Organizing a class orienteering event

Orienteering is a wonderful teaching tool. It allows the teacher to illustrate many abstract ideas in concrete terms. The sport also appeals to students operating on multiple learning levels. In the Fall it is often used as an Orientation device to introduce new students to the school and classmates. In the Spring it is sometimes used to prepare students for class trips.

There are events developed around just about any subject from Math and Science through Arts and Humanities and any age group from Elementary School through University. A good place to start for some ideas would be Orienteering and Map Games for Teachers by Mary E. Garrett and Published by United States Orienteering Federation (USOF), PO Box 1444, Forest Park, GA 30298 (www.us.orienteering.org).

It is important to make the activity relevant. Remember the focus of the tie-in to the curriculum. If the event has strong goals and objectives, there is a greater chance that the students will "get" the concepts being taught and will have more fun doing it. The end result is that more students are likely to want to repeat the experience and to take it to the next level.

Start with the familiar and build in increments. Many teachers start in the classroom itself. Use of the inside of the school building(s) introduces a wider field of experience, but is dependent on the specific school situation. The school grounds are often the best choice for a first-time, outdoor experience.

Sometimes the better choice would be a nearby park. If the event is to augment a specific concept, like 3-D graphing or Watersheds, you may wish to find a location with special landforms. For student groups, it is preferable to have a small area with clearly defined boundaries.

If there is an orienteering club near your area, they may already have maps of nearby parks or may be able to provide assistance in making a map of your school grounds or nearby park. If you can get experienced help to produce a map, this is the best approach. The club will often have people that would be willing to work with teachers

Erie Ave.

Legend

contour line, 6 meters
knoll, small knoll
trail, indistinct trail
driveway, parking lot
sidewalk
fence
building, block
man made objects
rock wall

open forest
fight
walk
open land
trees & bushes
trees & grass
distinct vegetation edge
ditch, stream bed
distinct tree, misc veg.
out of bounds

10 meters

Scale 1:2000

Erie Ave.

Course 1
Course 2

Clark Montessori Jr/Sr High School

and school groups. To find the orienteering club nearest you, contact USOF (see above.)

Let's assume that you have to make a map on your own. First, obtain any existing maps of the area you plan to use. You might also run across aerial photos; these can be helpful as well. If you are using school grounds, you should be able to find an engineering or architectural map of the property. For parks, start with the park administration. Other good sources of existing maps are County Auditors and County or City Engineering Departments. Any of these materials you can find we will call your base maps.

Take the best base map (the one that seems to show the most accurate detail) and walk around the property with it. This process is called field checking. Add things that would be readily visible to students (e.g. new parking lot, baseball backstops, etc.) Delete things that are no longer there or invisible to students (e.g. underground utilities). Include all major features, but remember that too much detail will make the map too cluttered. If you are working on a very small school property and there are 4 or 6 major light posts, you might want to map them. But, if there are 20 or 30 light poles, it is probably best to leave them off the map. Try to be consistent in which types of objects you map across the property.

As you draw new objects on the map, you'll use a combination of compass bearing, pace count, and sightings. You'll notice that the backstop is directly between the southwest corner of a building and the corner of the parking lot, but slightly left of a line from the southeast corner of the building to the street corner. Check those relationships as you go, and you should be able to end up with a reasonably accurate map. Mapping is an art. Don't expect perfection on your first attempt.

When you have finished field checking, you will want to draft a finished map. You can do this manually by tracing over your field notes onto clear plastic film (mylar) or onto tracing paper. Some people have just used White-Out® on copied maps and added the details to create a master. If you are computer literate, you can scan your field notes into a computer and use just about any drawing program to create a neat, professional looking map. You can download a free version of orienteering mapping software called Ocad (www.ocad.com).

Decide on a scale for the map. For school grounds, it often works best to choose a scale that will comfortably fit onto a standard (8.5 by 11 inch) sheet of paper. Leave adequate space for a legend-at least a quarter of the page. Use a copier or computer to enlarge or reduce your map to the desired scale.

