Math 1

Projectile Motion

SWBAT solve real-life quadratic problems.

Maximums or Minimums

Refers to the vertex of the graph (highest or lowest point)

Step 1: Refer to your question. Determine what each variable represents in the context of the problem.
Step 2: Find the axis of symmetry to find the x-value of the vertex
Step 3: Substitute the AOS into the equation for the y-value

X-Intercepts

Refers to when the graph "hits the ground"

Method 1: Solving Real-Life X-Intercepts (by hand)

Step 1: Refer to your question. Determine what each variable represents in the context of the problem.
Step 2: Set equation equal to zero and solve by factoring or quadratic formula.
Step 3: Eliminate the solution that does not fit the in the context of the problem.

Method 2: Solving Real-Life X-Intercepts (using graph)

Step 1: Set the equation equal to zero.
Step 2: Put the equation into Y_1 = enter
Step 3: 2^{nd} TRACE Zero
Step 4: Move Cursor to left of first x intercept for left bound. Press Enter
Step 5: Move Cursor to right of first x intercept. Press Enter
Step 6: Press Enter. Focus on the value of "x" (that's what we are solving for!)
Step 7: Repeat steps 4, 5, 6 until you have found the value for all x-intercepts
Remember answer is an ordered pair

Skill base practice: Solve manual $x^2 - 2x - 1$ **Find the following information**

AOS:
Vertix:
Maximum or Minimum
Roots
# of solutions.

Solve using the graphing calculator $-2x^2 + 12x - 2$

AOS:
Vertix:
Maximum or Minimum
Roots
# of solutions

Graph

Example: Jason jumped off a cliff into the ocean in Acapulco while vacationing with some friends. His height as a function of time could be modeled by the function $h(t) = -16t^2 + 16t + 480$, where t is the time in seconds and h is the height in feet.

a) How many seconds did it take Jason to reach his maximum height?

a) What was Jason's maximum height?

Example: If a toy rocket is launched vertically upward from ground level with an initial velocity of 128 feet per second, then its height h after t seconds is given by the equation $h(t) = -16t^2 + 128t$ (if air resistance is neglected).

a) How long will it take the rocket to hit its maximum height?

b) What is the maximum height?

Example: The function $f(t) = -16t^2 + 80t$ models the approximate height of a firework t seconds after it is launched from the ground.

a) When does the firework explode?

b) How high was the firework when it exploded?

Example: Eli threw a ball off a cliff into the ocean in Mexico while vacationing with some friends. The ball's height as a function of time could be modeled by the function $h(t) = -3t^2 + 3t + 150$, where t is the time in seconds and h is the height in feet. How long did it take the ball to hit the ground?

Example: The equation $h(t) = -5t^2 + 20t + 60$ gives the height of a ball, h, in feet above the ground at t seconds after the ball is thrown upward. When will the ball hit the ground?

Example: The function $g(t) = -4t^2 + 16t + 20$ models the approximate height of a pen t seconds after it is launched. When will the pen hit the ground?

Example: The height h, in feet, of a rocket t seconds after blast-off is given by the formula $h(t) = 1440t - 16t^2$. After how many seconds will the rocket hit the ground?

Example: Wendy is diving from a 10-meter platform. Her height h in meters above the water when she is x meters away from the platform is given by the formula $h = -x^2 + 2x + 10$. Approximately how far away from the platform is she when she enters the water?

You Try! The height h in feet of a ball t seconds after being tossed upward is given by the formula $h = 84t - 16t^2$.

a) After how many seconds will the ball reach its maximum height?
b) What is the ball's maximum height?
c) After how many seconds will the ball hit the ground?

You Try! The function $P(t) = -5t^2 + 70t + 600$ models a company's profit in thousands of dollars, where t is the number of years since 1990.

a) In what year will the company reach its maximum profit?
b) What is the company's max profit?
c) How much money will the company have in 2002?