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ABSTRACT

This orienteering manual is used to teach map and compass skills to elementary school students on an overnight outdoor experience administered by volunteers. Although the experience is aimed at elementary students, student teachers have the opportunity to participate as instructors. After a few words to the volunteers on maximizing learning among the students and a brief history of the Barton Flats School of Orienteering, the guide presents a daily schedule for the overnight event, followed by a few basic definitions concerning orienteering and parts of a compass. Instructions on using a compass and measuring distance by steps are accompanied by group activities and practice exercises. Then participants negotiate a short orienteering course. Worksheets and exercises teach how to read topographic maps, how to determine declination, the difference between map north and compass north, and how to find directions with map and compass. The event culminates in the running of three orienteering races. Includes worksheets and six resources for orienteering. (TD)

Barton Flats
School of Orienteering
presents

Orienteering

Map and Compass

A guide
and
outline
to its
science
and
practice

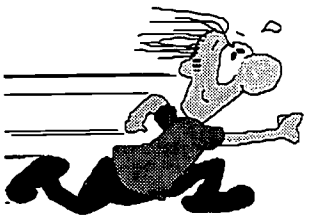
A sport for all ages.

Orienteering

Words for the Volunteers

This Orienteering program has been developed with parents, student teachers, and other adult persons to be volunteers to help in the learning process. Without this support the overnight 'map and compass experience' would not be taking place. Their presence is most valuable for student learning. Here are a few suggestions to maximize learning among the students.

- ↑ Learn with them as needed.
- ↑ Share with them how you remember, calculate or learn something.
- ↑ Ask them to explain to you how they got certain answers.
- ↑ Allow the students to plan, calculate, and execute.
- ↑ Allow the students to take the leadership role in running a course.
- ↓ No snoring during the night or day!



The race belongs not to the swift but to those who run smart.

Orienteering

Map and Compass

A guide and outline to its science and practice

by

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History and Introduction

The Barton Flats School of Orienteering had its beginnings in the early eighties in the "hills and hallows" of southeastern Tennessee. Its purpose then and now remains the same: appreciation of the great out-of-doors through the use of maps and compasses. The School has from its beginning been based and run in conjunction with teacher training programs. While elementary school students have been the principal recipients of the program, teachers in training have an unparalleled opportunity to be a part of the instructional staff; as such, they learn to teach maps and compasses in an interesting manner. In addition, they experience the organization and planning of effective off school site instruction.

Orienteering is an activity that has become a competitive sport or a fun activity. It combines the skill of map and compass reading with physical activity to make it an challenging and demanding. The sport of Orienteering has gain popularity in Europe and as of late in the United States and Canada. There are many Orienteering clubs throughout North America, where individuals learn and compete.

The Barton Flats School of Orienteering relies heavily on the classroom teacher for organization and planning. The program has become a model for schools that want their students to experience this type of outdoor education.

VirLynn Burton, 5th grade teacher at Loma Linda Elementary School in Loma Linda, California, has contributed immeasurable in the organization of the experience, the utilization of parent volunteers and student teachers and in the writing of this manual.

Mel Campbell teaches teachers to teach in the Department of Curriculum and Instruction at La Sierra University in Riverside, California. He bring years of outdoor expertise and teaching to this manual.

The Barton Flats School of Orienteering

Groups

1

2

3

4

5

6

Duties

Group 1

Group 2

Group 3

Group 4

Group 5

Group 6

Daily Schedule

Day 1

9:15	Arrive
9:15-9:30	Luggage to cabins
9:30-9:45	Thoughts for the Day
9:45-10:30	Movie, "What Makes Them Run"
10:30-11:55	Orienteering Instruction
11:55-12:05	Declination Check
12:05-12:45	Lunch and Free Time
12:45-1:45	Service Time
1:45-3:00	Orienteering Instruction
3:00-5:30	Run "Barton Flats" Course
5:30-6:00	Dramatic Presentation
6:00-6:30	Supper
6:30-7:00	Preparation for Evening Progam
7:00-7:30	North Star Declination Check
7:30-9:30	Evening Program and Games
9:30-9:45	Cabin "Bedtime Stories" Stories
9:45	Lights out, sack out