Once you have a map, plan one or more courses and put out markers. You can use official orienteering markers and punches available from Brunton and other suppliers. Or you can often borrow markers from the local club. If these are not options, simple ones can be made from a variety of materials. Plastic pint milk jugs painted orange are quick and easy to make. Students can make them from white and orange construction paper laminated with contact paper. Don't forget to give each marker its own, unique code and record the location of each marker.

If you have a limited time for the activity, (say a 45 or 50 minute class period), then it is usually best to have 2 or more different courses of approximately equal length and difficulty so that students have to navigate their own course without just following other students. Each control marker should be hung on a mapped object. Once the students find / identify the cor-

rect object, they should be easily able to find the marker. Plan courses to avoid dangerous areas and consider where a teacher, aide or chaperone can stand to best see large portions of the course at once.

Introduce the activity in class. Explain what type of marker they will be looking for and how they will mark their map or score card to prove they were there. It is usually easiest in a school situation to just have a code on the control that lets the student know that they are at the correct location and a method to record that they were there. When official controls are used, an identifying punch is at each control. You may find tying crayons or markers to the controls with a different color for each site to be a simple solution.

You will need to spend some time talking about map colors and symbols, scale and how to orient the map. Making a slide or overhead transparency of your map is really helpful here.

Explain the rules, such as whether the students will be doing course on their own or if they must stay with their partner / team. Emphasize boundaries and safety including warnings concerning roads, parking lots, ponds, fences, etc. as they apply to your particular situation. Be sure to specify a time limit and an audible signal-air horn, school bus horn, etc.-that means "return immediately".

At last it is time to take the students outside to the starting point. Give each student (or team) a score card and a map. Start each student or team at intervals on alternating courses. With a single course, students or teams should be started at least a minute apart. From a standpoint of having each student / team learn the most, the greater separation between start times the better. However, from a practical standpoint you will want to get all groups out on the course as quickly as possible. This is why it is best to have several courses.

It is best if you can recruit aides or helpers for the actual activity. An aide can handle the timing of starts and finishes and make sure that every student or team has checked back in. An additional teacher or aide can be stationed at key points where they can see most, or all, of the course. Depending on the area used, you may need several helpers. You may want one or two "rovers" to go out on the course and assist students who are having difficulty.

As the activity winds down, you want to be sure that all students have checked back in. Often the slowest students will take 3 times as long as the fastest students to complete the course. If time permits, quick finishers can be sent out on a second course or they may be recruited to assist students having difficulty. Just be sure that they check out and in for each course they do. Quick finishers can also be sent out to collect control markers.

You'll want to have some time to evaluate the activity with your class. It is helpful if you can show an overhead transparency or slide of the map during this evaluation and have students explain how they did the course, what route choices they made and where they had difficulty.

There are many activities that Orienteering can be combined with. For example, students can use a map of a historic site, battlefield, or museum to navigate to specific points of interest. Instead of using a traditional control marker and punch, their score card can ask them to answer questions about each point they visit such as: Who was shot here? What year was this structure built? How much did this dinosaur weigh, etc.

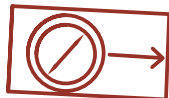Just remember to keep it relevant, keep it simple and keep it fun!

Orienteering Tools

Map
(with course)
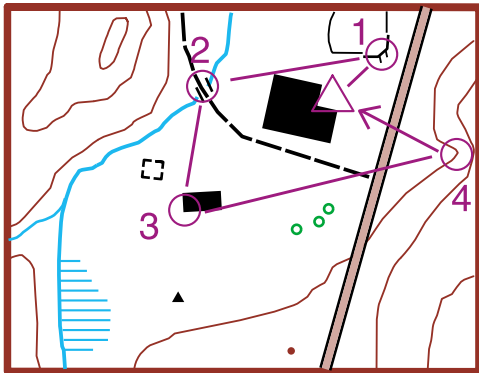
Control Card
(punch card)

