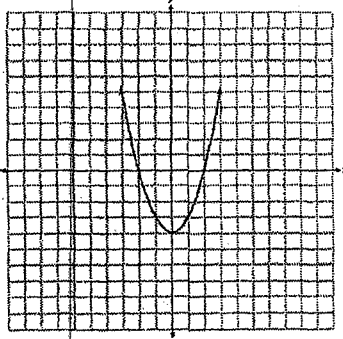Name: _____

Alg 2 CC Friday, Jan 25th Midterm

Formulas to know - Important things to remember

REVIEW # 1

	Question/WORK	ANSWER
1.	The minimum point on the graph of the equation $y = f(x)$ is $(-1,-3)$. What is the minimum point on the graph of the equation $y = f(x) + 5$? 1) $(-1,2)$ 2) $(-1,-8)$ 3) $(4,-3)$ 4) $(-6,-3)$	
2.	Which transformation of $y = f(x)$ moves the graph 7 units to the left and 3 units down? 1) $y = f(x + 7) - 3$ 2) $y = f(x + 7) + 3$ 3) $y = f(x - 7) - 3$ 4) $y = f(x - 7) + 3$	
3.	Derive the equation of a parabola given the focus of $(0,4)$ and the directrix $y=2$.	
4.	The function $f(x)$ is graphed on the set of axes below. On the same set of axes, graph $f(x + 1) + 2$. 	

5. A meteorologist drew the accompanying graph to show the changes in relative humidity during a 24-hour period in New York City.
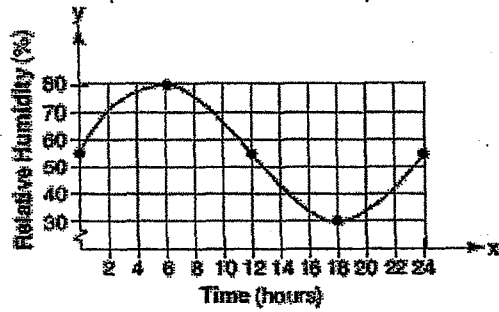
What is the range of this set of data?

1) $0 \leq y \leq 24$

2) $0 \leq x \leq 24$

3) $30 \leq y \leq 80$

4) $30 \leq x \leq 80$

6. Factor: $6a^2 + 7ax - 3x^2$

7. Solve the system:
$$6x - 2y - 4z = -8$$
$$3x - 5y + 5z = -14$$
$$x + y - 5z = 6$$

| 8.	Multiply $(2x^3+1)(5x^2+4)$ and write your result in simplest form.	
9.	Write an equation of the line, in point-slope form, whose slope is 5 and passes through (-5, 3).	
10.	Find the slope of the line that passes through the points $(5,-2)$ and $(20,4)$.	
11.		

③

REVIEW # 2

	Question/WORK	ANSWER
1.	Solve the system: $\begin{aligned} x - 2y + z &= -11 \\ 3x + 2y - z &= 7 \\ -x + 2y + 4z &= -9 \end{aligned}$	
2.	Write, in POINT-SLOPE form, the equation of the line that passes through points (-1, 2) and (7, -3).	

④

3.	Write the equation of the parabola that is the collection of all points equidistant from $(4, 1)$ and $y=-3$.	
4.	Which equation represents a parabola with a focus of $(0,4)$ and a directrix of $y=2$? (1) $y=x^2+3$ ( ) $y=-x^2+1$ (3) $y=\dfrac{1}{2}x^2+3$ ( ) $y=\dfrac{1}{4}x^2+3$	
5.	Find the axis of symmetry of the parabola whose equation is $f(x)=-2x^2-8x+5$.	
6.	Find the vertex of the parabola whose equation is $f(x)=-2x^2-8x+5$.	

