Name: _____ Date: _____

Chapter 4 Review

For each type of question, the achievement level is indicated. Showing work is an important strategy in communicating your knowledge and ideas so please be thorough.

Learning Goal 4.1	Given a quadratic equation, identify the number of solutions, zeros, roots or $x-$ intercepts.

1. Analyze the following quadratic functions to determine the number of $x-$ intercepts each function has.

Developing		
a. $a(x) = -x^2 - 4$ 0	b. $b(x) = x^2 + 5$ 0	c. $c(x) = x^2 - 1$ 2
d. $d(x) = (x-1)^2$ 1	e. $y = -(x+4)^2$ 1	f. $f(x) = (x-5)^2$ 1
Proficient		
g. $g(x) = {}^{7}/_{9}(x+3)^2 - 5$ 2	h. $h(x) = 5(x-3)^2 + 2$ 0	i. $y = -0.9(x+1)^2 - 6$ 0
j. $j(x) = -3(x+2)^2 - 5$ 0	k. $k(x) = {}^{1}/_{10}(x+5)^2 - 2$ 2	l. $y = -0.2(x-2)^2 + 4$ 2
m. $m(x) = {}^{5}/_{3}(x+2)^2 + 1$ 0	n. $n(x) = -{}^{1}/_{4}(x-7)^2 - 2$ 0	o. $y = -2(x+5)^2 + 1$ 2

2. Analyze the discriminant of the following equations to determine the number of of solutions each equation has.

Developing		
a. $x^2 + 4x + 5 = 0$ 0	b. $x^2 + 10x + 24 = 0$ 2	c. $x^2 + 8x + 1 = 0$ 2
d. $x^2 + 8x + 15 = 0$ 2	e. $x^2 + 2x + 35 = 0$ 0	f. $x^2 + 2x + 24 = 0$ 0
Proficient		
g. $x^2 = 3x + 2$ 2	h. $-x^2 + 11x - 24 = 0$ 2	i. $-5x^2 - 150 = -55x$ 2
j. $x^2 + 7x = 10$ 2	k. $-6x^2 = -18x - 12$ 2	l. $x^2 + 3x = 18$ 2
m. $7x^2 = 14x - 7$ 1	n. $-x^2 - 8x = 16$ 1	o. $3x^2 - 16x = 12$ 2

Name: _____ Date: _____

Chapter 4 Review

Extending
3. Explain when given the quadratic function $f(x) = a(x-p)^2 + q$ how you can tell how many $x-$ intercepts there will be. Include all possibilities in your explanation.
4. Explain, in your own words, how to use the discriminant to determine the number of solutions to a quadratic equation.

Name: _____ Date: _____

Chapter 4 Review

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Learning Goal 4.2	Given a quadratic equation, find the values of the solution(s) by factoring, completing the square and using the quadratic formula.

1. Solve the following quadratic equations using factoring.

Developing		
a. $x^2+6x+5=0$ $x=-5,-1$	b. $x^2-10x+24=0$ $x=4,6$	c. $x^2+2x-15=0$ $x=-5,3$
d. $x^2+8x+15=0$ $x=-5,-3$	e. $x^2+2x-35=0$ $x=-7,5$	f. $x^2-9x+18=0$ $x=3,6$
g. $x^2-8x-20=0$ $x=-2,10$	h. $x^2+2x-24=0$ $x=-12,2$	i. $x^2+14x+24=0$ $x=-12,-2$
Proficient		
j. $3x^2-21x-54=0$ $x=-2,9$	k. $2x^2-15x+25=0$ $x=\frac{5}{2},5$	l. $10x^2+x-3=0$ $x=-\frac{3}{5},\frac{1}{2}$
m. $x^2-6x=27$ $x=-3,9$	n. $3x^2-4x=7$ $x=-1,\frac{7}{3}$	o. $x^2-8x+12=12$ $x=0,8$
p. $3x^2-6x=105$ $x=-5,7$	q. $x^2-9=4x+36$ $x=-5,9$	r. $8x^2+22x-21=0$ $x=\frac{3}{4},\frac{7}{2}$
s. $3x^2+x-4=0$ $x=-\frac{3}{4},1$	t. $0.5x^2+5=3.5x$ $x=2,5$	u. $5x^2=15x$ $x=0,3$
Extending		
v. $3x^2+6=x(x+13)$ $x=\frac{1}{2},6$	w. $2x(x-6)+3x=2x-9$ $1,\frac{9}{2}$	x. $(2x+1)^2=(x+5)^2$ $x=-2,4$
y. $(2x-1)^2-2(2x-1)-8=0$ $-\frac{1}{2},\frac{5}{2}$	z. $5x^2-20x=x^2+8x-49$ $x=\frac{7}{2}$	aa. $\sqrt{4x}+3=x$ $x=1,9$
bb. $\sqrt{2x-7}+5=x$ $x=4,8$	cc. $36x^2-49(x-4)^2=0$ $x=\frac{28}{13},28$	dd. $10x^2+29x-21=0$ $x=-\frac{7}{2},\frac{3}{5}$

Name: _____ Date: _____

Chapter 4 Review

ee. $\frac{1}{5}(x+1)^2 - \frac{1}{180}(x-1)^2 = 0$ $x = -\frac{7}{5}, -\frac{5}{7}$	ff. $10x^2 + 23x = 5$ $x = -\frac{5}{2}, \frac{1}{5}$	gg. $6x^2 + 5 = 17x$ $x = \frac{1}{3}, \frac{5}{2}$