Compass

Punch

Control Code
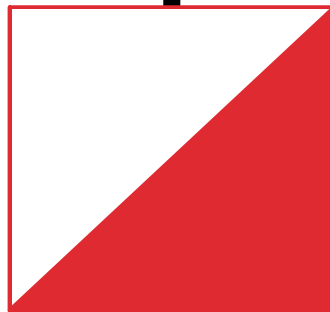
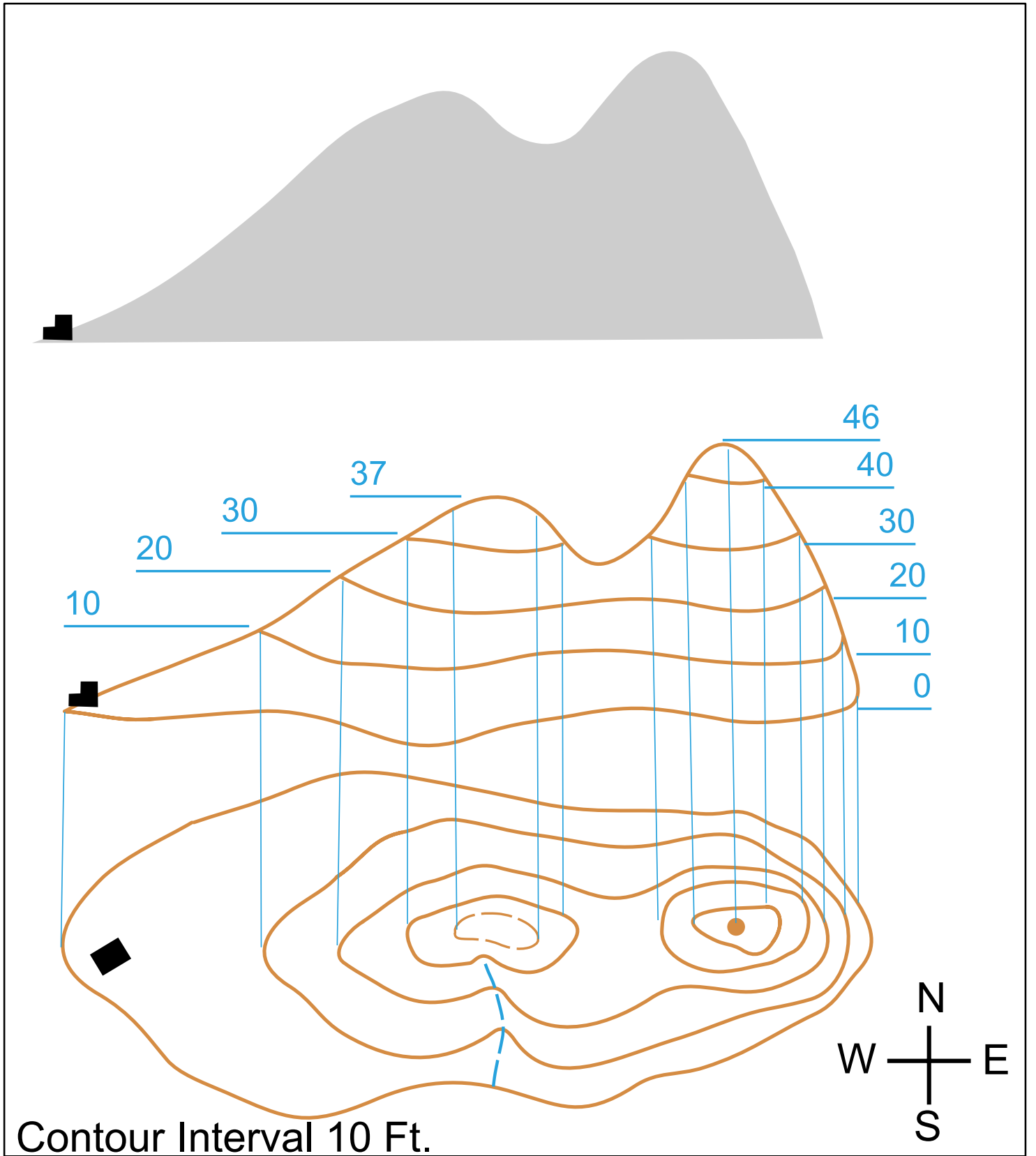Control Marker
(or flag)

