Hidden World of Parabolas

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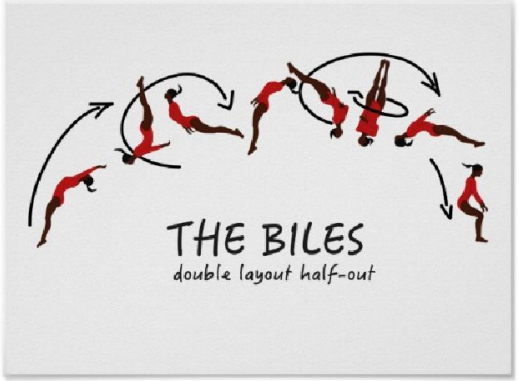
Team 2
eTwinning collaborative presentation

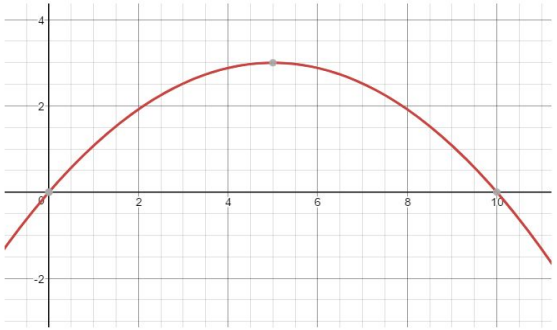
Mathematics can also be applied in architecture. If we take a closer look, we will see imaginary parables made by these bridges.

On the golden gate bridge we can see the ropes that make the parabola.

On this concrete bridge we can see hemispheres that strengthen the structure and make a parabola.

Quadratic function and gymnastics





$$y = ax^2 + bx + c$$

$$nule\ funkcije\ x \in \{0,10\}$$

$$teme\ T(5,3)$$

$$x = 0 \Rightarrow c = 0$$

$$3 = \frac{4ac - b^2}{4a} = -\frac{b^2}{4a} = -\frac{b}{2a} * \frac{b}{2}$$

$$3 = 5 * \frac{b}{2} \Rightarrow b = \frac{6}{5}$$

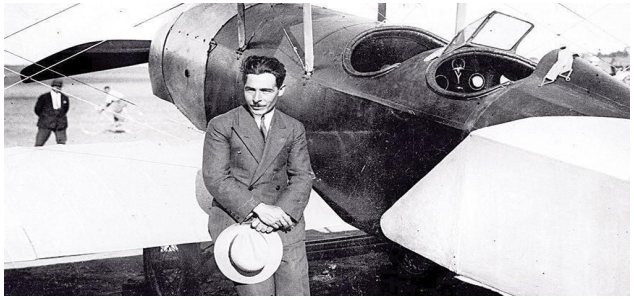
$$5 = -\frac{b}{2a} \Rightarrow a = -\frac{6}{10}$$

$$y = -\frac{6}{50}x^2 + \frac{6}{5}x$$

Simone Biles was the first gymnastics that succeed this jump and that is why it is called the Biles double layout. This quadratic function can be used to describe that practice.

Jelena M.

VECİHİ HÜRKUŞ



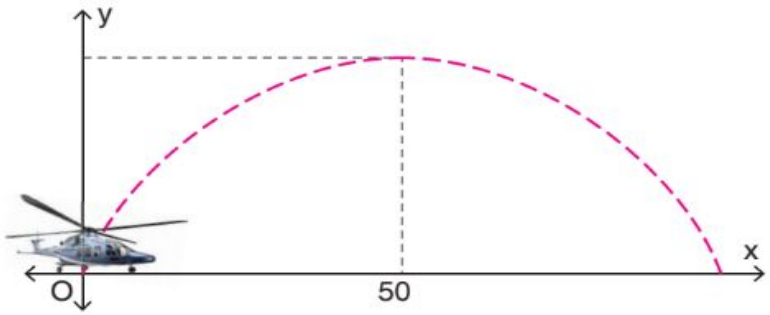
Aviation contributions:

In 1917, Hürkuş became the first Turkish aviator to fly a twin-engine aircraft, a Russian Caudron G.4 captured at the Caucasian Front. In 1918 he manufactured a propeller from scratch in Istanbul, for a Nieuport 17 also captured from the Russians. During the Turkish War of Independence he produced adhesive from gelatin to glue fabric to aircraft wings.