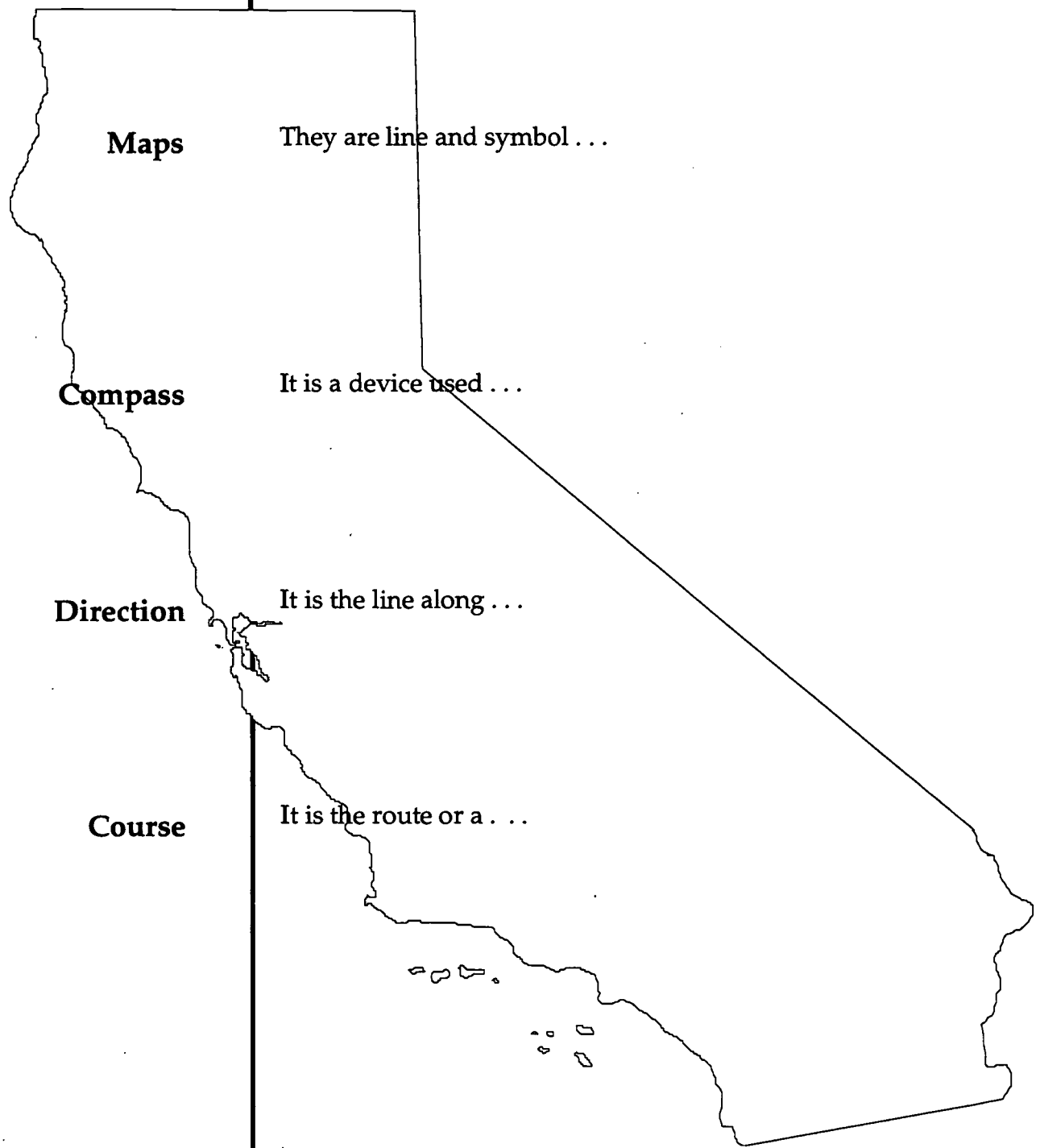
Day 2

7:15	Wake up, get up, wash up, dress up
7:45-8:00	Thoughts for the Day
8:00-8:45	Breakfast and free time
8:45-9:30	"Super" Course instruction and placements
9:30-11:00	Run "Super" Course
11:00-11:30	Debriefing
11:30-12:15	Lunch and picking up markers
12:15-1:00	Clean up, pack up, load up
1:00-2:00	The "Great Dessert" Walk
2:00	Leave