46
40
37
30
30
20
20
10
10
0

Contour Interval 10 Ft.

N
W E
S

Paradise Island

Ark-La-Tex Orienteering
www.softdisk.com/customer/jimh/
jimh@softdisk.com
318-949-3601

Legend

1:5,000 Scale
Contour Interval 10 Ft.

Paved Road	
Gravel Road	
Foot Path	
Small Foot Path	
Building ■ Ruin	
Rocky Ground	
Bridge	
Special Feature ✕ Fodder	
Contour Line	
Form Line ⌣ Ruin	
Gully	
Depression ⌣ Pit ⌄	
Impassable Cliff	
Passable Rock Face	
Earth Bank	
Water	
Marsh Source	
Sandy Ground	
Difficult Slow Good	
Fence	
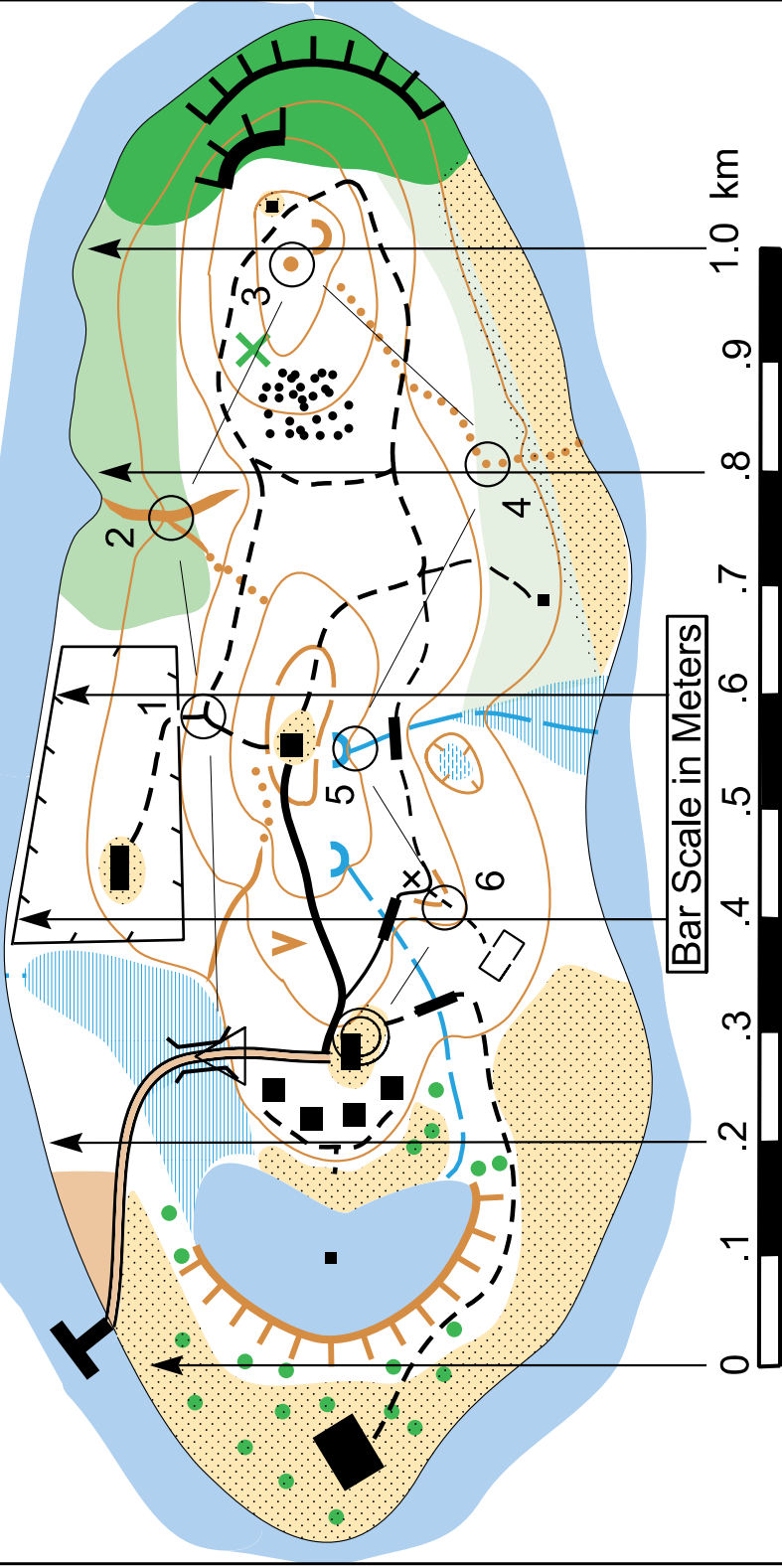
Bar Scale in Meters