2. Solve the following quadratic equations using completing the square.

Developing		
a. $x^2 + 16x - 25 = 0$ $x = -8 \pm \sqrt{89}$	b. $x^2 - 8x + 8 = 0$ $x = 4 \pm 2\sqrt{2}$	c. $x^2 + 14x + 37 = 0$ $x = -7 \pm 2\sqrt{2}$
d. $x^2 - 10x + 3 = 0$ $x = 5 \pm \sqrt{22}$	e. $x^2 + 4x - 3 = 0$ $x = -2 \pm \sqrt{7}$	f. $x^2 + 4x - 2 = 0$ $x = -2 \pm \sqrt{6}$
g. $x^2 - 2x - 2 = 0$ $x = 1 \pm \sqrt{3}$	h. $x^2 - 6x + 11 = 0$ No solutions	i. $x^2 - 8x - 4 = 0$ $x = 4 \pm 2\sqrt{5}$
Proficient		
j. $-3x^2 + 4x - 59 = -4x^2$ $x = -2 \pm 3\sqrt{7}$	k. $5x^2 - 20x + 6 = 0$ $x = \frac{10 \pm 2\sqrt{15}}{5}$	l. $3x^2 - 6x - 34 = 0$ $x = \frac{3 \pm \sqrt{111}}{3}$
m. $3x^2 + 18x - 2 = 0$ $x = \frac{-9 \pm \sqrt{87}}{3}$	n. $\frac{1}{2}x^2 + 3x + 1 = 0$ $x = -3 \pm \sqrt{7}$	o. $\frac{1}{2}x^2 + 3x - \frac{9}{2} = 0$ $x = -3 \pm 3\sqrt{2}$
p. $-10x + 2 = 5x^2$ $x = \frac{-5 \pm \sqrt{35}}{5}$	q. $-\frac{1}{2}x^2 + 6x - 1 = 0$ $x = 6 \pm \sqrt{38}$	r. $3x^2 + 9x + 5 = 0$ $x = \frac{9 \pm \sqrt{21}}{6}$
s. $5x^2 - 20x + 8 = 0$ $x = \frac{10 \pm 2\sqrt{15}}{5}$	t. $-2x^2 + 16x = 3$ $x = \frac{8 \pm \sqrt{58}}{2}$	u. $2x^2 = 2x + 1$ $x = \frac{1 \pm \sqrt{3}}{2}$
Extending		
v. $3x^2 - x - 3 = 0$ $x = \frac{1 \pm \sqrt{37}}{6}$	w. $9x^2 - 21 = 13x$ $x = \frac{13 \pm 15\sqrt{37}}{18}$	x. $5 = 3x^2 + 7x$ $x = \frac{7 \pm \sqrt{109}}{6}$
y. $2x = 3(x-1)(x+1)$ $x = \frac{1 \pm \sqrt{10}}{3}$	z. $(2x+1)(x-1) = 5x$ $x = \frac{3 \pm \sqrt{11}}{2}$	aa. $11x - 3x^2 + 8 = 0$ No Solutions

Name: _____ Date: _____

Chapter 4 Review

3. Solve the following quadratic equations using the quadratic formula.

Developing		
a. $x^2 + 4x + 5 = 0$ No Solutions	b. $x^2 + 10x + 24 = 0$ $x = -6, -4$	c. $x^2 + 8x + 1 = 0$ $x = -4 \pm \sqrt{15}$
d. $x^2 + 8x + 15 = 0$ $x = -5, -3$	e. $x^2 + 2x + 35 = 0$ No Solutions	f. $x^2 + 2x - 24 = 0$ $x = -1 \pm \sqrt{37}$
Proficient		
g. $x^2 = 3x + 2$ $x = \frac{3 \pm \sqrt{17}}{2}$	h. $-x^2 + 11x - 24 = 0$ $x = 3, 8$	i. $-5x^2 - 150 = -55x$ $x = 5, 6$
j. $x^2 + 7x = 10$ $x = \frac{-7 \pm \sqrt{89}}{2}$	k. $-6x^2 = -18x - 12$ $x = 1, 2$	l. $x^2 + 3x = 18$ $x = -6, 3$
m. $7x^2 = 14x - 7$ $x = 1$	n. $-x^2 - 8x = 16$ $x = -4$	o. $3x^2 - 16x = 12$ $x = -\frac{2}{3}, 6$

Extending
4. The diagonal of a rectangle is 17 cm long. The rectangle is 7 cm longer than it is wide. What are the dimensions of the rectangle? $8 \text{ cm} \times 15 \text{ cm}$
5. Consider the quadratic equation $x^2 + bx + 10 = 0$, where b is a constant. Determine the possible values of b so that this equation does not have a solution. Explain your strategy. $b < 2\sqrt{10}$
6. When the square of a number is added to the number, the sum is 3. What is the number? Justify your answer. $\frac{1 \pm \sqrt{13}}{2}$
7. Josie's rectangular garden measures 9 m by 13 m. She wants to double the area of her garden by adding equal lengths to both dimensions. Determine this length to the nearest centimeter. $17.43 \text{ m} = 1743 \text{ cm}$
8. A car was travelling at a constant speed of 19 $^{\text{m}}/_{\text{s}}$, then accelerated for 10 s. The distance travelled during this time, d metres, is given by the formula $d = 19t + 0.7t^2$, where t is the time in seconds since the acceleration began. How long did it take the car to travel 200 m? 8.1 seconds