In 1923, in Edirne, Hürkuş flew an abandoned Italian Caproni Ca.5 aka Ca.57 or Breda M-1 with nine passengers, the first Turkish pilot to fly a passenger aircraft. He constructed the country's first gliders (US–4 ve PS–2), and played a role in the establishment of the Turkish Bird (Turkish Aviation Society) from 1935 to 1936 in Etimesgut, Ankara.

During his flying career, which spanned a period of 52 years (1916–1967), Vecihi Hürkuş flew a total of 102 different models of aircraft and spent 30,000 hours (3.4 years) in the cockpit.

QUESTION



A helicopter which bears his name, acts as given in the figure above. The way of the helicopter corresponds to the graph of the function

$$y = f(x) = -0{,}0024 \cdot x^2 + 0{,}24 \cdot x$$

a-) How many kms far the helicopter lands on? Let's find out.

b-) Let's find the maximum height reached by the helicopter.

c-) Let's find the gap that helicopter's rise continuously.

d-) Let's find the gap that helicopter's descend continuously.

ANSWER

a-) $y = f(x) = -0{,}0024 \cdot x^2 + 0{,}24 \cdot x = 0$

$x \cdot (-0{,}0024 \cdot x + 0{,}24) = 0$

=> <u>x = 100</u> is found.

b-) $\frac{-b}{2a} = \frac{-0{,}24}{2.(-0{,}0024)} = 50$

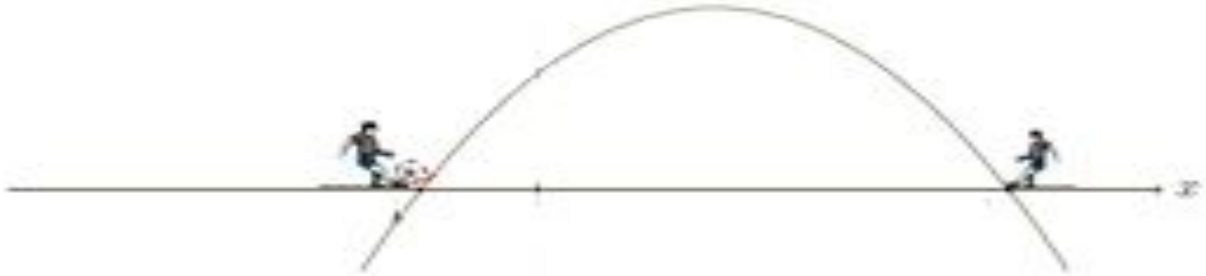
$y = f(x) = -0{,}0024 \cdot x^2 + 0{,}24 \cdot x$ & $y = f(50) = -0{,}0024 \cdot (50)^2 + 0{,}24 \cdot 50$ **=> <u>y = 6 km</u> is found.**

c-) The gap that helicopter's rise is **[0,50]** as it is seen in the graphic.

d-) The gap that helicopter's descend is **[50,100].**

Ersel G.
Babaeski Şehit Ersan Yenici Anatolian High School

QUESTION



In a football game, Ali passes to his friend Cengiz as shown in the figure.

Since the function of the path followed by the ball is calculated as $f(x)= -4x^2+36$

A) How meters can the ball rise from the ground?

B) What is the distance between Ali and Cengiz?

