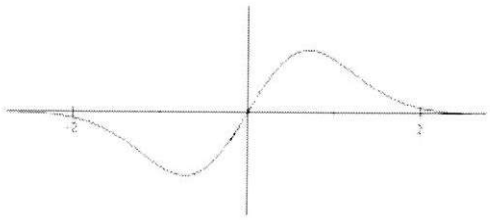
If you can turn your paper upside down and the graph still look the same, the function is odd.



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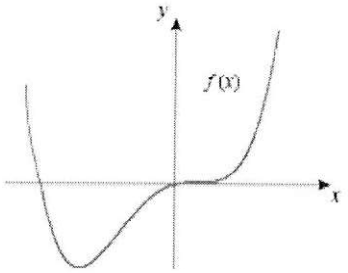
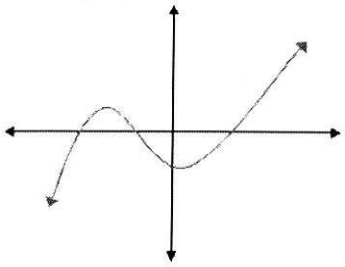
If neither of these things work, the function is neither even nor odd.

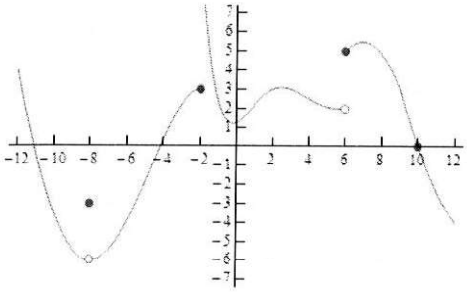


Continuous vs. Discontinuous

If the graph is smooth and doesn't stop or have a hole anywhere, it is continuous.



If the graph isn't smooth or if it has a hole, it is called discontinuous.



Unit 2 – Quadratics

Add & Subtract Polynomials

14. $(19e^3 + 4e^2) + (11e^3 - 6e^2)$ = $30e^3 - 2e^2$
15. $(-11h^4 + 4h) - (-6h^4 + 3h^2 - 5h)$ = $-5h^4 - 3h^2 + 9h$
16. 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? = $4a^2 - 5a - 3$

17. 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: $-21c^2 + 850c + 46{,}995$ $-21c^2+805c+42,640$

Private School: $45c + 4355$

Write a polynomial for how many more students are enrolled in public school than private school.

18. $(4x^2 + 3x^3 - 2x^2 + 3 + 5x) - (8x^2 + 8x^2 - 7x + 4 + 3x^3 - 2 + 4x) - 2x$ $= -14x^2+6x+1$

