

Investigation Backpack 03

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Investigation Backpack began in the September issue of *The Oregon Mathematics Teacher* (www.octm.org/TOMT.html). Here we go with episode #3, in which we suggest two investigations:



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- Adventurer's Handbook intertwines math, science, geography, and other disciplines that you might like to add.
- Piracy and Triangulation uses geometry, algebra, and map skills to hide or find a pirate's booty.

For more information about investigations that we suggest in **Investigation Backpack**, do this:

- Go to www.curriki.org and search for **investigation**.
- Go to www.octm.org/TOMT/InvBack.html and browse **Investigation Backpack December**.

Adventurer's Handbook

Level and Subject: We ran this investigation for 4th-, 5th-, and 6th-grade students for several years, intertwining math, science, geography, and other disciplines. You can easily adjust it to the grade level and disciplines of your choice.

The Hook: The investigators create a handbook for adventurers here and now, or any time and place that they can travel to in our totally terrific time and space machine. It is related to hiking, camping, and adventuring, and can include math, science, social studies, language arts, and other subject areas. We suggest doing it in two parts over a school year.

Part 1. Adventures here and now. Teams outfit themselves for hiking, camping, and adventuring. Plan and get ready to go on a 1-day hike; 2-day hike with overnight camp; longer hiking, backpacking, and camping trip. Introduction, setting the scene, shopping for equipment, map reading, orienteering, survival skills, et cetera, et cetera. Math, science, ecology, and other topics can blend into these activities. We use role-playing game techniques to “go” on simulated hikes, camping trips, and adventures. This can involve students in story telling and creative writing.

Part 2. Adventures in time and space. Time-traveling expeditions to interesting times and places. For example, to Beringia in 18,000 BCE to observe and do research on the crossing of animals and people from Asia to America over the land bridge that existed at that time. Or to Mars in, say, Earth year 2030. Or Middle Earth or Harry Potter's world or other times and places selected by teachers or students.

Piracy and Triangulation

Level and Subject: This investigation is intended for students who have studied circles at almost any level. I have used it at various grades with students from 3rd grade up through Algebra II in high school. It is highly flexible, depending only on the level of mathematical rigor you wish to insert.

The Hook: Piracy and Triangulation

Avast, matey! You've just done some serious plundering on the high seas and now wish to bury your treasure from the prying eyes of the local law enforcement! You've chosen your island, picked your landmarks, but now wish to hide it so that only the literate might find it. Remember, most pirates had no need for learning their letters and such, and you be much smarter than your average piratin' scoundrel. You decide to leave clues rather than an x to mark the spot. Your knowledge of triangulation will keep your booty safe.

Investigation: Students need some familiarity with a compass to complete the treasure map activity, which can be found at the following website:

Investigation BackPack December at www.octm.org/TOMT/InvBack.html

Use the grid on the map with higher level math classes. After introducing the standard equation for circles I often have students choose their own origin on the pirate map and determine the equations of the circles for the clues from there. The connection to algebra can be made by solving the system of 3 equations, 3 unknowns, if desired.

As a possible extension, older students could be asked to develop this activity for use at a lower grade; creating the maps, clues and setting up the "island" on a playground.

Tips and Resources:

If you have access to a beach or to a playground with sand or a foot or so of bark chips like we have, expand the activity! I have replaced icons on the map with landmarks on the playground or beach and have given students a long rope and measuring device and instructions from 3 points. I've pre-filled and buried several small plastic boxes with Hershey Treasures® and had teams look for them. Even older students will enjoy this!