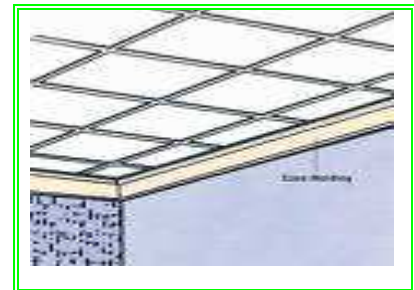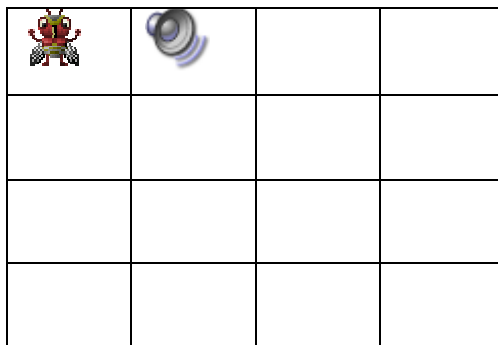# 1.The cartesian coordinate system
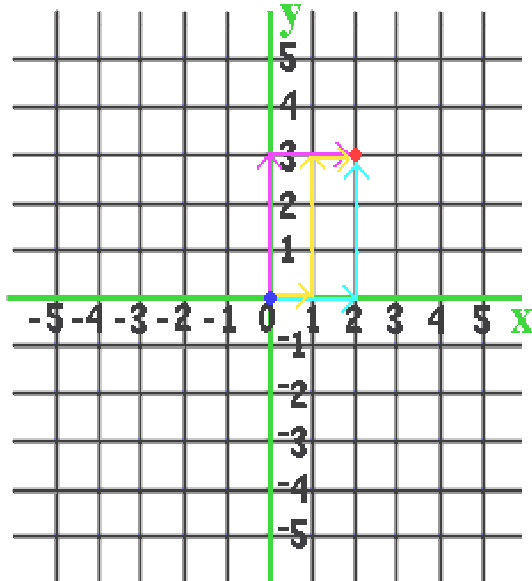
- There is a story about a sick mathematician:

- Rene Descarte lay in bed sick, and he saw a fly buzzing around on the ceiling. His ceiling was made of tiles.

- Then he realized that he could describe the position of the fly by the ceiling tile it was on, and he developed the Cartesian coordinate system in the 17th century.

Coordinates

- We can describe the position of a point, using two numbered lines (called AXES).
- What's the name of the horizontal axis?
- What's the name of the vertical axis
- What's the origin?

T.1.QUESTIONS (fill in the gaps): work in pairs and report the results in the plenary.

- Can you describe how to get to the red point from zero? I would go up _____ units and then right _____ units.
- How else can we get there? We can first go _____ units to the right, and then _____ units up. Or we can go _____ right, up, and _____ more to the right.

- **_Coordinates of a point:_** it's the mathematical term for the position of a point.
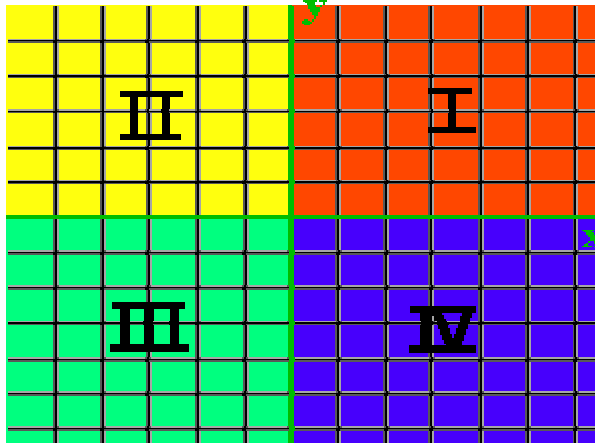
$$(x , y)$$

The first coordinate in an ordered pair is called: the x-coordinate

The second coordinate in an ordered pair is called: the y-coordinate

- So, if our point is (2, 3), we go two steps to the left, and then three steps up.

The four quadrants

- The x-axis and y-axis divide our paper into four sections .These sections are called quadrants.

T.2.Now circle the correct answer (Work in pairs. We will report the results in the plenary).

- The first quadrant contains all the points with <u>positive / negative</u> x and <u>positive / negative</u> y coordinates, and is represented by the Roman numeral I.

- The second quadrant contains all the points with <u>positive / negative</u> x and <u>positive / negative</u> y coordinates, and is represented by the Roman numeral II.

- The third quadrant contains all the points with <u>positive / negative</u> x and <u>positive / negative</u> y coordinates, and is represented by the Roman numeral III.

- The fourth quadrant contains all the points with <u>positive / negative</u> x and <u>positive / negative</u> y coordinates, and is represented by the Roman numeral IV.