7.	Find the y-intercept of the parabola whose equation is $f(x) = -2x^2 - 8x + 5$.	
8.	Graph $f(x) = \sqrt{x-2} + 3$, without a calculator (using transformations).	
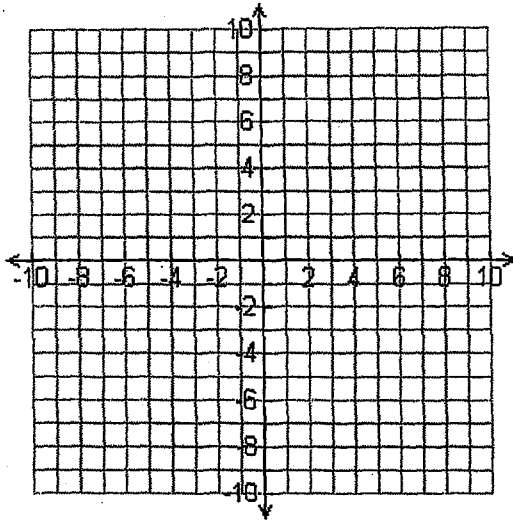
9.	State the domain of $f(x) = \sqrt{x-2} + 3$.	
10.	State the range of $f(x) = \sqrt{x-2} + 3$.	

| 11.	The table below shows the heights, y of a competitive water skier x seconds after jumping off a ramp. **Use your calculator** to write a function that model the height of the water-skier over time. When is the water-skier 5 feet above the water? How long is she in the air?	

Time (seconds), x	0	.25	.75	1	1.1
Height (feet), y	22	22.5	17.5	12	9.24

⑥

REVIEW # 3

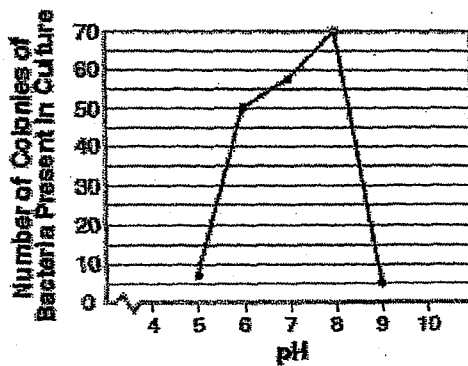|	Question/WORK	ANSWER
1.	The relationship between t, a student's test scores, and d, the student's success in college, is modeled by the equation $d = 0.48t + 75.2$. Based on this linear regression model, the correlation coefficient could be 1) between -1 and 0 2) between 0 and 1 3) equal to -1 4) equal to 0	
2.	Factor: $6a^2 + 9ab - 3b - 2a$	
3.	Solve $2x^2 - 12x + 4 = 0$ by completing the square, expressing the result in simplest radical form.	
4.	The conjugate of $7 - 5i$ is 1) $-7 - 5i$ 2) $-7 + 5i$ 3) $7 - 5i$ 4) $7 + 5i$	
5.		

6. Multiply $x + yi$ by its conjugate, and express the product in simplest form.

7. Which equation represents the function shown in the accompanying graph?
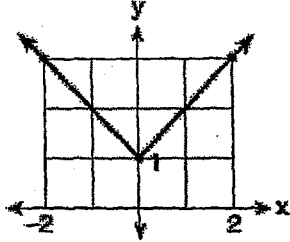
1) $f(x) = |x| + 1$

2) $f(x) = |x| - 1$

3) $f(x) = |x + 1|$

4) $f(x) = |x - 1|$

8. The accompanying graph illustrates the presence of a certain strain of bacteria at various pH levels.

What is the range of this set of data?

9.	\ —		
10.	1. Solve the system of equations: $$x = 3$$ $$5x + 4y = -9$$ $$-x + 4y - 2z = -25$$		

REVIEW # 4

	Question/WORK	ANSWER
1.	In an electrical circuit, the voltage, E, in volts, the current, I, in amps, and the opposition to the flow of current, called impedance, Z, in ohms, are related by the equation $E = IZ$. A circuit has a current of $(3 + i)$ amps and an impedance of $(-2 + i)$ ohms. Determine the voltage in $a + bi$ form.	
2.		
3.	Solve the system: $\begin{aligned} -3x - y + 6z &= -17 \\ -3x - 5y - 5z &= 21 \\ -6x + y + 3z &= -28 \end{aligned}$	
4.	Which equation has imaginary roots? 1) $x^2 - 2x + 1 = 0$ 2) $x^2 - 2x - 1 = 0$ 3) $x^2 - 2x + 5 = 0$ 4) $x^2 - 2x - 5 = 0$	

