

Quadratic Problems

Problem 1: Solve the following quadratic equations by factoring:

(i) $9x^2 - 121 = 0$

(ii) $x^2 + 5x + 6 = 0$

(iii) $x^2 - 14x + 24 = 0$

(iv) $x^2 - 10x + 24 = 0$

(v) $4x^2 - 19x + 12 = 0$

(vi) $2x^4 - 5x^3 - 3x^2 = 0$

Problem 2: Solve the following quadratic equations by completing the square:

(i) $4x^2 - 2x - 5 = 0$

(ii) $x^2 - 2x - 1 = 0$

(iii) $5x^2 - 6x - 8 = 0$

Problem 3: Solve the following quadratic equations using the quadratic formula:

(i) $x^2 - 13 = 0$

(ii) $x^2 - 3x - 2 = 0$

(iii) $3x^2 - 5x + 1 = 0$

Problem 4: Find the points of intersection between the line $y = 2x + 1$ and the parabola $y = x^2 - 2$ and graph this scenario.

Problem 5: If I were to throw a baseball out the window of our Sims classroom, approximating the height of the classroom from the ground as 14m, my throw speed to be 20m/s, and the angle to be approximately fourth a right angle, then the height of the ball above the ground in meters, t seconds after throwing given by $h(t) = -10t^2 + 20t + 14$.

(i) What does $h(0)$ physically represent?

(ii) How long does the ball stay in the air?

(iii) What is the maximum height of the ball?

Problem 6: Find 4 different quadratic functions having zeros at $x = -2$ and $x = 7$ – two which are concave up and two which are concave down.

Problem 7: Solve $x + \sqrt{4x + 1} = 5$ and find the roots/zeros of the function $f(x) = x - \sqrt{x} - 12$.

Problem 8: Explain whether the following equations have solutions, if so how many and what are they?

(i) $x^2 + 4x + 1 = 0$

(ii) $x^2 + 4x + 8 = 0$

(iii) $3x^2 + 12x + 12 = 0$

Problem 9: Find *the* quadratic equation with roots $x = -3, 5$ and passes through the point $(1, 32)$.

Problem 10: Find the vertex and axis of symmetry of the quadratic function $g(x) = x^2 + 11x - 4$ two different ways.

Problem 11: Find the value of k such that the graph of the equation $y = (x - 3)^2 + k$ passes through the point $(2, 6)$.

Problem 12: Find the equation of the parabola with vertex $(-3, -2)$ and passes through the point $(1, -50)$.

Problem 13: Can you find the equation of a parabola with x -intercept 5 and y -intercept 10? Can you find the equation of a parabola with x -intercepts $-2, 5$? Can you find a parabola with x -intercepts $-5, 1, 3$?

Problem 14: Can you find the equation of a parabola that goes through the points $(-2, -4), (1, 8)$, and $(2, 16)$?