T.3.QUESTION (do it in pairs and then we will report the results in the plenary):

- Will any point that has coordinates (positive, negative) be in the fourth quadrant?

To plot a point:

- **Starting from zero**, we go all the way **to the right** (the x-coordinate is a positive number) **or to the left** (the x-coordinate is a negative number), counting steps: one, two…

- Then we go **up** (the y-coordinate is a positive number) **or down** (the y-coordinate is a negative number): one, two three… steps.

Activities

- ACTIVITY 1. Activity in pairs:
    - On a set of axes, draw a picture made by joining dots with straight lines. Using coordinates, write instructions for drawing this picture.
    - Give your instructions to other members of your group or class.
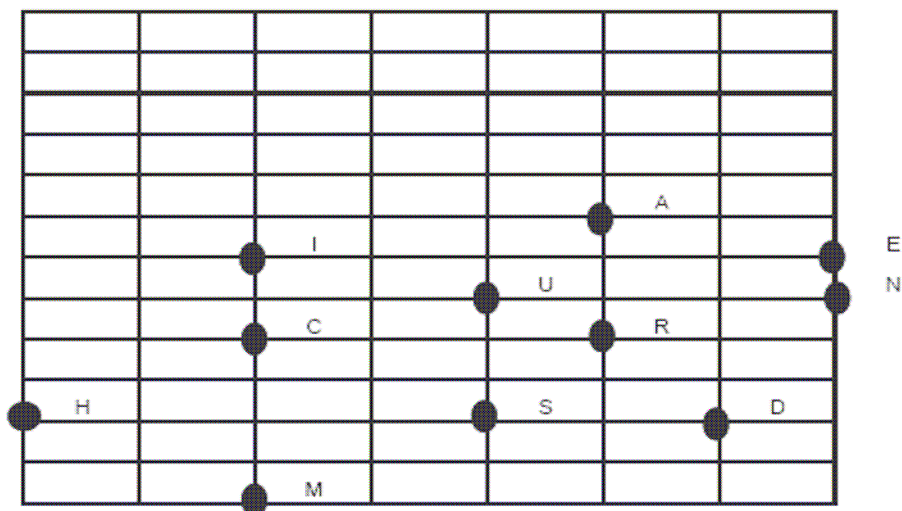   - Ask them to draw the picture from your instructions.

Instructions: PLOT THIS POINTS AND JOIN THEM IN ORDER:

x2; y3:2 units to the right, 3 units up…

- ACTIVITY 2. Go to this webpage:

http://www.shodor.org/interactivate/activities/MazeGame/.
    - Determine the X and Y coordinates at the end point of the robot's next step.
    - The robot can't come in contact with any mines.

- ACTIVITY 3. Other webpages to practice: You have to find out what the point displayed on the graph is :http://www.funbrain.com/cgi-bin/co.cgi?A1=s&A2=2; Bug2: http://www.oswego.org/ocsd-web/games/BillyBug2/bug2.html

- ACTIVITY 4. Write down the letter that is beside each of the following points.

  - You should end up with a sentence.
  - What does this sentence say?
  - Note: We are working within the first quadrant, and you have to number both axes starting from 0, 1…
  - Work in pairs and then we will report the result in the plenary classroom.

(2,0) (4,5) (2,4) (0,2)

(2, 4) (5, 7) (5, 4) (7, 6)

(2, 6) (4,2)

(7,5) (7,6) (7,6) (6,2) (7,6) (6,2)
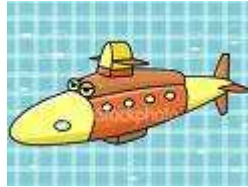

- ACTIVITY 5. Listening activity. I will read aloud the coordinates of several points:

    - Write each ordered pair.
    - Plot them on a graph.

- ACTIVITY 6. Game: SINK THE SHIPS. A game for 2 players.

- Equipment: A graph for each player. The numbers on each axis from 0 to 5.

- Preparation: each player secretly puts the following ships on his or her graph: **1 submarine** (1 dot); **2 destroyers** (2 dots each), **1 cruiser** (3 dots), **1 battleship** (4 dots).

- The game: the players take turns to name a coordinate. If one of the opponent's dots is at this coordinate the opponent says **"hit"**; otherwise the opponent says **"miss"**. The opponent puts a cross through a dot that has been hit. Once all the dots belonging to a ship have been hit, the opponent must say **"ship sunk"**.

- The loser is the first player to have all of his or her ships sunk.

- ACTIVITY 7. Researching tasks (work in pairs, then you will report the results in the plenary).

  - You are going to study how many junk messages you receive a week in your hotmail (7 days).
  - Represent the results in a table.
  - Represent the results in the Cartesian coordinate system.
  - We will comment on the results in the plenary classroom.