- *Please note there are no bells or whistles.*
- *Bells and whistles are for dogs, not people!*
- *Consult this timetable and your watch to be on time for all activities.*

Basic Definitions

Orienteering It is finding the . . .



Maps They are line and symbol . . .

Compass It is a device used . . .

Direction It is the line along . . .

Course It is the route or a . . .

Parts of a Compass

Place the compass on the sheet below by centering the dial over the dotted circle. Connect a line from the name to the compass part.

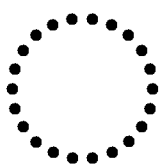
ruler ◆

◆ direction of travel arrow

needle ◆

◆ base

dial ◆



index line ◆

◆ orienteering arrow

Setting the Degrees—Off North

Dial setting.

a. Twist the dial until the number of degrees off north is on the index line.

Right angle to your body.

b. Hold the compass at waist height with a the direction of travel arrow pointing away from you.

Turn slowly.

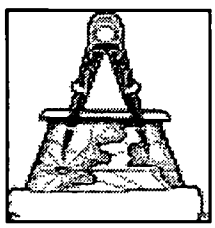
c. Turn your body until the red end of the magnetic needle is over the orienteering arrow.

Almost there.

d. Face in the direction of the arrow is pointing.

Then you would walk toward that object.

e. Look up and record an object in the distance.



Group Activities—Off North

a. Find the direction of 80^0 off north.

Shortcut notation:

80 degrees off north can be written as 80^0 off north.

b. Find the direction of 268^0 off north.

c. Assign another group to find the degrees off north.

Practice—Degrees Off North

- ✎ **Find the degrees off north on the compass.**
- ✎ **Face in that direction.**
- ✎ **Record what you see in the distance with words and sketch.**

a. 60 degrees off north

b. 175 degrees off north

c. 275 degrees off north

Check a partner to see if he or she can find the degrees off north. Write in the space provided, the number of degrees off north for your partner to find. Then check if he or she knows how to find the correct position.

One last check!

Measuring Distance By Steps

Find the number of steps in 100 feet. Walk normally!

Find the number of steps in 100 feet. Count the number of steps and put the number on line 'a'.

a. _____

Walk the 100 feet the second time. (Why would you do it twice?)

Place the number of steps on line 'b'.

b. _____

Now some easy addition.

Add the number of steps on line 'a' and 'b' together and place the answer on line 'c'.

c. _____

Finally divide by two. That is the answer!

Divide the number on line 'c' by 2 and put the answer in the box. This is the number of your steps in 100 feet

Sample Calculation

The first time Paul counted 42 steps in 100 feet.

a. **42**

The second time Paul counted 45 steps in 100 feet.

b. **45**

Add 'a' and 'b' together and place on line 'c'

c. **87**

Divide 'c' by 2.. Round off your answer. This is the number of your steps in 100 feet.

44

From Distance To Steps

Answers

1. The distance between an oak tree and a Chinese elm is 154 feet. Approximately how many of your steps is this?

1. ☐

2. The distance between your front door and the street is 75 feet. Approximately how many of your steps is this?

2. ☐

3. The distance from the cypress tree to the duck pond is 284 feet. Approximately how many of your steps is this?

3. ☐

4. The distance between the door to the tennis court and the picnic table is 385 feet. How many of your steps is this?

4. ☐

Sample Calculations

From home plate to center field wall is 327 feet. How many steps does Mary Lou need to take to get from home base to the center field wall? Mary Lou had previously found that her 52 steps equaled 100 ft?

