: 1 DIF: Basic REF: Lesson 6-3
OBJ: 6-3.2 Identify general shapes of graphs of polynomial functions.
STA: MA.912.A.4.5
TOP: Identify general shapes of graphs of polynomial functions.
KEY: Polynomial Functions | Graph Polynomial Functions

31. ANS: D
Multiply $f(x)$ and $g(x)$ to obtain the required answer.

	Feedback
A	You have multiplied the two functions incorrectly.
B	The answer has an incorrect operator.
C	Did you check the calculations?
D	Correct!

PTS: 1 DIF: Average REF: Lesson 7-1
OBJ: 7-1.3 Find the product of functions. STA: MA.912.A.2.7 | MA.912.A.2.8
TOP: Find the product of functions. KEY: Functions | Product of Functions

32. ANS: A PTS: 1

33. ANS: B
If the vertex and another point on the graph of a parabola are known, the equation of the parabola can be written in vertex form.

	Feedback
A	Did you check the signs of the coefficients?
B	Correct!
C	Did you find the correct coefficient values?
D	Did you substitute correctly in the vertex form of the equation?

PTS: 1 DIF: Average REF: Lesson 5-7
OBJ: 5-7.2 Write a quadratic function in the form y = a(x - h)^2 + k.
STA: MA.912.A.2.10
TOP: Write a quadratic function in the form y = a(x – h)^2 + k.
KEY: Quadratic Functions

34. ANS: D
Use the definition of logarithms with base b to solve the logarithmic equation.

	Feedback
A	What is the value on the right side of the equation?
B	Did you simplify correctly?
C	Did you apply the definition of logarithm?
D	Correct!

PTS: 1 DIF: Basic REF: Lesson 8-4 OBJ: 8-4.1 Solve logarithmic equations.
STA: MA.912.A.8.2 | MA.912.A.8.5 TOP: Solve logarithmic equations.
KEY: Solve Equations | Logarithmic Equations

35. ANS: B
Use the division algorithm. When dividing, you can add or subtract only similar terms.

	Feedback
A	Change the signs of the product terms only.
B	Correct!
C	Did you use the correct signs of the terms?
D	Did you consider both the terms of the divisor?

PTS: 1 DIF: Advanced REF: Lesson 6-2
OBJ: 6-2.1 Divide polynomials using long division. STA: MA.912.A.4.4
TOP: Divide polynomials using long division.
KEY: Polynomials | Divide Polynomials | Long Division

36. ANS: B
Substitute the values of the x- and y-coordinates in the equation $y - y_1 = m\left(x - x_1\right)$. Manipulate the equation to get it in the slope-intercept form.

	Feedback
A	The slope-intercept equation has to include the value of slope as well.
B	Correct!
C	Did you calculate the value of the slope correctly?
D	You have to substitute the values of x- and y-coordinates to obtain the slope-intercept equation.

PTS: 1 DIF: Advanced REF: Lesson 2-4
OBJ: 2-4.1 Write an equation of a line given the slope and a point on the line.
STA: MA.912.A.3.10
TOP: Write an equation of a line given the slope and a point on the line.
KEY: Equations of Lines | Slope | Graphs

37. ANS: B
Write the expression inside the radicand as ≥ 0. Solve for x and graph the function.

	Feedback
A	Plot the graph using all the given values of the equation.
B	Correct!
C	Did you find the correct value of the domain?
D	What is the range of the graph?

PTS: 1 DIF: Average REF: Lesson 7-3
OBJ: 7-3.1 Graph and analyze square root functions. STA: MA.912.A.2.6
TOP: Graph and analyze square root functions.
KEY: Square Root Functions | Graph Square Root Functions

38. ANS: C
Solve the system of inequalities by graphing the inequalities on the same coordinate plane. The solution set is represented by the intersection of the graphs.

	Feedback
A	Did you plot the inequalities correctly?
B	You have interchanged the coordinates.
C	Correct!
D	Did you check the sign of the coordinates?