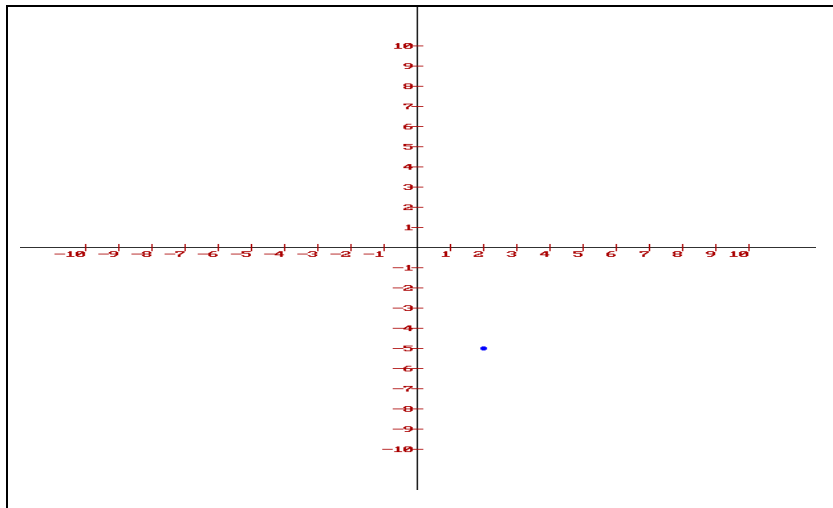I have received .... unk messages during this week.

I have received .... messages more than ....

I have received .... messages less than ....

- ACTIVITY 8. Cartesian coordinates cards. Game: we have couples of cards: one card shows the ordered pair:

$$(2, -5)$$

And the other card shows the representation on the coordinate system.

After dealing the cards, the students have to find their matching cards.

The students with the point-card will ask questions to the students with the graph-card, in order to find their matching cards.

Who has got the	Ordered pair Coordinate point	(2,-5)? 2 units to the right, 5 units down?
Have you got the	"	" ?"

Yes, I have
No, I haven´t. I have the…
It´s me. I have the…

- ACTIVITY 9. GAME. We are going to divide the class in groups of three.

    - Each group has to prepare questions (at least 8 questions) about this unit. Try to make the questions original, funny, creative, …

    - In turns, the first group asks (aloud) a question to the next group. If the answer is right, the group gets 5 points. Then the second group asks another question to the following group, and so on.

    - The winner is the group with the maximum score.

What's the definition of "…"?
Can you define the word "…"?
Can you locate the point (…; …) in the coordinate system?
How many…?
How…?
When…?
Do you know…?
Is it true that…?
Am I right If I say that…?
Who…?

- ACTIVITY 10. NAVAJO RUG WEAVER. Read this text and answer the questions. Work in pairs. Then we will report the answer in the plenary. You can use the internet to do more research.

Weaving is a highly important aspect of Navajo history and culture. Navajo rugs and blankets have been an important part of the commerce of Navajo society.

The process of weaving the rugs is considered serious and personally meaningful work. The skills and philosophies of weaving are taught to Navajo girls by their mothers, grandmothers, and other older women. The fine details of weaving are seldom taught to non-Navajos
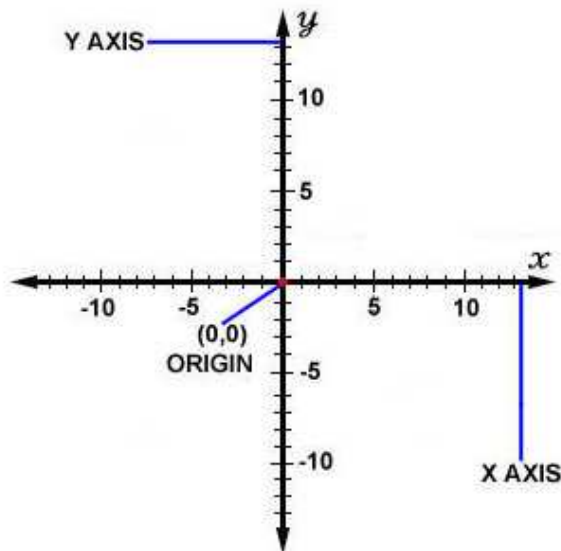

Navajo designs are complex. Since looms…

…are set up so that you have vertical warps and horizontal wefts…

13
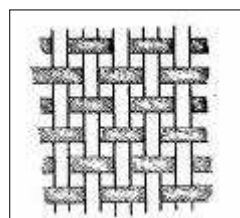
…however, we can talk about rug designs in terms of Cartesian coordinates.

This rug design resembles the Cartesian grid on the left, and allows us to see how the position of any design element on a rug can be described according to a Cartesian coordinate relative to the centre of the rug, which is like the "origin" of a Cartesian grid.

