EXAMPLE 3 Graphing a quadratic function using a table of values

Oct. 21, 2015

Sketch the graph of the function:

$$y = x^2 + x - 2$$

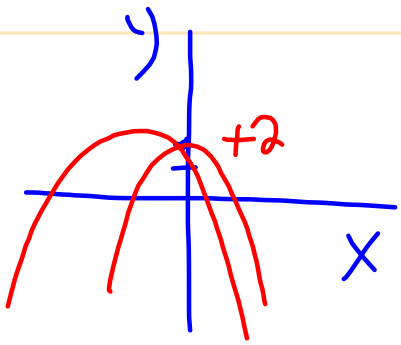
Determine the y-intercept, any x-intercepts, the equation of the axis of symmetry, the coordinates of the vertex, and the domain and range of the function.

Warm-up:

Oct. 16, 2017

Your Turn

Explain how you could decide if the graph of the function $y = -x^2 + x + 2$ has x-intercepts.



Answer

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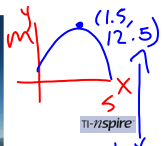
EXAMPLE 4 Locating a vertex using technology

Oct. 16, 2017

Oct. 2, 2012

A skier's jump was recorded in frame-by-frame analysis and placed in one picture, as shown.



Vertex
Max height: 12.5 m

The skier's coach used the picture to determine the quadratic function that relates the skier's height above the ground, y, measured in metres, to the time, x, in seconds that the skier was in the air:

$$y = -4.9x^2 + 15x + 1$$

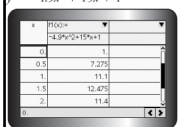
$0 \le y \le 12.5$

R: $\{y \mid$ ...

Graph the function. Then determine the skier's maximum height, to the nearest tenth of a metre, and state the range of the function for this context.

Isidro's Solution

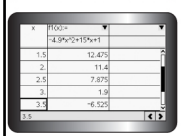
$y = -4.9x^2 + 15x + 1$

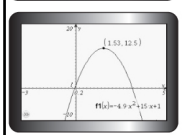


I entered the equation into my calculator.

To make sure that the graph models the situation, I set up a table of values. The skier's jump will start being timed at 0 s, and the skier will be in the air for only a few seconds, so I set the table to start at an x-value of zero and to increase in increments of 0.5.

I decided to set the minimum height at 0 m—it doesn't make sense to extend the function below the x-axis, because the skier cannot go below the ground. I checked the table and noticed that the greatest y-value is only 12.475... m, and that y is negative at 3.5 s. I used these values to set an appropriate viewing window for the graph.





I graphed the function and used the calculator to locate the maximum value of the function.

The skier achieved a maximum height of 12.5 m above the ground 1.5 s into the jump.

The range of the function is $\{y \mid 0 \le y \le 12.5, y \in \mathbb{R}\}$.

In this situation, the height of the skier varies between 0 m and 12.5 m.

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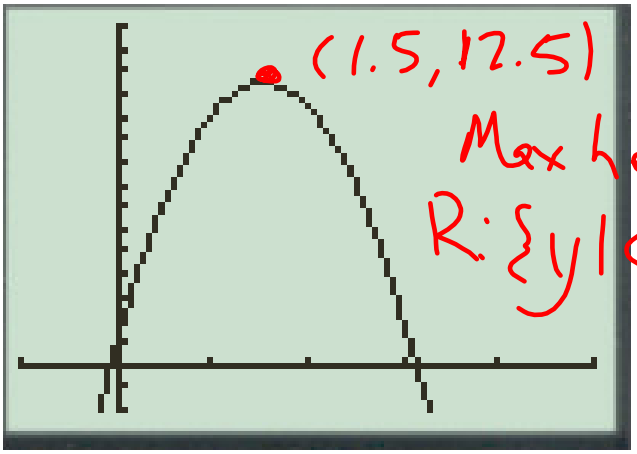
Oct. 16, 2017

$y = -4.9x^2 + 15x + 1$

Graph the function. Then determine the skier's maximum height, to the nearest tenth of a metre, and state the range of the function for this context.



Max height: 12.5 m

R: $\{y \mid 0 \leq y \leq 12.5, y \in R\}$

Oct 16-10:16 AM

Attachments

7s2e2 final.mp4

7s2e4 final.mp4

7s2e3 final.mp4

fm7s2-p8.tns