ANSWER

- A) $x=0 \Rightarrow f(0)= -4.(0^2)+36 \Rightarrow y=36$

- B) $y=0 \Rightarrow -4x^2+36=0$

$-4x^2=-36 \Rightarrow x^2=9 \Rightarrow x=-3$ or 3

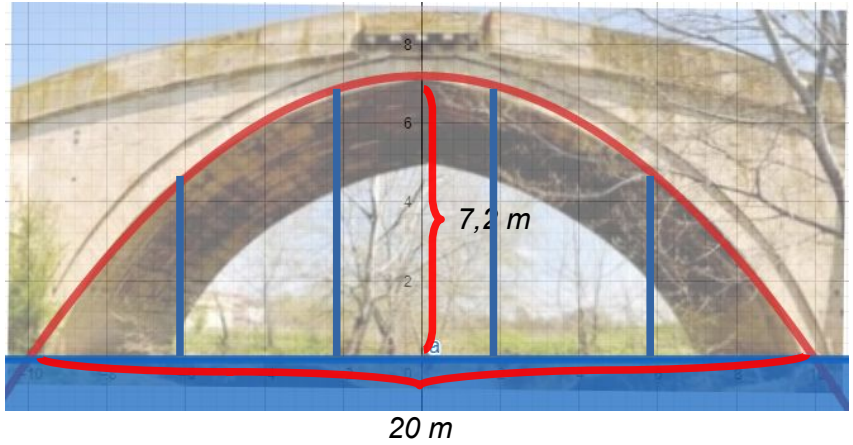
Accordingly, the distance between Ali and Cengiz is 6 meters.

Ersel G.
Babaeski Şehit Ersan Yenici Anatolian High School

Babaeski Sinanlı Bridge

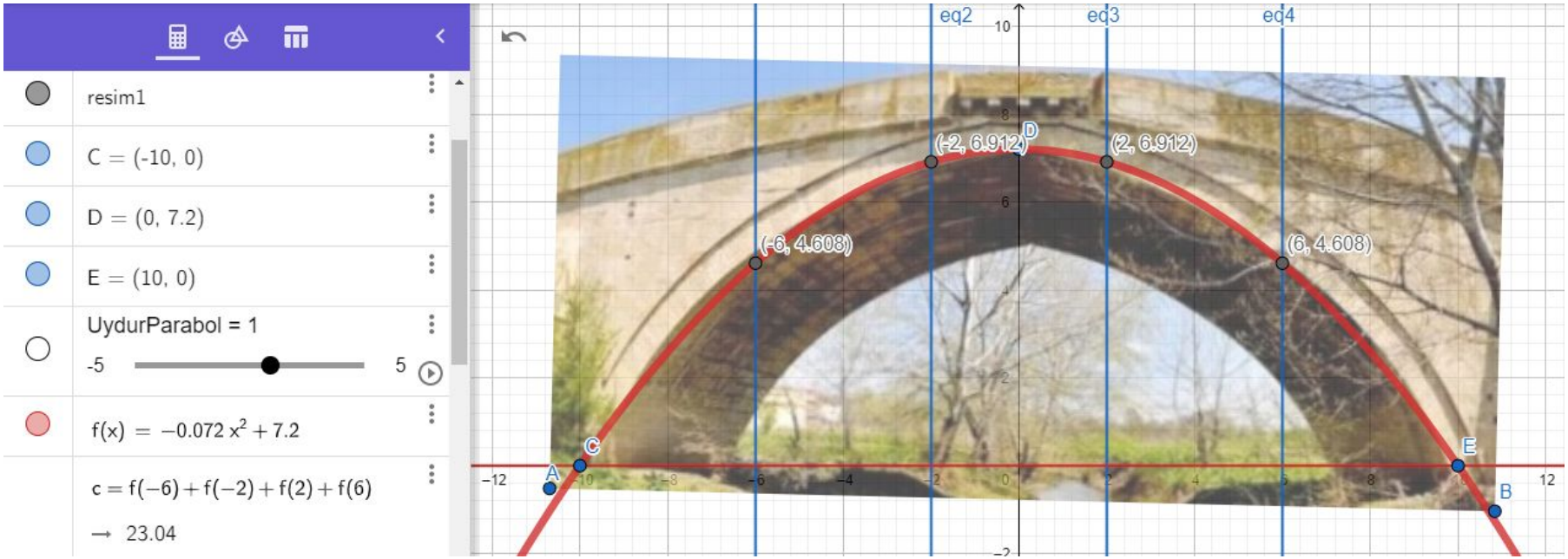
It is a stone arch bridge built by Mimar Sinan by Sokullu Mehmet Pasha in the second half of the 16th century. The bridge is 123 meters long and the span of the central arch in the form of a parabola is 20 meters.

