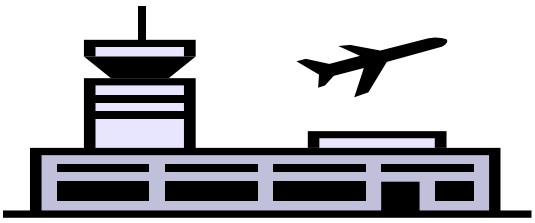


Practice Task: Air Traffic Controller

Adapted from "Paths-Activity 20.22" in Van de Walle's
Elementary and Middle School Mathematics, Teaching Developmentally

This task requires students to create travel paths for three airplanes attempting to land safely at the airport.

STANDARDS FOR MATHEMATICAL CONTENT

Graph points on the coordinate plane to solve real-world and mathematical problems.

MCC5.G.1 Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., *x*-axis and *x*-coordinate, *y*-axis and *y*-coordinate).

MCC5.G.2 Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.

STANDARDS FOR MATHEMATICAL PRACTICE

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

BACKGROUND KNOWLEDGE

Students need to know the difference between vertical and horizontal lines and how locate and name points in the first quadrant of the coordinate plane.

COMMON MISCONCEPTIONS

- Students reverse the points when plotting them on a coordinate plane. They count up first on the *y*-axis and then count over on the *x*-axis. The location of every point in the plane has a specific place. Have students plot points where the numbers are reversed such as (4,

5) and (5, 4). Begin with students providing a verbal description of how to plot each point. Then, have them follow the verbal description and plot each point.
- When playing games with coordinates or looking at maps, students may think the order in plotting a coordinate point is not important. Have students plot points so that the position of the coordinates is switched. For example, have students plot (3, 4) and (4, 3) and discuss the order used to plot the points. Have students create directions for others to follow so that they become aware of the importance of direction and distance.

ESSENTIAL QUESTIONS

- How does the coordinate system work?
- How can the coordinate system help you better understand other map systems?
- How do coordinate grids help you organize information?

MATERIALS

- "Air Traffic Controller" recording sheet
- Floor grid (could be created with tiles on the floor) or shower curtain grid
- One Person to be the air traffic controller
- Three people to be airplanes
- Colored pencils/markers

GROUPING

Small group task

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION:

Comments: Identifying points on a coordinate grid is important in understanding how the coordinate system works and in constructing simple line graphs to display data or to plot points. These skills further help us to examine algebraic functions and relationships. The skills developed in this lesson can be applied cross-curricular to reading latitude and longitude on a map and to plotting data points.

TASK

Getting Started:

1. The Air Traffic Controller tells the planes where they need to go using coordinates on the grid.
2. Each plane enters the grid at the origin (0,0). This is where the Air Traffic Controller's radar first picks up each plane's signal. Once the Air Traffic Controller "sees" a plane, he or she must tell them where to go using coordinates.
3. The Air Traffic Controller is responsible for keeping the planes, pilots, and their passengers safe from collisions with other aircrafts.
4. The more planes there are in the sky, the more difficult it is to keep planes safe.

5. Each Air Traffic Controller has to keep track of each plane by doing the following:
    a. Each plane's name must be written on the recording sheet.
    b. The coordinates for the path that each plane takes must be written down.
    c. The Air Traffic Controller must draw a flight plan on the recording sheet for each plane. Each plane must go from point A (0,0) to the final destination or landing strip, point B (10,10).
    d. Submit both the coordinates and the flight plan to the FAA President (Your Teacher) at the end of this exercise.
6. The job of Air Traffic Controller passes from one person to the next until all students have had the job. Once students have constructed their flight plan, the group may move to the floor grid or shower curtain grid to make sure all planes will land safely.

Finishing Up:

Air Traffic Controllers:

Before you turn in your flight paths and coordinates, please be sure to complete the following:

1. Highlight or shade each plane's flight path a different color with a key at the bottom that shows which color represents each plane.
2. Put your name on your papers.
3. Turn them in to the FAA President.

FORMATIVE ASSESSMENT QUESTIONS

- What is the coordinate for the horizontal axis?
- What is the coordinate for the vertical axis?
- Why do you need to plot your point where two lines intersect?
- How do you graph a point on the coordinate plane?
- How do you name a point on the coordinate plane?
- How do you use an ordered pair to identify a point on the coordinate plane?
- How do you use an ordered pair to locate a point on the coordinate plane?

DIFFERENTIATION

Intervention

- If students are still struggling with plotting points on the coordinate plane, there are two activities in Van de Walle's Elementary and Middle School Mathematics Teaching Developmentally: Activity 20.21 "Hidden Positions" and Activity 20.22 "Paths".

