SINTESI DEL PROGETTO

Scuola/e	Liceo Linguistico "G.Cesare-M.Valgimigli", Rimini
Autori	Oriella Soggia
Titolo del modulo	The Ellipse
classe	3rd year liceo linguistico
livello linguistico	B1/B1+
obiettivi disciplinari	Getting students to obtain the definition of an ellipse as a locus of points. Drawing an ellipse and learning about its properties. The eccentricity and the comparison with the circumference.
contenuti disciplinari	Ellipse as a locus of points and its properties.
punto del programma (eventuali prerequisiti)	Cartesian plane, circumference.
numero di ore	6
materiale (libri, software, DVD, videocassette, fotocopie…)	photocopies, websites, blackboard, software, app.
supporti (laboratorio, lavagna luminosa, video….)	Lim
compresenza (SI/NO)	No

DESCRIZIONE DEL PROGETTO

The aim of this project is learning about the ellipse as locus of points in a cooperative way.

The teacher suggests some activities that help students to get themselves the ellipse definition.

The two key words of this project are: "**cooperative learning**" and "**scaffolding**".

- **The first activity is an introduction of the topic:**

Activity 1 (in group)

The ellipse and the circle

An ellipse usually looks like a "squashed" circumference. In fact a circumference is a special kind of ellipse.

Try to put in each box most of things you know that have the shape of a circumference or of an ellipse

circumference	ellipse
Example: The orange's section	*Example: The Coliseum*

Do you imagine how was possible in the past to build human artefacts with the shape of an ellipse like Coliseum?

- **Then the teacher reads a short story that is also a problem to solve. Students, after the listening, check the comprehension.**

Activity 2 (listening)

A wonderful village

Once upon a time there was a little village in the south of England. Its inhabitants were friendly and had a peaceful life.

In fact in this village there was an apple tree, that never finished to produce its fruit, and an inexhaustible source of drinking water, so people could drink and eat whenever they wanted.

In spite of this, their King , who was a right man, wanted to put all the inhabitants of his kingdom in the same conditions, building new houses so everyone could reach the tree and the source without being disadvantaged.

In order to do this he asked a wise man.....

How do you think the wise solved the problem? In which position did the King build the houses?

Activity 2
Fill in the gaps:

A wonderful village

Once upon a time there was a little village in the ……………. of England. Its …………………………. were friendly and …………………….a peaceful life.

In fact in this village there was an …………………………………….(2 words), that …………………….. finished to produce its fruit, and an inexhaustible …………………………………………….(4 words), so people could drink and eat whenever they wanted.

In spite of this, their …………………. , who was a right man, wanted to put all the inhabitants of his kingdom in the same ……………………………, building new houses so everyone could …………………… the tree and the source without being disadvantaged.

In order to do this he asked a ………………….. man.

How do you think the ……………………. solved the problem? In which position did the King build the houses?

- **The third activity is solving the problem of the wise. People of the short story can be in the same condition if the sum of the distances from the apple tree and the source is constant. Exactly the definition of the ellipse! Now students can draw the ellipse with a string….**

Activity 3   (in pairs)

Drawing an ellipse

Try to draw an ellipse with a pencil, two pins and a string.

X

Apple tree

X

source

- **The fourth activity is to find the definition of an ellipse, work about specific vocabulary and standard equation. The website "Math Open Reference" and a Lim are the two instruments that can help to make this lesson.**

  (http://www.mathopenref.com/ellipse.html)

- **After that teacher can introduce the eccentricity plotting some ellipses with different shapes (using apps of the website and Lim) and students might compare circumference and its eccentricity with ellipse.**

- **Finally teacher should give some example to find the ellipse's standard-form equation by its properties or to recognize an ellipse from the equation.**

- **Some example of exercise:**

Exercise 1:

Fill in the gaps using the correct word

CENTER of an ellipse
A point inside the ellipse which is the _____ of the line segment linking the two foci.
The_____ of the major and minor axes.

SECANT
 A line that _____ an ellipse at two points.

Exercise 2:

Write down the ellipse definition:

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Exercise 3:

Find and draw the ellipse which has a=3 and a focus F(0; -4).

Exercise 4:

Recognize which of these equations is an ellipse:

$2x^2 + 3y^2 - 4 = 0$ $\frac{4}{9}x^2 + \frac{16}{25}y^2 - 1 = 0$

Exercise 5:

Find the vertex and the eccentricity of this ellipse:

$$\frac{x^2}{9} + \frac{y^2}{25} - 1 = 0$$

- **THE FINAL CLASSWORK:**

Name_____   **date**_____

Exercise 1: Fill in the gaps using the correct word

ELLIPSE AS A CONIC SECTION

When a cone is _____at an angle ($\neq 90°$) by a plane, the intersection is in the _____ of an ellipse. It is one of the four _____ sections.

ELLIPSE'S CENTER

A point inside the ellipse which is the _____ of the line segment linking the two foci.

The_____ of the major and minor axes.

SEMI-MAJOR AXIS

The distance from the center to the _____ on the ellipse. It is _____of the major axis.

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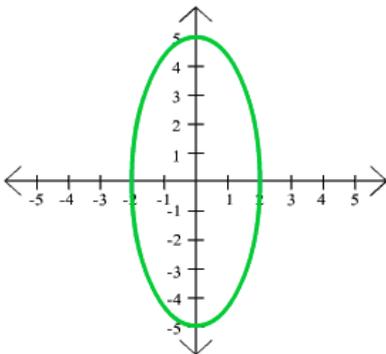A line that _____ an ellipse at two points.

Exercise 2:

Write down the ellipse definition:

Exercise 3:

When does an ellipse become a circumference? Write down an example.

Exercise 4:

Find the equation of these ellipse:

Exercise 5:

Find the ellipse's standard-form equation and draw it.

   a) a=3 and foci (0; ±4)
   b) focus (-3, 0) and minor vertex (0, 4)

Exercise 6:

Recognize which of these equations are ellipses:

$$16x^2 + 25y^2 - 400 = 0 \qquad 2x^2 + 8y^2 + 4 = 0 \qquad \frac{4}{9}x^2 + \frac{16}{25}y^2 - 1 = 0$$

Exercise 7:

Find the foci and the eccentricity of this ellipse:

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

Exercise 8:

Is the point $P(0; \sqrt{2})$ on the ellipse $x^2 + \frac{y^2}{2} = 1$?