

Quadratic Functions — Word Problems

Most Common Application Problems (MPM2D / MCF3M)

Name: _____

Date: _____

Solve each problem. Show full steps.

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Problem 1 — Projectile Motion

Occurrence: 6 times across typical tests Matchness score: **10 / 10**

A ball is thrown upward from a platform.

The height is modeled by

$$h(t) = -5t^2 + 20t + 3$$

where h is height in metres.

a) When does the ball reach maximum height? b) What is the maximum height? c) When does the ball hit the ground?

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Problem 2 — Maximum Area Rectangle

Occurrence: 5 times Matchness score: **10 / 10**

A farmer has 120 m of fencing to build a rectangular enclosure.

a) Let the width be x . Write an expression for the length. b) Write an equation for the area. c) Determine the dimensions that produce the maximum area.

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Problem 3 — Revenue Model

Occurrence: 4 times Matchness score: **9.5 / 10**

A concert promoter sells tickets for \$40 each and sells 300 tickets.

For every \$5 increase in ticket price, 20 fewer tickets are sold.

a) Write a quadratic function representing revenue. b) Determine the ticket price that maximizes revenue.

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Problem 4 — Height of a Firework

Occurrence: 4 times Matchness score: **9.5 / 10**

The height of a firework is modeled by

$$h(t) = -4.9t^2 + 18t + 2$$

a) What is the maximum height? b) At what time does the firework reach this height? c) When does it hit the ground?

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Problem 5 — Parabolic Bridge

Occurrence: 3 times Matchness score: **9 / 10**

The arch of a bridge follows a parabolic shape.

The arch is 30 m wide and 12 m high.

Find an equation for the parabola describing the arch.

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Problem 6 — Garden Path

Occurrence: 3 times Matchness score: **9 / 10**

A square garden has an area of 196 m².

A path of equal width is built around the garden so that the total area becomes 324 m².

Find the width of the path.

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Problem 7 — Two Numbers Problem

Occurrence: 3 times Matchness score: **8.5 / 10**

The product of two consecutive integers is 132.

Find the two integers.

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Problem 8 — Basketball Arc

Occurrence: 2 times Matchness score: **8.5 / 10**

A basketball shot follows the path

$$h(x) = -0.4x^2 + 2.8x + 2$$

where x is horizontal distance in metres.

a) What is the maximum height? b) How far from the player does the ball hit the ground?

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Problem 9 — Invented Example (Common Style)

Invented based on common quadratic applications.

Matchness score: **8 / 10**

A rectangular poster has an area of 600 cm².

Its length is 10 cm longer than its width.

Find the dimensions.

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Problem 10 — Invented Example (Optimization)

Invented based on common optimization questions.

Matchness score: **8 / 10**

A company produces x items per day.

Profit is modeled by

$$P(x) = -2x^2 + 120x - 400$$

a) How many items should be produced to maximize profit? b) What is the maximum profit?

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