

Plane Table Mapping

Introduction:

Students can follow up learning about explorers of Africa and the New World by mapping a landscape of their own! Mapping is an important part of exploration - it allows future explorers and colonists to know their terrain, which can make the difference between life and death.

Remind your students that this land, America, was named after the Italian mapmaker Amerigo Vespucci!

Lesson Objective:

Students will use a protractor to draw a map of a constructed landscape.

CA Dept of Education Math Standards:

4th grade: Use of two-dimensional coordinate grids

7th grade: Use ratios to scale a landscape to map size

Important Terms:

Scale (the ratio between map measurements and landscape measurements)

Supplies: ([or buy a lesson plan kit below](#))

1 Barry Scientific protractor (a swinging-arm protractor is necessary)

1 standard drinking straw

1 piece of paper

Clear tape

Teacher Preparation:

- (1) Choose a level place for your landscape. Playgrounds are good sites.
- (2) Place various items such as chairs in various locations within your landscape. Chalk is also helpful for drawing out terrain features, such as swamps.

You can pick a theme, such as “Exploration of the African Inland,” and make the items match the theme: A flag marked “Landfall,” a square patch marked “Quicksand,” a circle marked “Poisoned Pool,” et cetera.

- (3) Find several spots for the plane tables. Students will use the plane

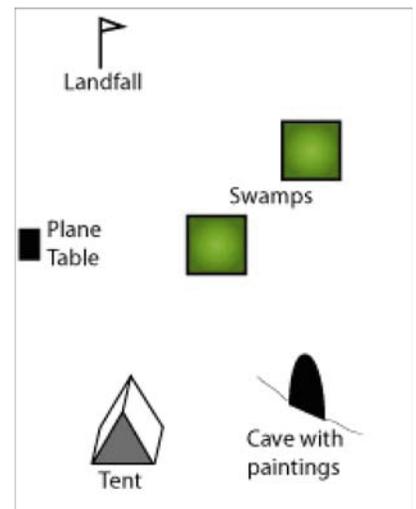
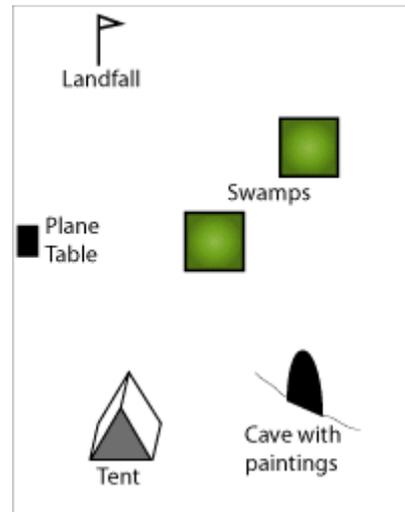
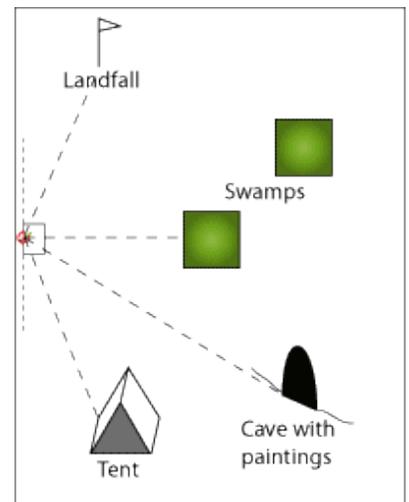
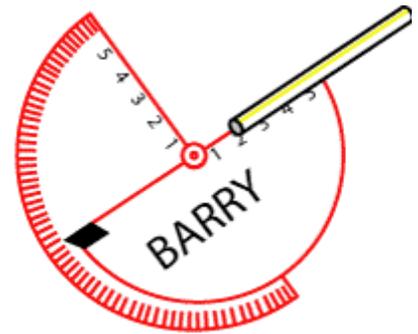


table to make their maps, so the best location is one that has a 180° view of the entire landscape you have created.

The plane table itself can be a portable folding table, or a board laid across stools. It must be flat, and once the students begin working, it must not move. (No rolling chairs, please.)

Instructions to Students:

- (1) Attach a half-length drinking straw, which will be the sighting mechanism, to the half of the protractor with no degree markings. Tape it along the ruler edge of the protractor.
- (2) Set up the plane table at one of the chosen plane table spots. The table itself needs to be stable.
- (3) Each student group needs to measure its paces. An easy way to do this is to walk with a steady stride along a line with a known length, while counting paces. Divide the number paces into the length of the line to find the distance of the student's pace.
- (4) The student groups need to choose a **scale** to use for their map. The students can calculate an appropriate scale after measuring the dimensions of the landscape (by pacing it) and the dimensions of their sheet of paper.
- (5) Swivel the protractor, and peer through the straw until one of the items in the landscape comes into view. Pace the distance from the table to the item. Note both the angle and the distance, and use the scale to calculate where the item should appear on the map. Do this for all map items.
- (6) Ask the students if their maps should look the same. Does it make a difference whether the students started in different places?



Discussion:

What problems might students encounter when making this map?

How could the following problems be solved?

- What if the line of sight between the table and item were obstructed?

- What if the items were higher or lower than the plane table?

- What if there were barriers between the item and the table, making it difficult to reach the item?

Explorers face these exact problems. Distance is often measured by triangulation instead of pacing. Vertical distances are measured by tilting a professional plane table, and noting the angle. Barriers are overcome with machetes, muscle power, or making multiple plane table maps that avoid the barriers.