10

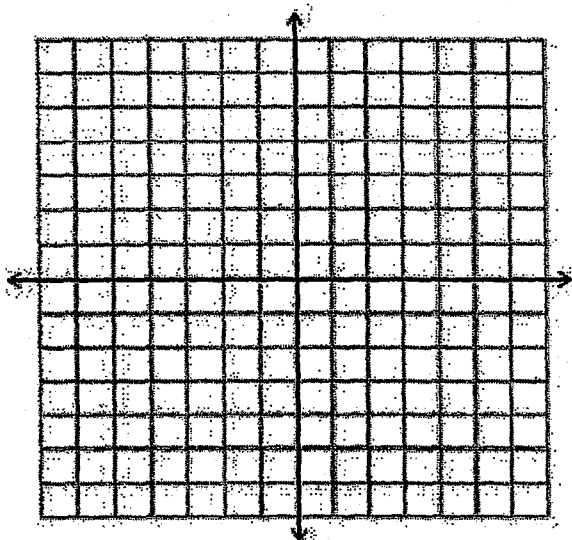5. The data table below shows water temperatures at various depths in an ocean.

Water Depth (meters)	Temperature (y) (°C)
50	18
75	15
100	12
150	7
200	1

Write the linear regression equation for this set of data, rounding all values to the *nearest thousandth*. Using this equation, predict the temperature (°C), to the *nearest integer*, at a water depth of 255 meters.

6. Factor: $1 - x - x^2 + x^3$

7.	The graph of g(x) is given below. Graph y=g(-2x) on the same axes.	
8.	Write the equation of the line that passes through the points (-4,4) and (2,-1) in **POINT-SLOPE FORM**.	
9.	Which equation has imaginary roots? 1) $x^2 - 2x + 1 = 0$ 2) $x^2 - 2x - 1 = 0$ 3) $x^2 - 2x + 5 = 0$ 4) $x^2 - 2x - 5 = 0$	
10.	How many points of intersection does the system $\begin{array}{l} y = 1 - x^2 \\ y = 2 - x \end{array}$ have?	

⑫

REVIEW # 5

		Question/WORK	ANSWER
1.			
2.			
3.		Write an equation of the parabola whose focus is (2,3) and directrix is y=-1.	
4.		Factor: $a^6 - a^4 - a^2 + 1$	
5.		Which equation has imaginary roots? 1) $x^2 - 1 = 0$ 2) $x^2 - 2 = 0$ 3) $x^2 + x + 1 = 0$ 4) $x^2 - x - 1 = 0$	

(13)

6. The mid-September statewide average gas prices, in dollars per gallon, (y), for the years since 2000, (x), are given in the table below.

| Year Since 2000 (x)	Price Per Gallon (y)
1	1.345
2	1.408
3	1.537
4	1.58

Write a linear regression equation for this set of data. Using this equation, determine how much *more* the actual 2005 gas price was than the predicted gas price if the actual mid-September gas price for the year 2005 was $2.956.

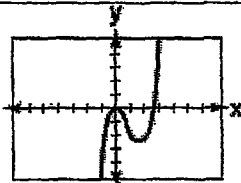**7.** The accompanying graph represents the equation $y = f(x)$.
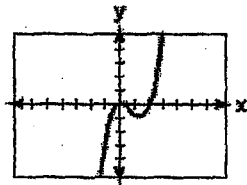
Which graph represents g(x) if $g(x) = -f(x)$?

1)
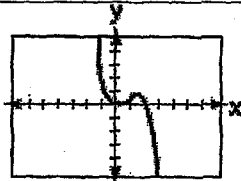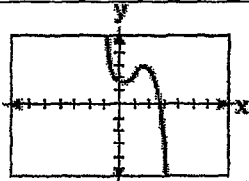
2)
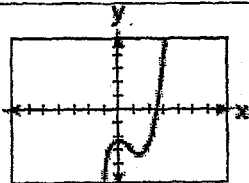
8.

9.	State the conjugate of $9 - \sqrt{11}$.		
10.	Solve by factoring: $x^3 + 7x^2 - x - 7 = 0$		
11.	Solve the system algebraically: $\begin{array}{l} x + y^2 = 25 \\ 4 + 3y = 0 \end{array}$		
12.			