QUESTION



The Sinanlı Bridge will be restored. For this, a platform was installed under the central arch. The distance between the highest point of the arch and the platform is 7.2 meters. 4 equal spaced supports will be placed between the platform and the arch as shown in the figure. What is the total length of the supports to be used for this job?

ANSWER



Simay O. and Fatmanur A.
Babaeski Şehit Ersan Yenici Anadolu Lisesi

A Task with Answers:

Which of the following is correct for the vertex of the f(x) = -3x^2 + 12x + 1?

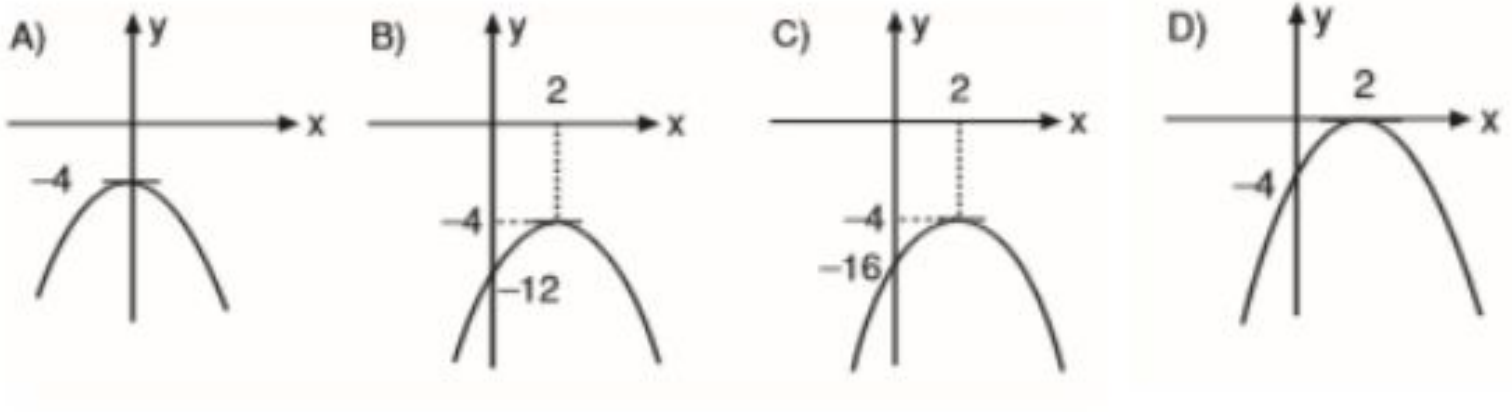
A. There is a local minimum at (-2, -35)
B. There is a local maximum at (-2, -35)
C. There is a local minimum at (2, 13)
D. There is a local maximum at (2, 13)

Fun fact: The Name “Parabola”
The Greek mathematician Apollonius of Perga (third to second centuries B.C.) is credited with naming the parabola. Parabola; is from the Greek word meaning “exact application,” which, according to the Online Dictionary of Etymology, is “because it is produced by ‘application’ of a given area to a given straight line.”

Milica M., The First High School of Kragujevac

A Task with Answers:

Which of the following is the graph of the parabola $y = -3(x - 2)^2 - 4$?



Author: Segah Beril Y, Babaeski Şehit Ersan Yenici Anadolu Lisesi

A Task with Answers:

What are the points of intersection of the line with equation $2x + 3y = 7$ and the parabola with equation $y = -2x^2 + 2x + 5$?

- 1 The points of intersection are : (2 , 0) and (-2/3 , 29/5).
- 2 The points of intersection are : (2 , 1) and (-2/3 , 29/5).
- 3 The points of intersection are : (2 , 3) and (-2/3 , 29/5).
- 4 The points of intersection are : (2 , 4) and (-2/3 , 29/5).

Author: David Ž. The First High School of Kragujevac

Dear team partners,

Thank you!