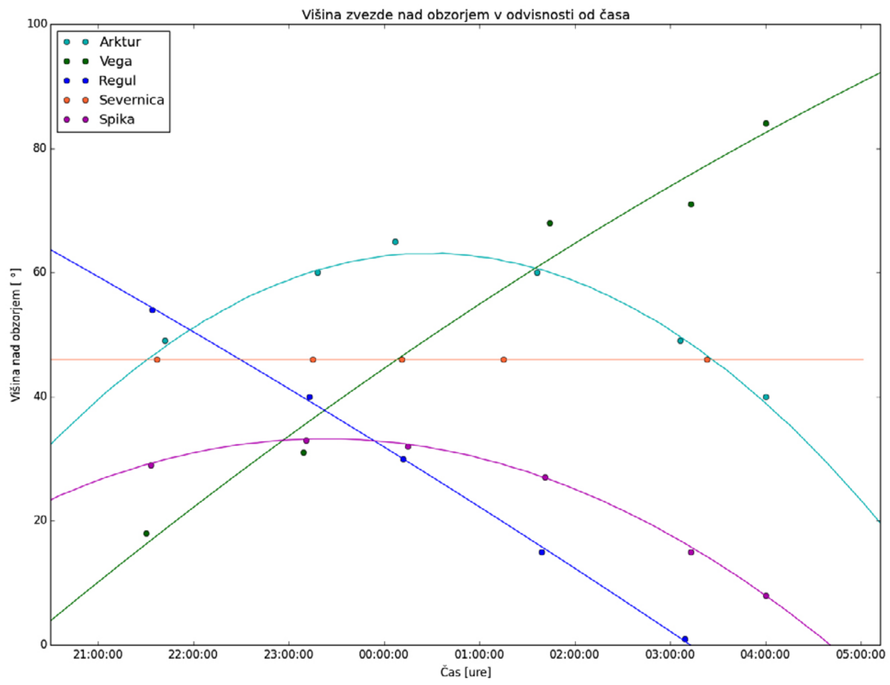
SCIENCE ON STAGE 2015 LONDON

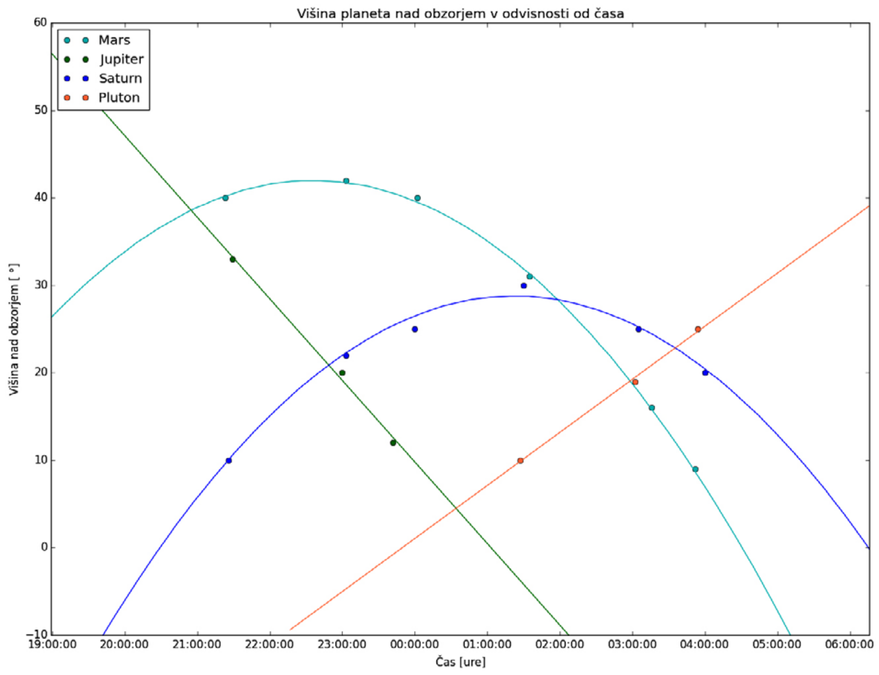
TWO ASTRONOMICAL EXERCISES

1. THE HEIGHT OF A SKY OBJECT, GRAPHS AND MATHEMATICAL FUNCTIONS

The primary purpose of the exercise is to lead students to realise that natural laws can be deduced from simple measurements (e.g. they learn to understand apparent motion of a celestial object across the sky), that a curve can be drawn through the measured points and that a corresponding function can be written using a suitable computer application.



