X & Y COORDINATES

Teachers Guide

Challenger
LEARNING
CENTER
HAMMOND, IN

Background:

One piece of information that is essential to us on a daily basis is our location. We may not realize how often we use this type of information, but a little reflection on your conversations and actions over the past 24 hours will reveal a great dependency on being able to accurately state your location. For example, if you speak to a friend on the phone, he or she may ask from where you are calling. This can be as simple as saying, "I'm at Susan's house now, but I'm leaving for home in half an hour." Or you might say, "I am at 334 West 3rd Street in Hometown, Iowa, USA."

To be more explicit, you might add, "In the Western Hemisphere of planet Earth, the third planet from a star called the Sun, in the Milky Way Galaxy."

Another way to specify a location is by using a coordinate system. Probably the most-used system is the rectangular, or Cartesian coordinate system. In this system, a grid divides a surface into four quadrants. (See image below.) Locations are given by stating a pair of numbers or coordinates. The first number represents a horizontal value, X. This value can be either positive or negative. The second number represents a vertical value, Y, and it too can be either positive or negative. By finding where the horizontal and vertical values intersect, you can determine any location on the grid.

_____

Skills:

• Determining coordinates and intersections
• Reading graphs
• Interpreting data
• Identifying integers and non-integer rational numbers

_____

Objective:

Students will: Identify and plot points using an X & Y coordinate grid.

_____

Challenger
LEARNING
CENTER
HAMMOND, IN

X & Y COORDINATES

Overview:

In this activity students will use an X & Y coordinate system to locate missing spacecraft on a coordinate grid sheet.

_____

Key Question

How are the X & Y axes used to find a specific location?

_____

Key Concepts

• Precise locations can be specified using an X-Y coordinate grid.
• The X-axis is the horizontal axis; the Y-axis is the vertical axis.
• Locations on a grid are found by calling out a pair of coordinates.

_____

Materials

- Grid sheet – 1 copy per student
- Pencils
- Paper
- Red Marker
- A book or other object to serve as a shield

_____

Preparation:

1. Make copies of the grid sheets.
2. Divide students into teams of two.
3. Discuss coordinate systems with the students.
4. Draw a grid on the chalkboard like the diagram on the previous page. Draw points and practice identifying points with students. For example (X1,Y2) means finding where the X1 line and Y2 line intersect.
5. Before the class period ends, conclude the lesson with Reflection and Discussion questions.

X & Y COORDINATES

Management:

This activity can be completed in one class period.

_____

Reflection & Discussion:

1. In a coordinate pair, which number represents the X coordinate? Y coordinate?
2. Look at each quadrant, which quadrants have positive X values? Negative Y values? Positive X, positive Y? Negative X, positive Y?
3. How would locating the spacecraft on the paper be different of you didn't have a coordinate system?
4. Can you think of a situation when the X-Y coordinate system might not be easy to use?
5. Can you think of any real-life examples of coordinate systems?

_____

Transfer & Extension:

1. Reduce the size of the spacecraft on the grid. How does this affect the time it takes to locate all of the spacecraft? What happens if you increase the grid size?
2. Research several different coordinate systems, specifically those used in astronomical research. Give a report on right ascension and declination as it applies to positions of astronomical objects.
3. Design a system to locate missing spacecraft that would make use of a three-dimensional field. This would require a Z-axis.

_____

X & Y COORDINATES

Student Procedures

Information:

1. This activity is done in pairs. Sit on the opposite side of a table or desk from your partner.

2. Place a book or other shield device in the center of the desk. Make sure you cannot see your partner's grid

3. Draw a spacecraft in each of the 4 quadrants. Your partner will do likewise. *The spacecraft must be the size of 4 squares on the grid.* The object of the game is to be the first person to find all of the missing spacecraft.

4. Decide which of you will go first. (Flip a coin or choose some other method.)

5. Whoever goes first will call out two numbers (the X and Y coordinates), representing a point on the partner's grid. For the sake of example, pretend that your partner is going first.

6. Locate the coordinates on your grid. If this point corresponds to the location of any part of a spacecraft, tell your partner that he or she has found a spacecraft. Your partner now has another turn to find another spacecraft. If at any time your partner's coordinate does not correspond to the location of a spacecraft, it is your turn to find their spacecraft.