(15)
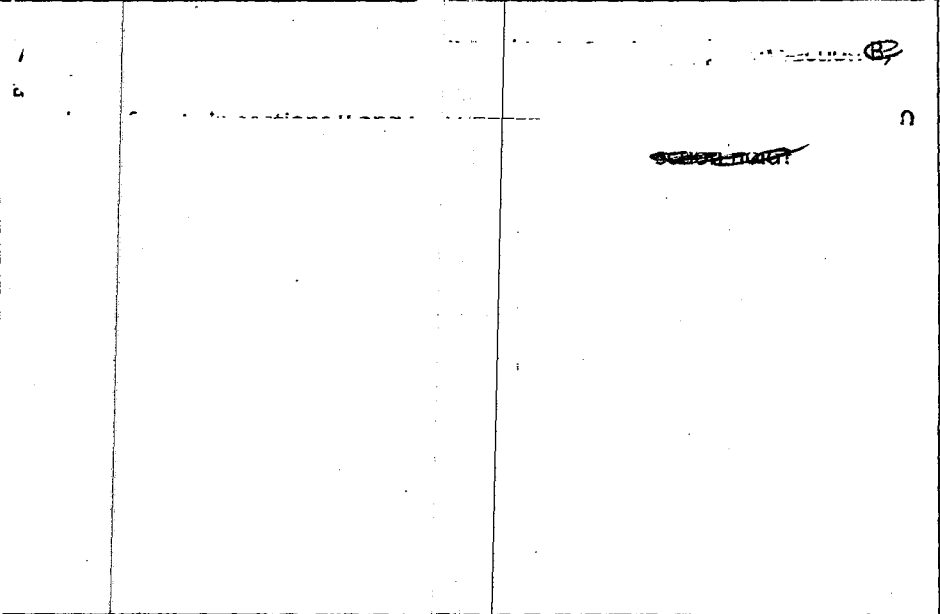
REVIEW # 6

	Question/WORK	ANSWER
1.	Factor Completely: $4x^2 + 4x - 63$	
2.	Factor Completely: $x^4 - y^4$	
3.	Simplify the expression $\left(x^2 + 1\right)^2 - 2x^2$	
4.	Solve: $x^3 + 7x^2 - x - 7 = 0$	
5.	State the y-intercept of $f(x) = x^2 - 6x + 2$	
6.		

7.		
8.	Evaluate the discriminant of $x^2 - x + 2 = 0$.	
9.	Solve $x^2 - 6x + 2 = 0$ by Completing the Square.	
10.	Write an equation of a parabola which the focus point is (1,1) and directrix is y=-3.	
11.	Write a system of two equations in two variables where one equation is quadratic and the other is linear such that the system has no solution. Explain, using graphs, algebra, and/or words, why the system has no solution.	

REVIEW # 7

	Question/WORK	ANSWER
1.	Divide using long division: $\left(x^3 + 3x^2 - x - 8\right) \div \left(x - 1\right)$	
2.	Explain why (x-1) is or is not a linear factor of $\left(x^3 + 3x^2 - x - 8\right)$.	
3.	Write an equation of the parabola whose focus is (0,4) and directrix is y=2.	
4.	Write $\left(5 + 2yi\right)\left(4 - 3i\right) - \left(5 - 2yi\right)\left(4 - 3i\right)$ in $a + bi$ form, where y is a real number.	

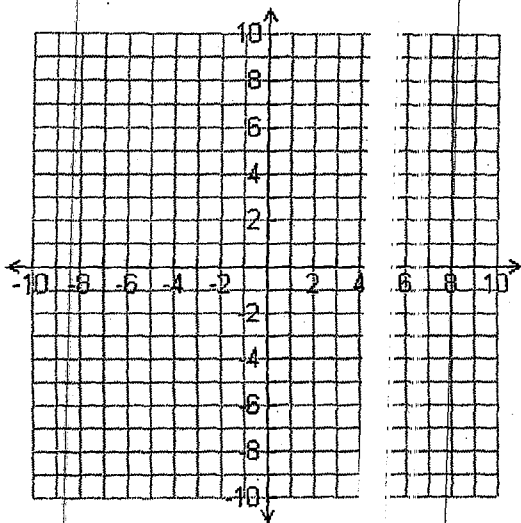|			
5.	Show that x-4 is a factor of the function $f(x) = 2x^3 - 5x^2 - 11x - 4$. Explain your answer.		
6.			
7.	Find the axis of symmetry of $f(x) = 3x^2 - 6x + 5$.		
8.	If $\sqrt{\sqrt[3]{(x+1)^5}} = (x+1)^a$, for $x = -1$ and a is constant, what is the value of a?		