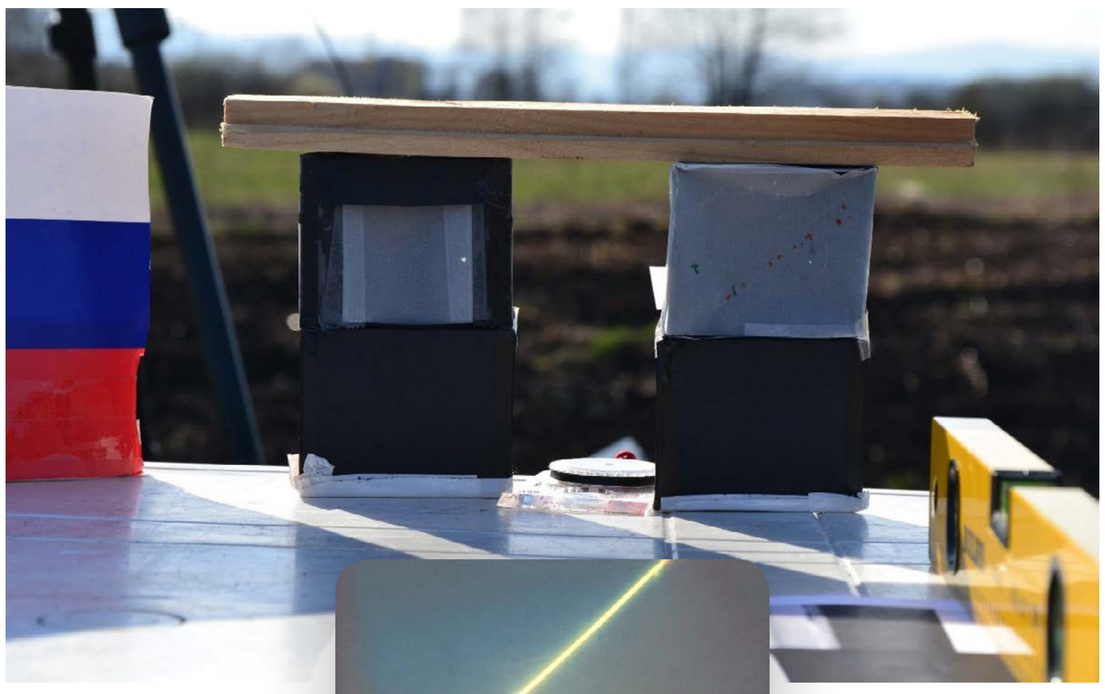
ARCTURUS: $p_A = -5.2582 \cdot 10^{-4} \cdot x^2 + 0.1853 \cdot x + 46.9674$
VEGA: $p_V = -7.9699 \cdot 10^{-5} \cdot x^2 + 0.2010 \cdot x + 16.2246$
REGULUS: $p_R = -3.4763 \cdot 10^{-5} \cdot x^2 - 0.1483 \cdot x + 54.9091$
SPICA: $p_S = -3.2898 \cdot 10^{-4} \cdot x^2 + 0.07415 \cdot x + 28.8114$
POLARIS: $p_{Po} = 0 \cdot x^2 + 0 \cdot x + 46.000$