0   .1   .2   .3   .4   .5   .6   .7   .8   .9   1.0 km

Mathematics in Orienteering

compiled by Mike Minium, 2001

Measurement:
Measure course length on map.
(length on map in cm. or mm. then use scale to convert to m. or km.)

Measuring "climb" (the amount of uphill on course)
Count number of contours crossed in an uphill direction.
(If start/finish are at same place, this is total contours crossed divided by 2)
Multiply number of contours by the contour interval to get climb in meters or feet.

English / Metric conversion of distances and climb.

Scale: 0   100   200   300
        METERS
Measure Distance:
_____ meters   from 5 to 8
_____ meters   from 1 to 6
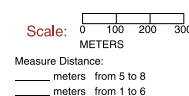
Percentage:
Express climb percent of distance.

Determine percentage of your time to complete course versus winning time.

Time Computation:
Find elapsed time. Subtract start time from finish time.

Rate Computation:
Compute average rate on course
(usually expressed in minutes per kilometer)
(remember to convert seconds to hundredths of minute)
example: time of 35:24 = 35.40 minutes.

Statistics:
Compute average times on course: mean, median, mode.

Compare statistics:
boys vs. girls.
2 (or more) different classes.
1st time doing a course vs. 2nd time doing same or similar course.

Geometry:
Measure angle (change of direction) at each control point.
(angle less than 90 degrees is called a dog-leg.
dog-legs are usually a flaw in course design).

Compare real versus created dog-legs.
Will competitors make a dog-leg even if straight line angle > 90 deg.

How many control points are the minimum needed to make a course:
(that starts / finishes at same point)
        ... with no angle greater than 90 degrees?
        ... with no angle greater than 60 degrees?

Add total angles of direction change for a whole course.
        If you treat left turns as negative and right turns as positive,
        you should end up with either 360 or -360... why?
        (for a course that uses same point for both start and finish)

        If you treat all angles as positive, compare 2 or more courses.
        Which one has greater total changes of direction?

        Planar Geometry:
What are contours? How do those lines translate to elevation?
At what point would a competitor chose to go around a hill rather than over it?
(One meter of climb is roughly equal to ten meters of horizontal.)

Additionally, students can be familiarized with the use of symbols as abstract representations of real objects and states of being. There is nothing quite like running up a hill of changing steepness to familiarize the students with the concrete differences in angles in inclination.