(9)

REVIEW # 8

	Question/WORK	ANSWER
1.	Solve the system: $\begin{aligned} 4x-2y+6z &=10 \\ x+3y+z &=16 \\ 5y-z &=19 \end{aligned}$	
2.	State the conjugate of $5-\sqrt{7}$	
3.	Solve: $x^2+3x-3=0$	

4.

Solve the system by graphing:
$$y = x^2 + 5x$$
$$y = 2x^2 + 5x$$

5.

Factor completely: $16x^4 - 81y^4$

6.

Identify the axis of symmetry, vertex, the maximum or minimum value, AND the range of $y = x^2 + 8x + 18$.

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7. Find an equation in the form $y = ax^2 + bx + c$ that goes through the points (4,89), (-1,29), and (-2,53).

8. Show that $2x + 5$ is a linear factor of $6x^4 + 15x^3 - 14x^2 - 27x + 20$. Explain your answer.

9. Write an equation of the parabola whose VERTEX is (-5,-2) and FOCUS is (-5,-6)

REVIEW #9

	Question/WORK	ANSWER
1.	Which of the following functions increases as the input values approach both negative infinity and positive infinity? (1) $f(x) = x^3 - 4x^2 + x$ (2) $g(x) = -2x^3 - 4x^2 + 9$ (3) $h(x) = x^4 - 4x^3 + 2x + 8$ (4) $r(x) = -x^4 + 9x^3 + x^2 + 8x +$	
2.	Which of the following could identify the transformation of a parabola with a vertex of (-4, -6) to parabola with vertex of (1, -6)? (1) $f(x) + 5$ (2) $5f(x)$ (3) $f(x+5)$ (4) $f(x-5)$	
3.	Jerome uses the polynomial identity $(x^2 - y^2)^2 + (2xy)^2 = (x^2 + y^2)^2$ to generate the Pythagorean triple 40, 41. What values of x and y did he use to generate the values for the three sides of a right triangle?	
4.	Simplify $8i^6 + 6i^5 - 5i^3 - 3i^2 - i - 9$	
5.	Determine the points of intersection for $x^2 + y^2 = 1$ and $y = x + 1$?	

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6.	Solve $(x-5)^2 = -9$	
7.	A boy standing on the top of an apartment building in Albany throws a water balloon up vertically. The height, h (in feet), of the water balloon is given by the equation $h(t) = -16t^2 + 64t + 192$, where t is the time (in seconds) after he threw the water balloon. What is the value of t when the balloon hits the ground? Explain and show how you arrived at your answer.	
8.	Divide $(x^3 + 7x^2 + 14x + 3)$ by $(x+2)$. Is $(x+2)$ a factor of $(x^3 + 7x^2 + 14x + 3)$? Explain why or why not.	

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9. Factor completely: $x^4 - 13x^2 + 3($

10. Solve the system:
$$x + 2y - z =$$
$$2x + y + z =$$
$$x + 2y + z =$$

25

11. Graph $f(x) = x^3 - 2x - 4$.
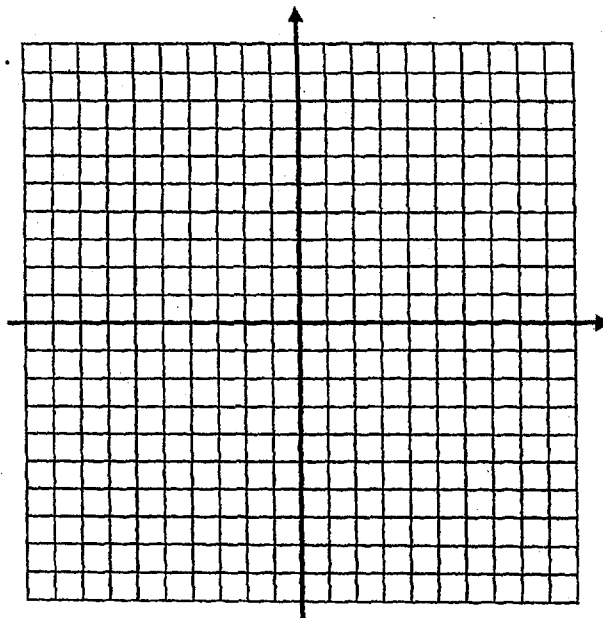
Based on the graph, what is the real solution to the equation $x^3 - 2x - 4 = 0$?