7. Keep track of the coordinates you have called so as not to repeat a number pair in a game.

8. When the game has been completed, try again with new grid sheets.
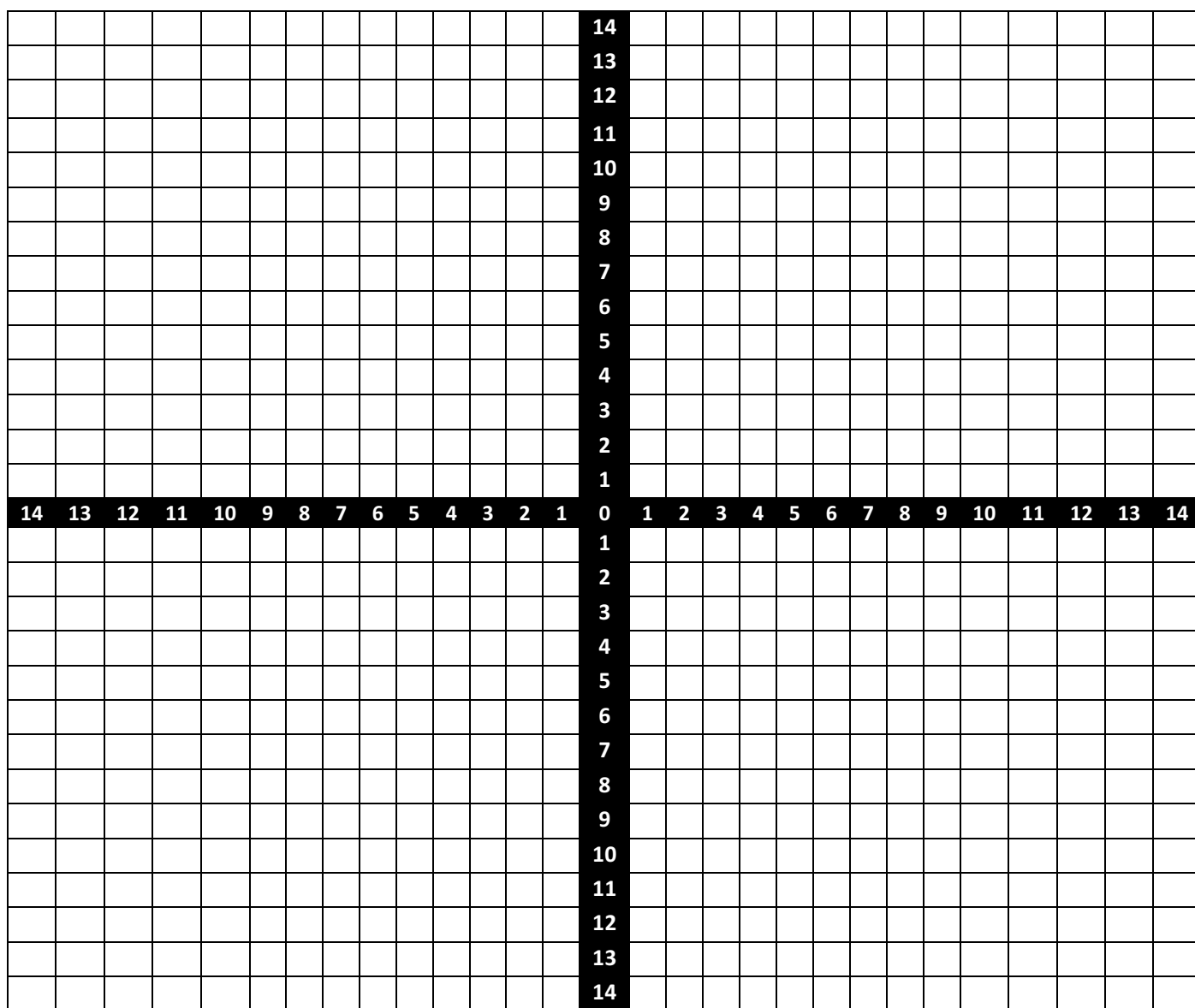
X & Y COORDINATES

Student Worksheet

X & Y coordinates

**** Please have each student label the +X and –X points on this worksheet after printing. The labels belong on the horizontal axis opposite of the vertical Y axis. The +X goes on the right & -X on the left.

(-x, +y)　　　　　　　　+ Y　　　　　　　　(+x, +y)

14
13
12
11
10
9
8
7
6
5
4
3
2
1

14 13 12 11 10 9 8 7 6 5 4 3 2 1 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14

1
2
3
4
5
6
7
8
9
10
11
12
13
14

(-x, -y)　　　　　　　　- Y　　　　　　　　(+x, -y)

Challenger
LEARNING
CENTER
HAMMOND, IN