Multiply Polynomials & Divide Monomials

19. $-3x^3y(-3x^3y^3 - 4x^2y + 2xy^3)$ $= 9x^6y^4 + 12x^5y^2 - 6x^4y^4$

20. The length of each side of a cube is (2x - 7). Find the volume of the cube. $= 8x^3 - 84x^2 + 294x - 343$

21. Simplify $(2x - 5)(3x^2 + 5x + 11)$ $= 6x^3 - 5x - 3x - 55$

22. $\frac{(-4m)^3}{48m^{-9}}$ $= \frac{-64m^3}{48m^{-9}} = \frac{-4m^{12}}{3}$

23. $\frac{33x^{18}y^8}{45x^{12}y^{11}}$ $= \frac{11x^6}{45y^3}$

Factor by GCF

24. What does GCF stand for? Greatest Common Factor

25. What is the GCF of the following 3 numbers? 24, 12, 48 12

26. What is the GCF of the following 3 terms? $25xy^2$, $50x^3y^2$, $75x^6y^2$ $25xy^2$

27. Factor: $10x^2 - 5x + 20x^3$ $= 5x(2x - 1 + 4x^2)$

28. Factor: $15z^2x - 6zx$ $= 3xz(5z - 2)$

Factor with a=1

29. $x^2 + 6x + 5$ $= (x+5)(x+1)$

30. $x^2 + 7x + 10$ $= (x+5)(x+2)$

31. $x^2 - 7x + 12$ $= (x-3)(x-4)$

32. $x^2 - 11x + 28$ $= (x-4)(x-7)$

33. $x^2 + 2x - 15$ $= (x-3)(x+5)$

Factor with a ≠ 1

34. $2x^2 + 22x + 36$ $= 2(x+9)(x+2)$

35. $5x^2 - 10x - 40$ $= 5(x-4)(x+2)$

36. $10x^2 - 25x - 35$ $= 5(2x-7)(x+1)$

37. $12t^2 - 28t - 24$ $= 4(t-3)(3t+2)$

38. $3x^2 - 15x + 18$ $= 3(x-6)(x+1)$

Solving Quadratics

39. $n^2 - 5n - 24 = 0$ $n = -3, 8$

40. $n^2 + n - 56 = 0$ $n = -8, 7$

41. $3x^2 + 13x + 10 = 0$ $x = -\frac{10}{3}, -1$

42. $2x^2 - x - 21 = 0$ $x = -3, \frac{7}{2}$

43. $3x^2 + 8x + 5 = 0$

$x = -\frac{5}{3}, -1$

Quadratic Formula & Discriminant

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

44. $6x^2 + 5x - 4 = 0$ $x = -\frac{4}{3}, \frac{1}{2}$

45. $5 + 34x - 7x^2 = 0$ $x = -\frac{1}{7}, 5$

46. $2x^2 - x - 6 = 0$

$x = -\frac{3}{2}, 2$

For #34 & 35, find the discriminant.

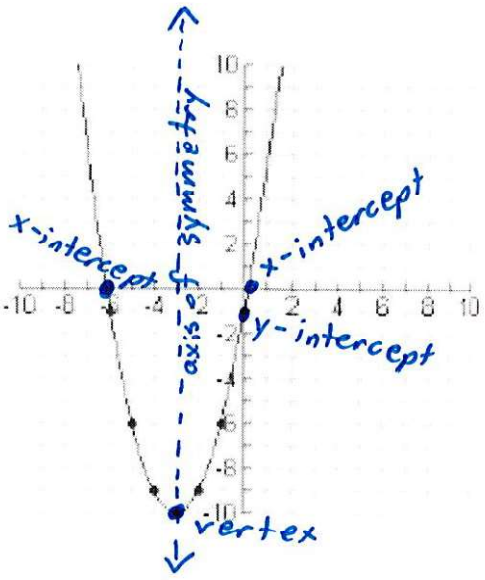
47. $6x^2 - 7x - 5$ discriminant = 169

48. $3x^2 - 7x - 6$

discriminant = 121

Labeling the Parts of a Parabola

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



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

a. How many times does the graph cross the x-axis? 2

b. What are the x-intercept? $(-0.83, 0)$ and $(1.5, 0)$

c. What are the other three terms that mean the same thing as x-intercept? roots, zeros, solutions

Graphing Quadratics in Standard Form

51. $y + 32x = 3x^2 + 45$

a. Axis of symmetry: x = 5 1/3

b. Opens up or down?

c. Vertex: (5 1/3 , -40 1/3)

d. Guide points: (,) and (,)

e. Zeros: (9 , 0) and (1 2/3 , 0)

f. Y-intercept: (0 , 45)

Graphing Quadratics in Vertex Form

52. $y = -(x + 3)^2 - 4$

a. Axis of symmetry: x = -3

b. Opens up or down?

c. Vertex: (-3 , -4)

d. Guide points: (,) and (,)

e. Zeros: (,) and (,) no zeros (doesn't cross x-axis)

f. Y-intercept: (0 , -13)

Converting Between Forms

53. Convert the following into vertex form: $y = -2x^2 + 12x - 21$ notebook on paper

54. Convert the following into standard form: $y = 2(x-2)^2 - 3$ on notebook paper

Systems of Linear and Quadratic Equations

55. What are the solutions to the system? $y = -x^2 + 15x$ and $y = 4x - 12$ $(-1, -16)$ and $(12, 36)$

Quadratic Regression use the calculator!

56. 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. $y = -0.038x^2 + 1.454x + 454.491$

b. Find the time which the projectile hit the ground. @130.95 seconds

57. 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 $y = 9.464x^2 + 6.679x + 238.214$

b. Estimate the population in 7 days. 748.703

Application of Quadratics

58. 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? 63 units

59. 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? 328 ft. high

60. 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? 484 ft.

61. 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? after 3.35 seconds @ a height of 286.61 ft.

62. 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? after 5 seconds