(http://privateschool.about.com/gi/dynamic/offsite.htm?zi=1/XJ/Ya&sdn=privateschool&cdn=education&tm=149&f=00&tt=14&bt=0&bts=0&zu=http%3A//www.rpi.edu/%7Eeglash/csdt.html)

QUESTIONS:

1. Where are the Navajos from? They are from….. (Search for information in the net).

2. Can you explain the meaning of "weaving"? It means…..

3. Is "Weaving" taught to Non-Navajo people?

4. Why does the rug design resemble the Cartesian grid? Because…….

- ACTIVITY 11. Read the following text, and complete the multiple choice exercise (if you are not sure about the answer, or you want to find more information visit the webpage referenced at the end of the text). Work in pairs. Then we will report the results in the plenary class.

Cartesian Coordinates and Graffiti.

- Graffiti has a long and proud history, but Urban Graffiti has existed for several decades, and it's still strong. Graffiti artists are passionate, skilled, community-oriented, and socially conscious.

- Graffiti artists often work in sketchbooks before they begin painting the graffiti. The sketchbooks sometimes use a grid to help plan the design. More commonly, the graffiti writers use the brickwork as a grid, as we can see in this picture below.
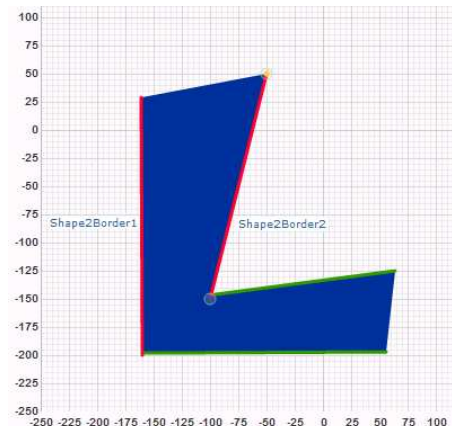
- These grids are much like the Cartesian coordinate system in mathematics

- In the link below, there is Graffiti Grapher software. You will use Cartesian coordinates to locate the start and finish of each line. Each coordinate is a pair of numbers. The X coordinate tells you how far left or right. The Y coordinate tells you how far up or down. Cartesian coordinates use both negative and positive numbers, so don't forget to use the "-" sign.

  http://privateschool.about.com/gi/dynamic/offsite.htm?zi=1/ XJ/Ya&sdn=privateschool&cdn=education&tm=149&f=00&tt=1 4&bt=0&bts=0&zu=http%3A//www.rpi.edu/%7Eeglash/csdt.ht ml

http://www.jupiterimages.com/popup2.aspx?navigationSubType=itemdetails
&itemID=

Medellín. Colombia.

http://www.graffiti.org/index/world.html

Urban graffiti has existed for…	…2 years
	…3 terms
	…40 years
Graffiti artists are….	…independent
	…concerned about social problems
	…easygoing
A grid is…	….horizontal and vertical lines crossed, forming squares
	….a sketchbook where you can draw
	..an avaricious person
We can find graffiti…	…in Europe
	…in Catalonia
	…around the world
Graffiti…	…are always legal
	….are always illegal
	….is often illegal
One of the four elements of hip hop is…	…the visual (Graffiti)
	…the music (D-Jing)
	…the dance (B-Boying)
	…the rap (emceeing)

- ACTIVITY 12. FINAL ACTIVITY.

  - Join the followings heads with the correct tails (working in pairs, later plenary).

The horizontal axis is called…	…positive x and positive y coordinates
The point (-2,-3) is…	…2 units to the left, 3 units up
The first quadrant contains all the points with …	…the x-axis
The fourth quadrant contains all the points with …	…2 units to the right, and 3 units up
The vertical axis is called…	…the y-axis
The point (2,3) is …	…negative x and positive y
The point (2,-3)…	…2 units to the left, 3 units down
The point (-2, 3) is…	…on the x-axis
The second quadrant contains all the points with…	…negative x and negative y coordinates
The point (2, 0) is…	…2 units to the left, 3 units down
The point (0, 2) is…	…n the y-axis

- Represent these points in the Cartesian coordinate system. Then you have to indicate if the points belong to the first, second, third or fourth quadrant. We'll report the results in the plenary class.

  A (2, 5); B (-1,3); C (0,-4); D (4,0); E (3,-2); F (-2,0); G(-2,-5);

  H (-3, 4); I (4,-6); J (0, 3).

I QUADRANT	II QUADRANT	III QUADRANT	IV QUADRANT

The point .... belongs to the first/second/third quadrant
The point .... is located in the first/second/third/quadrant

- We are going to divide the class in groups of three. Each group has to prepare a power-point presentation, summarizing the main points of the lesson (concepts and definitions, giving examples…). Your presentation will be recorded on the power point.