Math 2 Final Exam Study Guide Name: _____

Unit 1 – Quadratics

Add & Subtract Polynomials

1. $(19e^3 + 4e^2) + (11e^3 - 6e^2)$

2. $(-11h^4 + 4h) - (-6h^4 + 3h^2 - 5h)$

3. The fence around a quadrilateral-shaped garden is $6a^2 + 12a - 14$ long. Three sides of the fence have the following lengths:
   $7a$, $10a - 5$, and $2a^2 - 6$. What is the length of the fourth side of the fence?

4. A small town wants to compare the number of students enrolled in public and private schools. The polynomials below show the enrollment for each:

   Public School: $-21c^2 + 850c + 46{,}995$
   Private School: $45c + 4355$
   Write a polynomial for how many more students are enrolled in public school than private school.

5. $(4x^2 + 3x^3 - 2x^2 + 3 + 5x) - (8x^2 + 8x^2 - 7x + 4 + 3x^3 - 2 + 4x) - 2x$

Multiply Polynomials & Divide Monomials

6. $-3x^3y(-3x^3y^3 - 4x^2y + 2xy^3)$

7. The length of a rectangle is $(2x - 7)^2$ and the width is $(2x - 7)$. Find the area.

8. Simplify $(2x - 5)(3x^2 + 5x + 11)$

9. $\dfrac{(-4m)^3}{48m^{-9}}$

10. $\dfrac{33x^{18}y^8}{45x^{12}y^{11}}$

Factor by GCF

11. What does GCF stand for?
12. What is the GCF of the following 3 numbers? 24, 12, 48
13. What is the GCF of the following 3 terms? $25xy^2$, $50x^3y^2$, $75x^6y^2$
14. Factor: $10x^2 - 5x + 20x^3$
15. Factor: $15z^2x - 6zx$

Factor with a=1

16. $x^2 + 6x + 5$
17. $x^2 + 7x + 10$
18. $x^2 – 7x + 12$
19. $x^2 – 11x + 28$
20. $x^2 + 2x – 15$

Factor with a ≠ 1

21. $2x^2 + 22x + 36$
22. $5x^2 – 10x – 40$
23. $10x^2 – 25x – 35$
24. $12t^2 – 28t - 24$
25. $3x^2 - 15x + 18$

Factor by Grouping

See the extra practice questions in your portfolio for more practice here or redo old practice questions by covering up the work to check your answer later.

Solving Quadratics

26. $n^2 – 5n – 24 = 0$
27. $n^2 + n –56 = 0$
28. $3x^2 + 13x + 10 = 0$
29. $2x^2 – x – 21 = 0$
30. $3x^2 + 8x + 5 = 0$

Quadratic Formula & Discriminant

For #31 - #33, solve using the quadratic formula.

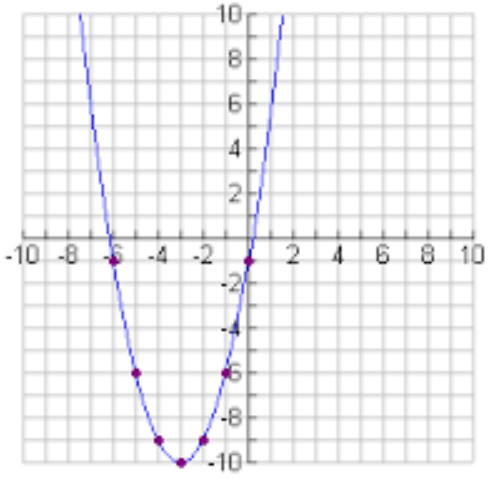
31. $6x^2 + 5x – 4$
32. $5 + 34x – 7x^2$
33. $2x^2 –x – 6$

For #34 & 35, find the discriminant.

34. $6x^2 –7x –5$
35. $3x^2 – 7x –6$

Labeling the Parts of a Parabola

36. On the graph, label the vertex, axis of symmetry, x-intercepts, and y-intercept.



37. $y = 12x^2 - 8x - 15$

- **a.** How many times does the graph cross the x-axis?
- **b.** What are the x-intercept?
- **c.** What are the other three terms that mean the same thing as x-intercept?

Graphing Quadratics in Standard Form

38. $y + 32x = 3x^2 + 45$
    a. Axis of symmetry: x = _____
    b. Opens up or down?
    c. Vertex: (_____ , _____)
    d. Guide points: (_____ , _____) and (_____ , _____)
    e. Zeros: (_____ , _____) and (_____ , _____)
    f. Y-intercept: (_____ , _____)

Graphing Quadratics in Vertex Form

39. $y = -(x + 3)^2 - 4$
    a. Axis of symmetry: x = _____
    b. Opens up or down?
    c. Vertex: (_____ , _____)
    d. Guide points: (_____ , _____) and (_____ , _____)
    e. Zeros: (_____ , _____) and (_____ , _____)
    f. Y-intercept: (_____ , _____)

Converting Between Forms

40. Convert the following into vertex form: $y = -2x^2 + 12x - 21$
41. Convert the following into standard form: $y = 2(x - 2)^2 - 3$

Systems of Linear and Quadratic Equations

42. What are the solutions to the system? $y = -x^2 + 15x$ and $y = 4x - 12$

Quadratic Regression

43. A projectile is fired upwards from the ground. The height of the projectile above the ground is shown in the following table:

Time(Seconds)	20	30	40	50	60	70
Height (feet)	372	462	509	501	437	323

    a. Find the quadratic equation that best fits this data.
    b. Find the time which the projectile hit the ground.

44. The population present in a bacteria culture over 5 days is given in the table below:

Time (days)	0	1	2	3	4	5
population	230	260	310	330	400	520

a. Find a good model for this data

b. Estimate the population in 7 days.

Application of Quadratics

45. The heights of 2 different projectiles after they are launched are modeled by $f(x) and\ g(x)$. The function $f(x)$ is defined as $f(x) = -16x^2 + 10x - 25$. The table contains values for the quadratic function $g(x)$.

X	g(x)
2	56
4	64
6	62

What is the approximate positive difference in the y-intercepts achieved by the two projectiles?

46. A pumpkin is thrown out of a window. The height *h* of the pumpkin in feet *t* seconds after it is thrown is given by the function $h(t) = -16t^2 + 96t + 200$. How high is the pumpkin after 2 seconds?

47. The expression $h(t) = -16t^2 + 16t + 480$ describes the height in feet of a bouncy ball t seconds after it has been launched from the 3rd floor O-Building. What is the maximum height of the object?

48. A parachutist jumps from an airplane and immediately opens his parachute. His altitude, y, in meters, after t seconds is modelled by the equation y = -4t + 300. A second parachutist jumps 5 s later and free falls for a few seconds. Her altitude, in meters, during this time, is modelled by the equation $y = -4.9(t - 5)^2 + 300$. When does she catch up to the first parachutist?

49. A ball is thrown straight up from the top of a 192 foot tall building with an initial speed of 64 feet per second. The height of the ball as a function of time can be modeled by the function $h(t) = -16t^2 + 64t + 192$. When will the ball reach a height of 112 feet?