One demonstration of the meaning of the two dimensional representation of a three dimensional object is to cut up a potato (or other vegetable) into slices of uniform thickness and have the students trace the slices. This will result in a contour drawing of "Potato Mountain". These contours can then be used to calculate the volume of the potato. This same method can be applied to the map of the school grounds to calculate the amount of dirt that would have to be hauled away if the whole thing were to be razed for a soccer or baseball field.

Contour and scale test
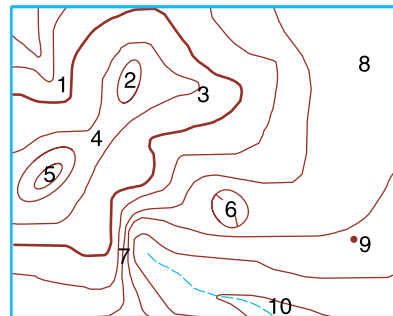
Identify the following:
___ Highest point on this map
___ Lowest point on this map
___ A Hill top
___ A Depression
___ A Re-entrant
___ A Spur
___ A Saddle
___ A Steep Area
___ A Flat Area
___ A Small Knoll

test A

NAME
_____

SCHOOL
_____

Scale: 0   100   200   300
        METERS

Measure Distance:
_____ meters   from 5 to 8
_____ meters   from 1 to 6

BASIC ORIENTEERING INSTRUCTION = Distance, Direction & Details

DETAILS -
Map Familiarization
A.   Five colors: Each color represents a different class of features:

Blue: Water (streams, marsh, pond)
Green: Vegetation (dense woods, individual trees)
Yellow: Clearings & fields
Brown: Earth topography or contours (valleys, hills)
Black: Natural objects (boulders, cliffs)
Man-made features (trails, buildings)
White: Normal forest

B.   Map Symbols: Use map legend and symbols to locate various features on the map.
Can also relate surrounding features to symbols shown on the map.

Orient the map
A.   Using the terrain: Turn the map until what is in front of you in the terrain is in front of you on the map
B.   Check using a compass: The north lines on the map should align with the compass needle.

Thumbing
A.   Fold your map into a small easily held piece. Try to make the first fold on a N-S meridian.
B.   Place your thumb on the map near where you are.
C.   As you move along, move your thumb also to a new location on the map.
D.   This helps keep track of where you are.

Map Walk: Read the map as you go along
A.   Point out features as you go along and identify on the map.
B.   Check map orientation as you go along.
C.   Check thumb position on the map
D.   Check what features you will be seeing next
E.   Contour reading: Compare terrain with map contours. Are you traveling uphill or downhill? Is it steep or level ground? Is there a rise on the left or right side?

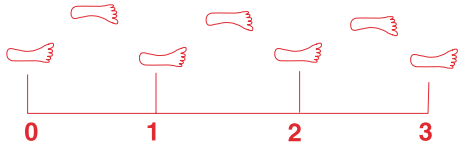Orienteering techniques: C A R
A. Control: Note the control description and symbol on the map.

B.   Attack Point: An easily found feature, such as a trail junction, trail bend, or stream crossing, that is near a control and is used to take a shorter more precise compass bearing to find a control.
C.   Route Choice: Which way should we go? Should we follow a trail or follow a compass

bearing? Which way is better or shorter? Does a longer trail route get to a better attack point? Is a trail faster than through woods and brush? Does it avoid steep climbs?

PACING CHART

DISTANCE -
Pace Counting: Determine your pace (using a pace course).
Then scale distances from the map and use your pace to locate controls.

0   1   2   3

For most adults, one walking pace is close to 5 feet.

10 paces = 50 feet, 20 = 100...

DIRECTION -
Compass Bearings: 3 step method:
A.   Place the edge of the compass on the map so it goes from where you are to where you want to go.

B.   Holding the compass on the map, and ignoring the needle, turn the dial so the lines in the housing line up with the north-south lines on the map.

C. Leaving the setting alone, turn yourself with the compass and map until the red end of the compass needle points to N on the dial (put RED in the SHED). The direction of travel arrow on the compass now points in the direction you want to go.

