

Calculation Error

Question

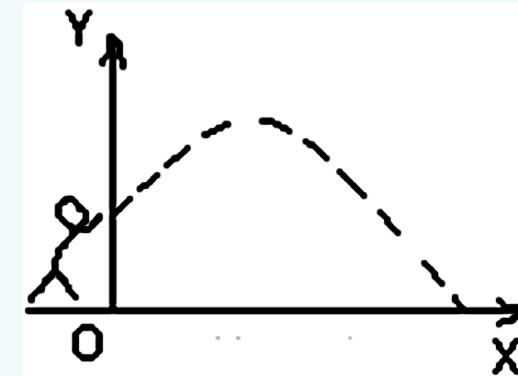
As shown in the figure, if Xiao Li throws a shot put, and the height y (meters) of the shot put from the ground is expressed as

$$y = -\frac{1}{8}x^2 + \frac{1}{2}x - \frac{3}{2}$$

then the maximum height of the shot put from the ground during its motion is ____ meters.

Ground Truth

2



Model's answer

To solve this problem, we need to find the maximum value of the function $y = -\frac{1}{8}x^2 + \frac{1}{2}x - \frac{3}{2}$ during the shot put's trajectory. This is a quadratic function with a downward-facing parabola, so we need to find its maximum value.

Solution Steps:

1. Determine the vertex form of the quadratic function:

For a quadratic function of the form $ax^2 + bx + c$, where $a = -\frac{1}{8}$, $b = \frac{1}{2}$, $c = -\frac{3}{2}$.

The x-coordinate of the vertex is: $x = -\frac{b}{2a} = -\frac{\frac{1}{2}}{2 \times -\frac{1}{8}} = 4$

2. Calculate the function value at the vertex: Substitute $x = 4$ into the original function to find the y-value: $y = -\frac{1}{8}(4)^2 + \frac{1}{2}(4) - \frac{3}{2}$
 $y = -\frac{16}{8} + 2 - \frac{3}{2}$
 $y = -2 + 2 - \frac{3}{2} = -\frac{3}{2}$.

Therefore, when the shot put reaches its highest point, the height from the ground is $-\frac{3}{2}$ meters.

Summary:

The answer to this problem is $-\frac{3}{2}$ meters.

ORM's Feedback

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{  
  "status": "WRONG",  
  "error_step": "Step 1: Finding the vertex x-coordinate",  
  "error_analysis": "The error occurs in finding the vertex x-coordinate. Using the formula x = -b/(2a) with a = -1/8 and b = 1/2, we get x = -0.5/(2×(-1/8)) = -0.5/(-1/4) = 0.5/(1/4) = 2. The solution incorrectly calculated this as x = 4."  
}
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