Verify algebraically that it is a zero of $f(x)$.

Write $f(x)$ as a product of a linear factor and a quadratic factor.

Find the two complex number zeros of $f(x)$.

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REVIEW # 10

	Question/WORK	ANSWER
1.	Solve: $-\sqrt{x+10} = -7$	
2.	Which equation has non-real solutions? (1) $2x^2 + 4x - 12 = 0$ (2) $2x^2 + 3x = 4x + 12$ (3) $2x^2 + 4x + 12 = 0$ (4) $2x^2 + 4x = 0$	
3.	Solve: $2x^2 - x + 1 = 0$	
4.	Find a polynomial function of degree 3 in standard form which has the corresponding table of values: 	X	Y	 |---|---| 	4	18	 	3	0	 	2	-4	 	1	0	 	0	6	 	-1	8	 	-2	0	 	-3	-24	 	-4	-70		

5. Use the graph of $f(x) = x^3 - 6x^2 + 11x - 6$ to rewrite f(x) as a product of linear factors.
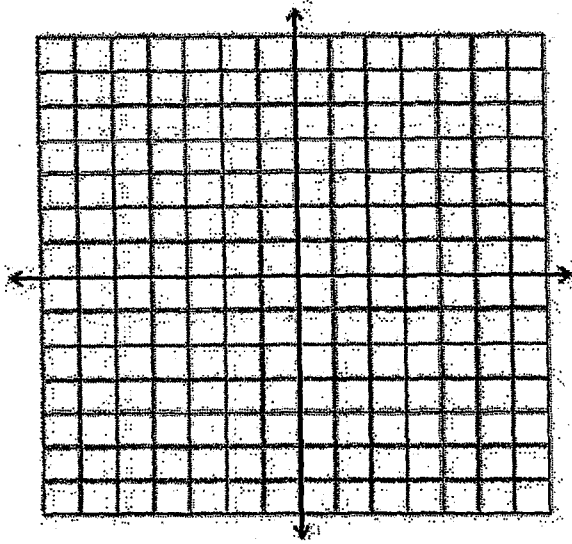
6. Write $-4\sqrt{-48}$ in simplest form.

7. Write $n^{\frac{7}{6}}$ in simplest radical form.

8. If $h(x) = \sqrt{\dfrac{x+4}{x+5}}$, find $h^{-1}(x)$

9.

Solve: $\dfrac{4x}{x-3} = 8 + \dfrac{12}{x-3}$

10. The vertex of a parabola, $f(x)$ has coordinates $(-3, 5)$. Determine the coordinates of the vertex of the parabola defined by $f(x+3)$.

11.

Solve the system:

$$x - 2y + 3z = 7$$
$$2x + y + z = 4$$
$$-3x + y - 2z = -10$$

REVIEW # 11

	Question/WORK	ANSWER
1.	The polynomial $p(x) = 2x^3 + 13x^2 + 17x - 12$ has $(x+4)$ as a factor. (a) Factor the polynomial into three linear terms. (b) Describe the steps you would use to sketch the graph of the function (without a calculator). Identify all intercepts and describe the end behavior of the graph.	
2.	Given: $f(x) = x^2 - 4x$. (a) Write an expression that defines $f(x+5)$. (b) Describe the transformation that maps the graph of $f(x)$ to $f(x+5)$.	

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3.	State the period of the graph of $x) = -3\cos\left(2x + \frac{x}{2}\right) - 1.$		
4.	Given the two functions $\begin{array}{l} f(x) = \\ g(x) = \quad \cdot x \end{array}$, simplify $2f(1-x) - 3g(x)$		
5.	Factor completely: $162x^4 - 144 \quad + 32$		
6.	Write a quadratic equation in which the sum of the roots is -3 and product of the roots is 5.		