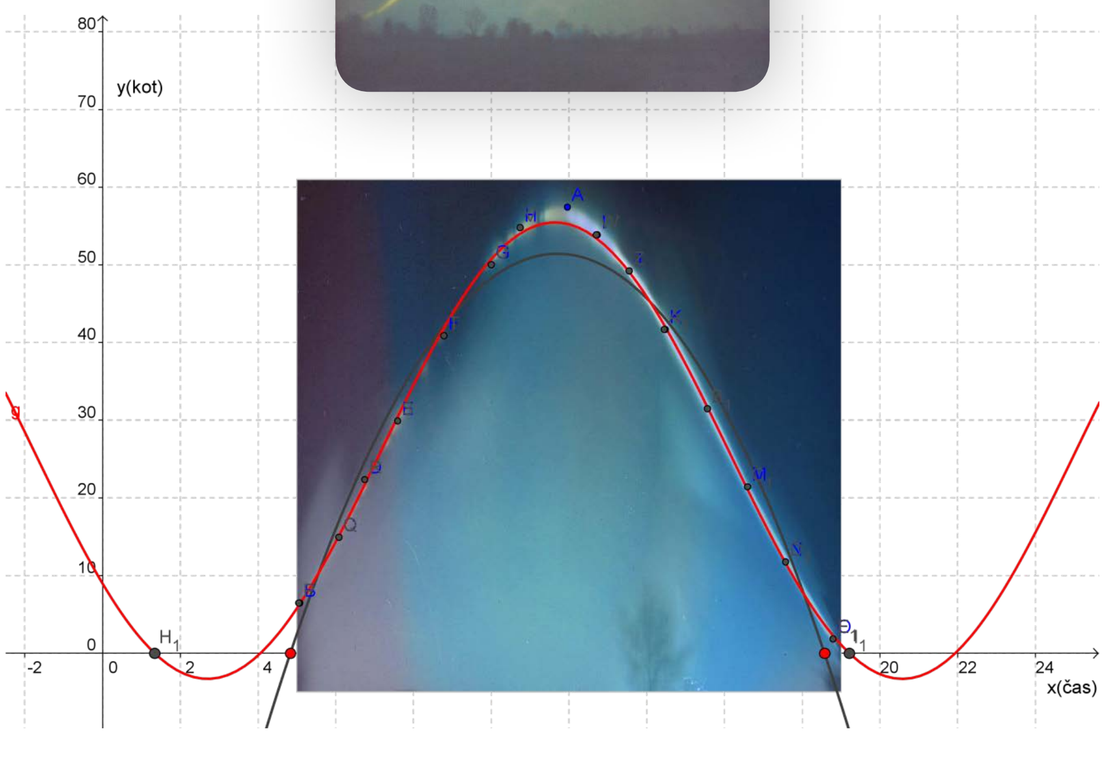


MARS: $p_M = -3.4237 \cdot 10^{-4} \cdot x^2 + 0.045670 \cdot x + 40.3947$
JUPITER: $p_J = -2.9555 \cdot 10^{-4} \cdot x^2 - 0.12427 \cdot x + 33.7562$
SATURN: $p_{Sa} = -3.5344 \cdot 10^{-4} \cdot x^2 + 0.16594 \cdot x + 9.30978$
PLUTO: $p_P = 1.4046 \cdot 10^{-4} \cdot x^2 + 0.014533 \cdot x - 1.41526$

2. HOW TO CAPTURE THE PATH OF THE SUN DURING THE DAY AND USE A MATHEMATICAL TOOL TO DESCRIBE IT.

In spring 2012, our school joined The Sunrise Project – Vernal Equinox 2012. We were encouraged to do so by an invitation on the Portal to the Universe (http://www.eaae-astronomy.org/sunrise-project/documents/SunriseProject.pdf). The basic idea of the project was to make a small pinhole camera in order to record the sunrise and the sunset on the vernal equinox.





The equation of the parabola is:
$f(x) = -1.09x^2 + 25.2x - 97.73$ with zeros at $x_1 = 4.83$ and $x_2 = 18.57$

The equation of the sinusoid is:
$g(x) = 29.39\sin(0.35x - 2.52) + 26.08$ with zeros at $x_1 = 4.06$ and $x_2 = 19.21$

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MATHEMATICS, PHYSICS, ASTRONOMY