Quadratic Word Problems

$Ax^2 + Bx + C$

Task Cards

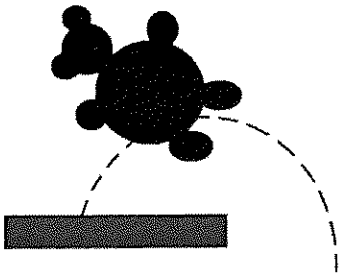
Task 1:

Your nephew is standing on his deck, which is 4 feet off the ground. He tosses his toy up into the air at an initial velocity of 7 feet per second. The equation $\mathbf{h = -2t^2 + 7t + 4}$ models the toy's height **h** in feet from the ground at **t** seconds after he threw it.

A: How high is the toy after 1 second?

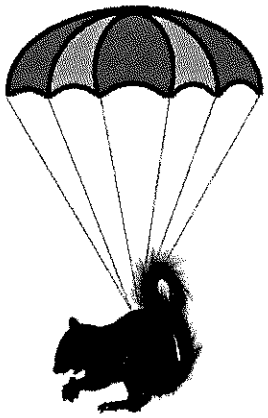
B: What is the toy's maximum height?

C: How long is the toy in the air?



Task 2:

A flying squirrel jumped from a tree 11 feet in the air at an initial velocity of 9 feet per second. The equation $\mathbf{h = -2t^2 + 9t + 11}$ models his jump where **h** is height in feet and **t** is time in seconds.



A: What was the squirrel's maximum height?

B: How many seconds after he jumped was the squirrel at his highest point?

C: When did the squirrel reach the ground?

Task 3:

A frog sitting on a stump 4 feet high hops off and lands on the ground. During her leap, the frog's height **h** in feet is given by the equation $\mathbf{h = -0.5d^2 + d + 4}$, where **d** is the horizontal distance in feet from the base of the stump.

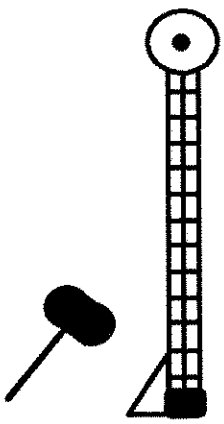
A: What was the frog's maximum height?

B: How far from the stump did the frog land?

C: When did she reach maximum height?

Task 4:

A carnival attraction tests your strength by how far in the air you can drive a weight with a hammer. If the weight reaches 15 feet you win a prize! The equation $\mathbf{h = -16t^2 + 31t + 2}$ gives the height **h** of the weight **t** seconds after you hit it.



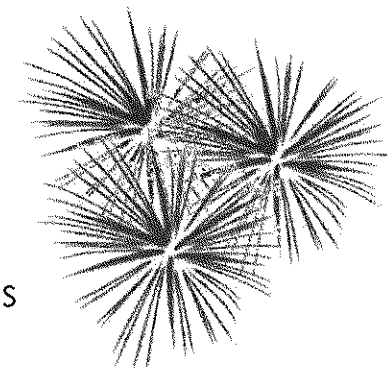
A: How long is the weight moving?

B: What was the weight's maximum height?

C: Did you win a prize? How do you know?

Task 5:

Fireworks are fired from the roof of a 100-foot building and travel 84 feet per second. The equation $\mathbf{h = -16t^2 + 84t + 100}$ models the height **h** of the fireworks at any given time **t** seconds.



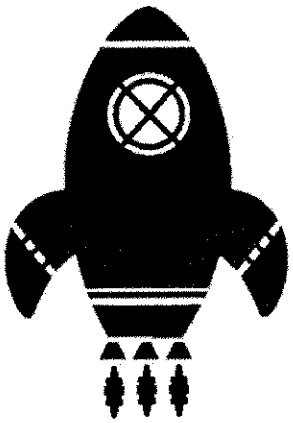
A: How long are the fireworks in the air?

B: How high did the fireworks get?

C: How high were the fireworks 2 seconds after they left the roof?

Task 6:

A toy rocket is launched from the top of 48-foot hill. The rocket's initial upward velocity is 32 feet per second and its height **h** at any given second **t** is modeled by the equation $h = -16t^2 + 32t + 48$.



A: How long was the rocket in the air?

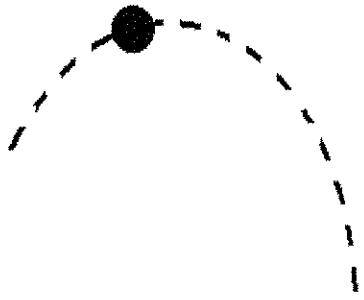
B: How high was the rocket at 2 seconds?

C: How high did the rocket get?

Task 7:

Your friend tosses a ball into the air at an initial velocity of 18 feet per second. The equation $h = -8t^2 + 18t + 5$ models the height **h** of the ball **t** seconds after it was thrown.

A: How long was the ball in the air?



B: How high did the soccer ball get?

C: When did the ball hit its highest point?

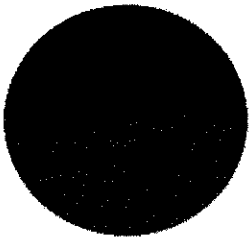
Task 8:

On Mars, gravity is less than it is on Earth. If you were to kick a Mars rock at an initial velocity of 56 feet per second from the top of 30-foot hill, the rock's height **h** would be modeled by the equation $\mathbf{h = -1.9t^2 + 56t + 30}$ where **t** is time in seconds.

A: How high would the rock be after 20 seconds?

B: How high would the rock get?

C: How long would the rock be in the air?



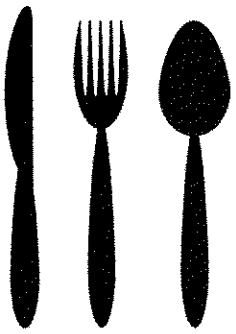
Task 9:

Amelia runs a catering business. Based on her records, her weekly profit can be approximated by $\mathbf{P = 2x^2 - 44x - 150}$, where **x** is the number of meals she caters and **P** is her profit. When P is negative, Amelia has lost money.

A: What is the least number of meals Amelia needs to cater in order to begin making a profit?

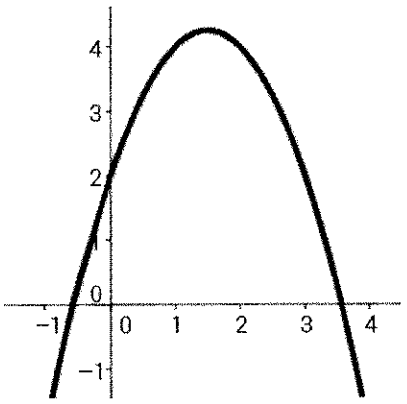
B: If she caters no meals one week, how much money does she lose?

C: What is her profit for catering 50 meals?



Task 10:

For this task, note if you are bring asked for the positive **zero** (root) coordinate, the **vertex x** coordinate, the **vertex y** coordinate or the **y-intercept**.



A: When will the ball hit the ground?

B: "The building was 100 feet high."

C: What was the ball's maximum height?

D: When was the ball at its highest point?

E: How long was the ball in the air?

F: How high off the ground was the ball before it was kicked?

Bonus!

The area of a door is 3024 square inches. If the length of the door is 48 inches longer than the width of the door, what is the width of the door?

A: Translate the problem into an equation.

B: Solve.

C: Show all of your work for bonus credit.