Name_____ School_____

PQS Study Guide

Lowest point on Map

Seasonal Stream

Reentrant

Hilltop, Highest point on map

Steep Slope

Depression

Saddle

Hilltop

Small Knoll

Reentrant

Spur

Flat Area

Spur

Small Depression
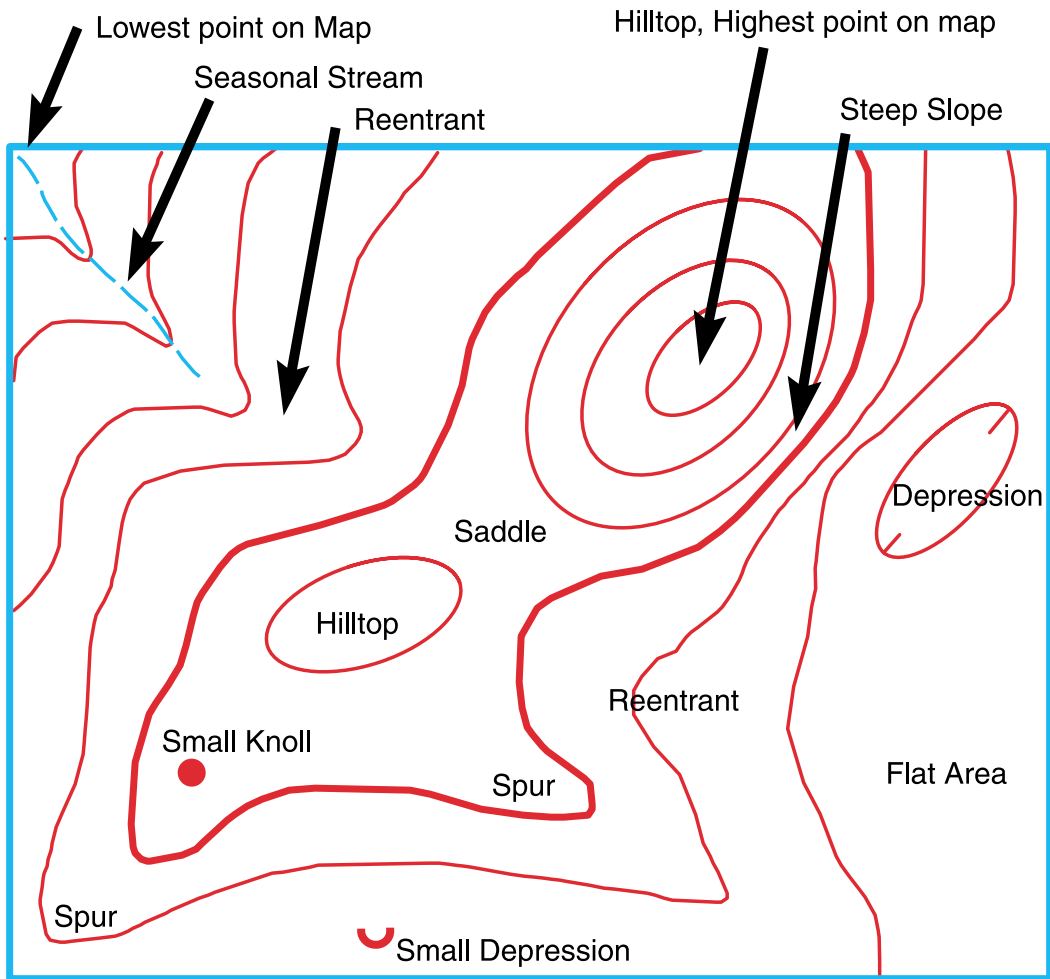
Symbol Test

▰	(black)
⬭	(brown)
▭	(brown and black)
⌇	(blue)
┼	(black)
▫	(black)
∿	(brown)
⊤⊤⊤	(brown)
— —	(black)
⟍	(black)