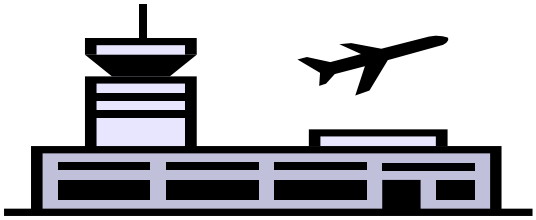
Extension

- This task can be extended by giving students an opportunity create flight plans for planes ahead of time. Once the students have their plans, they must enter the "radar map" one at a time, moving at a consistent pace. Planes take turns moving from one point to the next, following the flight plan. The students must follow their flight plan, and the "Air Traffic Controller" must facilitate this, should there be any confusion.

Name_____ Date_____

Air Traffic Controller

Directions



Materials:

- "Air Traffic Controller" recording sheet
- Floor grid (could be created with tiles on the floor) or shower curtain grid
- One Person to be the air traffic controller
- Two or Three people to be airplanes
- Colored pencils/markers

Objective: To create flight plans to safely direct all planes from point A (0,0) to point B (10,10).

Directions:

Getting Started:

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2. Each plane enters the grid at the origin-point A (0,0). This is where the Air Traffic Controller's radar first picks up each plane's signal. Once the Air Traffic Controller "sees" a plane, he or she must tell them where to go using coordinates.
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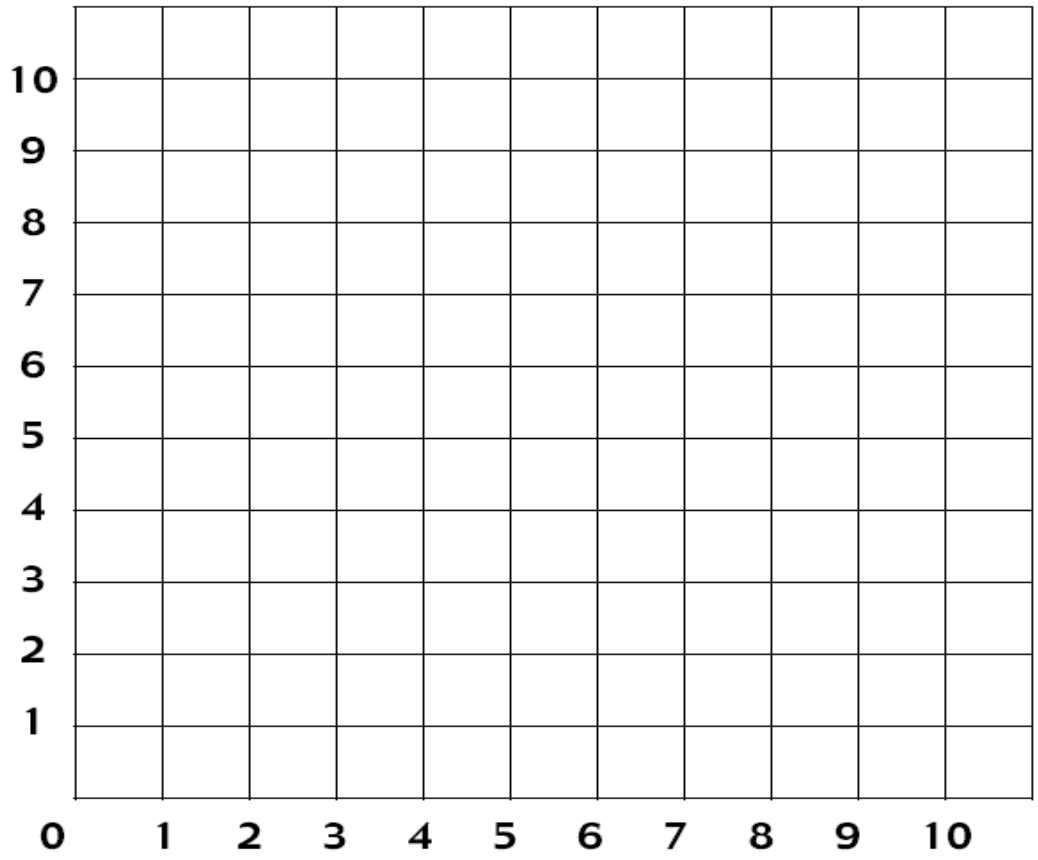
Name _____ Date _____

Air Traffic Controller

FlightPlan



	Name & Color	Coordinates
Plane #1		
Plane #2		
Plane #3		