PTS: 1 DIF: Advanced REF: Lesson 3-3
OBJ: 3-3.2 Determine the coordinates of the vertices of a region formed by the graph of a system of inequalities. STA: MA.912.A.3.14 | MA.912.A.3.15
TOP: Determine the coordinates of the vertices of a region formed by the graph of a system of inequalities. KEY: System of Inequalities | Graphs

39. ANS: C
The vertex form of a quadratic function is $y = a(x - h)^2 + k$.
The equation of the axis of symmetry of a parabola is $x = h$.

	Feedback
A	Did you check the *x*-coordinate of the vertex?
B	Did you use the correct equation of the axis of symmetry of a parabola?
C	Correct!
D	Did you identify the coordinates of the vertex correctly?

PTS: 1 DIF: Basic REF: Lesson 5-7
OBJ: 5-7.1 Analyze quadratic functions in the form y = a(x - h)^2 + k.
STA: MA.912.A.2.10
TOP: Analyze quadratic functions in the form y = a(x - h)^2 + k.
KEY: Quadratic Functions | Axis of Symmetry

40. ANS: D
Use the properties of real numbers to simplify the given expression.

	Feedback
A	Did you interchange the coefficients?
B	Did you calculate correctly?
C	Did you simplify the entire expression?
D	Correct!

PTS: 1 DIF: Average REF: Lesson 1-2
OBJ: 1-2.2 Use the properties of real numbers to evaluate expressions.
STA: MA.912.A.3.2
TOP: Use the properties of real numbers to evaluate expressions.
KEY: Real Numbers | Evaluate Expressions

41. ANS: A
The inverse function can be found by exchanging the domain and range of the function.

	Feedback
A	Correct!
B	The answer includes an incorrect negative sign.
C	You have interchanged the values.
D	Did you calculate the correct value of the inverse of the function?

PTS: 1 DIF: Average REF: Lesson 7-2
OBJ: 7-2.2 Find the inverse of a function. STA: MA.912.A.2.11
TOP: Find the inverse of a function. KEY: Functions | Inverses of Functions

42. ANS: B
To rewrite the degree measure of an angle in radians, multiply the number of degrees by $\frac{\pi \text{ radians}}{180^\circ}$.

	Feedback
A	One radian is about 57 degrees.
B	Correct!
C	One degree is about 0.0175 radian.
D	Did you multiply the number of degrees correctly by the conversion factor?

PTS: 1 DIF: Average REF: Lesson 13-2
OBJ: 13-2.2 Change degree measure to radian measure. STA: LA.910.1.6.1 | MA.912.T.1.1
TOP: Change degree measure to radian measure. KEY: Radian Measure | Degree Measure

43. ANS: D
Use the Binomial Theorem to expand the power.

	Feedback
A	In the terms having the same coefficients, the exponents are reversed.
B	Did you apply the Binomial Theorem correctly?
C	Check the sign between the terms of the binomial.
D	Correct!

PTS: 1 DIF: Advanced REF: Lesson 11-6
OBJ: 11-6.2 Use the Binomial Theorem to expand powers of binomials.
STA: MA.912.A.4.12
TOP: Use the Binomial Theorem to expand powers of binomials.
KEY: Binomial Theorem | Expand Powers of Binomials

44. ANS: A
Use the Binomial Theorem to expand the power.

	Feedback
A	Correct!
B	Did you use the Binomial Theorem correctly?
C	Did you check the sign between the terms of the binomial?
D	Did you check the coefficients of each term?

PTS: 1 DIF: Advanced REF: Lesson 11-6
OBJ: 11-6.2 Use the Binomial Theorem to expand powers of binomials.
STA: MA.912.A.4.12
TOP: Use the Binomial Theorem to expand powers of binomials.
KEY: Binomial Theorem | Expand Powers of Binomials

45. ANS: A
To use synthetic division, the divisor must be of the form $x - r$.

	Feedback
A	Correct!
B	Multiply the first coefficient with the constant in the divisor and bring it below the second coefficient.
C	Bring the first coefficient below itself in the third row.
D	Add the product of the constant in the divisor to the coefficient above it.