(3)

7. Simplify $\dfrac{2\left(\sqrt{m}\right)^3}{\sqrt[4]{m}}$ and write your answer with a fraction exponent.

8. Write an equation that represents a parabola with a focus of (0,4) and directrix of y=2?

9. Solve: $n = \log_{27} 3$

10. If $\sqrt{\sqrt[3]{(x+1)^5}} = (x+1)^a$, for $x \geq -1$ and a is constant, what is the value of a?

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REVIEW # 12

	Question/WORK	ANSWER
1.	For the function $f(x) = (x-3)^3 + 1$, find $f^{-1}(x)$.	
2.	Factor: $(2a-1)^3 + 8$	
3.	State the sum and product of the roots of $3x^2 - 5x + 6 = 0$	
4.	FACTOR COMPLETELY: $k^4 - 4k^2 + 8k^3 - 32k + 12k^2 - 48$	(Hint: If we factor by grouping with 4 terms ... how about we factor by "chunking" with 6 ... break it into 3 groups of 2. See structure in expressions ... this is on the newly released sample test for Algebra 2. You need to be willing & able to think outside of the box!)

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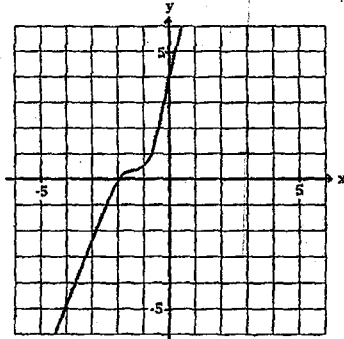| 5.	Rewrite the expression $(4x^2+5x)^2 - 5(4x^2+5x) - 6$ as a product of four linear factors.	
	(Again – see the structure in expressions – can you see this as $x^2 - 5x - 6$? How does that factor?)	
6.	The minimum point on the graph of the equation $y = f(x)$ is $(-1,-3)$. What is the minimum point on the graph of the equation $y = f(x) + 5$?	
	1) $(-1,2)$	
	2) $(-1,-8)$	
	3) $(4,-3)$	
	4) $(-6,-3)$	
7.	Derive the equation of a parabola given the focus of $(0,4)$ and the directrix $y=2$.	

(34)

8.	Write an equation of the line, <u>in</u> in-slope form, whose slope is 5 and passes through (-5, 3).		
9.	Factor: $6a^2 + 7ax - 3x^2$		
10.	Solve the system: $6x - 2y - 4z = -8$ $3x - 5y + 5z = -14$ $x + y - 5z = $		

REVIEW # 13

	Question/WORK	ANSWER
1.	Write a quadratic equation in which the roots are $2+i$ and $2-i$.	
2.	~~Graph the function $f(x) = 3\cos(2x) + 1$ between 0 and 2π.~~	
3.	~~State the EXACT value of $\sec\dfrac{5\pi}{6}$~~	
4.	Consider the parabola with focus point $(1, 1)$ and directrix the horizontal line $y = -3$. Find the equation of the parabola.	

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5.	Factor completely: $(2n-1)^3 - 2$		
6.	Write an equation of the line, in int-slope form, that goes through (5, 2) and (2, 5)		
7.	The graph of the polynomial function $f(x) = x^3 + 4x^2 + 6x + 4$ is shown below. a. Based on the appearance of the graph, what does the real solution to the equation $x^3 + 4x^2 + 6x + 4 = 0$ appear to be? b. Jiju does not trust the accuracy of the graph. Prove to her algebraically that your answer is in fact a zero of $y = f(x)$. c. Find the two complex number zeros of $x^3 + 4x^2 + 6x + 4 = 0$		

REVIEW # 14

	Question/WORK	ANSWER
1.	Write an equation of the parabola with a focus of $(0, 4)$ and a directrix of $y=2$.	
2.	If the terminal side of angle θ, in standard position, passes through point $(-4, 3)$, what is the exact numerical value of $\sin\theta$?	
3.	Use the properties of rational exponents to determine the value of y in the equation: $$\frac{\sqrt[3]{x^8}}{\left(x^4\right)^{\frac{1}{3}}} = x^y, x > 1$$	

4.	Write $(5+2yi)(4-3i)-(5-2yi)(4-3i)$ in simplest $a+bi$ form, where y is a real number.		
5.	Use an appropriate procedure to show that $x-4$ is a factor of the function $f(x)=2x^3-5x^2-11x-4$. Explain your answer.		
6.	Solve algebraically for all values of $$\sqrt{x-5}+x=7$$		

(39)