PTS: 1 DIF: Advanced REF: Lesson 6-2
OBJ: 6-2.2 Divide polynomials using synthetic division. STA: MA.912.A.4.4
TOP: Divide polynomials using synthetic division.
KEY: Polynomials | Divide Polynomials | Synthetic Division

46. ANS: C
Replace the values of $p(x)$ and simplify.

	Feedback
A	Did you substitute the correct values in the function?
B	The exponent value of the first term is 5, not 4.
C	Correct!
D	Add the value of the constant.

PTS: 1 DIF: Average REF: Lesson 6-3
OBJ: 6-3.1 Evaluate polynomial functions. STA: MA.912.A.4.5
TOP: Evaluate polynomial functions. KEY: Polynomial Functions

47. ANS: D
The order of operations for matrices is similar to that of real numbers.
Perform scalar multiplication before matrix addition and subtraction.

	Feedback
A	Did you multiply each of the elements by the scalar correctly?
B	Did you add the corresponding elements correctly?
C	Did you use the order of operations for matrices correctly?
D	Correct!

PTS: 1 DIF: Average REF: Lesson 4-2 OBJ: 4-2.1 Add matrices.
STA: MA.912.D.8.2 TOP: Add matrices.
KEY: Matrices | Add Matrices

48. ANS: A
If f and g are functions such that the range of g is a subset of the domain of f, then the composite function $f \circ g$ can be described as $[f \circ g](x) = f[g(x)]$.

	Feedback
A	Correct!
B	Did you check the mathematical operators in the equation?
C	Did you calculate correctly?
D	Did you perform the composition correctly?

PTS: 1 DIF: Advanced REF: Lesson 7-1
OBJ: 7-1.5 Find the composition of functions. STA: MA.912.A.2.7 | MA.912.A.2.8
TOP: Find the composition of functions.
KEY: Functions | Composition of Functions

49. ANS: A

If θ is the measure of an acute angle of a right triangle, *opp* is the measure of the leg opposite θ, *adj* is the measure of the leg adjacent to θ, and *hyp* is the measure of the hypotenuse, then the following are true.

$$\sin\theta = \frac{opp}{hyp} \qquad \cos\theta = \frac{adj}{hyp} \qquad \tan\theta = \frac{opp}{adj}$$

$$\csc\theta = \frac{hyp}{opp} \qquad \sec\theta = \frac{hyp}{adj} \qquad \cot\theta = \frac{adj}{opp}$$

	Feedback
A	Correct!
B	If x is the measure of an acute angle of a right triangle, then opp is the measure of the leg opposite x, adj is the measure of the leg adjacent to x, and hyp is the measure of the hypotenuse.
C	Did you use the correct definition of trigonometric ratios?
D	The sine, cosine, and tangent functions are reciprocals of the cosecant, secant, and cotangent functions, respectively.

PTS: 1 DIF: Average REF: Lesson 13-1
OBJ: 13-1.1 Find values of trigonometric functions for acute angles.
STA: MA.912.T.2.1 | MA.912.T.2.2 TOP: Find values of trigonometric functions for acute angles.
KEY: Trigonometric Functions | Acute Angles

50. ANS: A

Subtract $g(x)$ from $f(x)$ to obtain the required answer.

	Feedback
A	Correct!
B	Did you subtract the functions correctly?
C	Did you subtract the correct functions?
D	Check the sign of the answer.

PTS: 1 DIF: Average REF: Lesson 7-1
OBJ: 7-1.2 Find the difference of functions. STA: MA.912.A.2.7 | MA.912.A.2.8
TOP: Find the difference of functions. KEY: Functions | Difference of Functions