Steps in 100 feet	X	distance between two sites	÷	100
52	X	327	÷	100 = **170 steps**

Short Course

This short course requires you to go from one site to another using the compass "off north" setting and the number of steps for a certain number of feet. At each site there will be a marker giving the feet and degrees off north to the next marker. Complete the following blanks for each course attempted. The courses are color coded.

The color for the course you are running is _____

1. Go _____ degrees off north.

_____ feet to the next marker number 2.

_____ is the number of steps to take.

2. Go _____ degrees off north.

_____ feet to the next marker number 3.

_____ is the number of steps to take.

3. Go _____ degrees off north.

_____ feet to the next marker number 4.

_____ is the number of steps to take.

4. Go _____ degrees off north.

_____ feet to an unmarked site.

_____ is the number of steps to take.

Then

At this point, mark the end of the course by driving into the ground a nail with a piece of paper with you name on it.

Legend For Topographic Maps

In the boxes provided, sketch what represents the following on a topographic map. Use words if needed.

railroad tracks

ponds and lakes

churches

cemeteries

schools

highways

houses

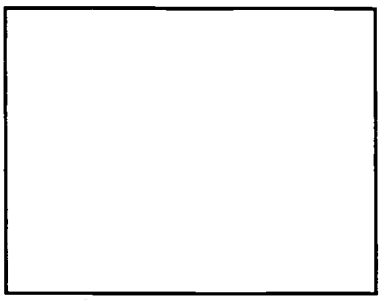
dirt roads

wadable streams

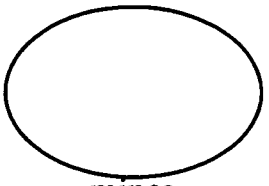
sheds

fields and meadows

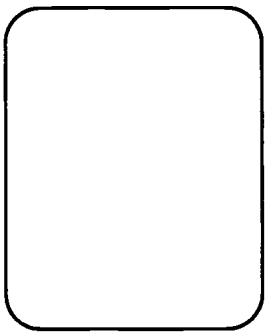
More Legends



drainage system

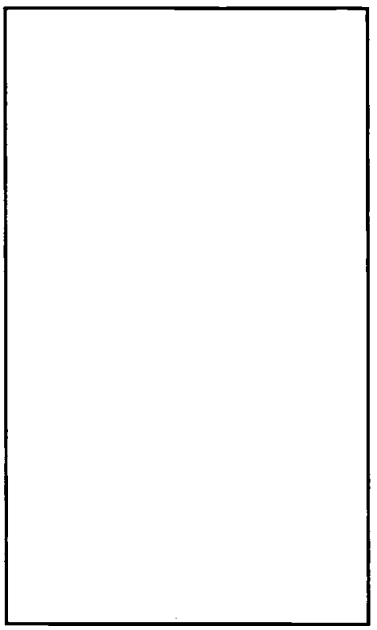


mines

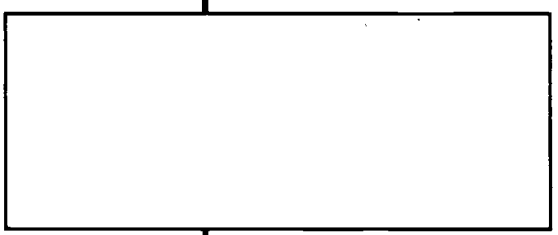


trails

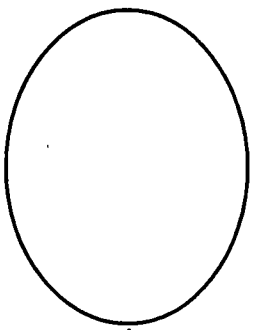
spring



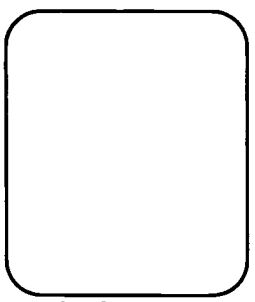
elevations



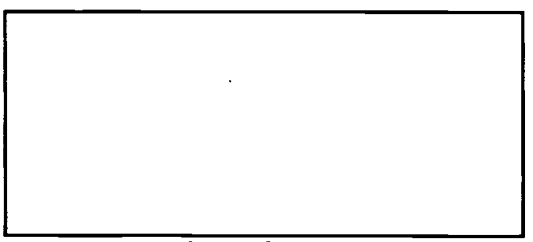
ravine



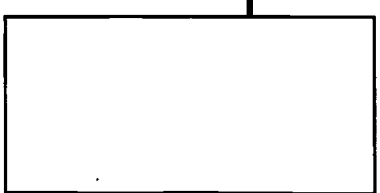
ruins



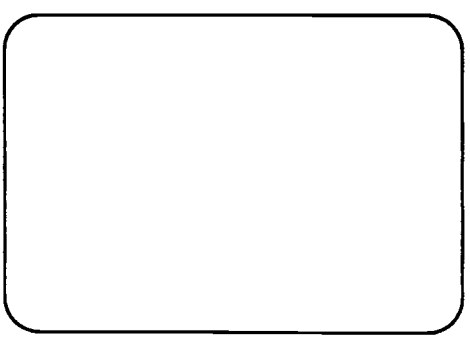
faults



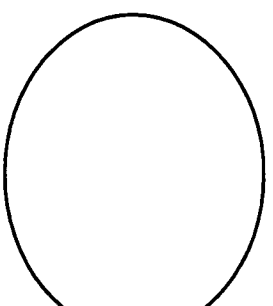
fence lines



pipelines

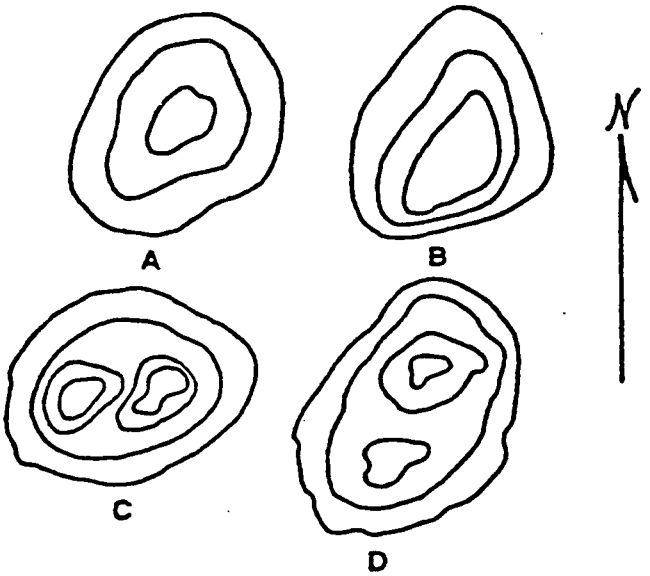


contours lines



power lines

Contour Lines



1. Is a round hill with two summits
2. Has a steep southern side
3. Has gentle uniform slopes
4. Has two summits—the northern one is higher

Letter	Number
A	
B	
C	
D	

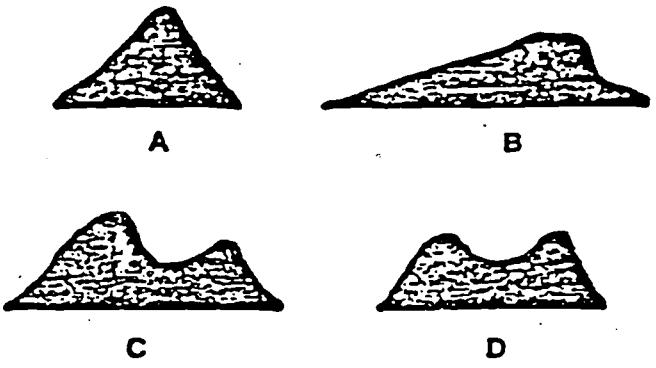
Contour Lines-just what do they mean?

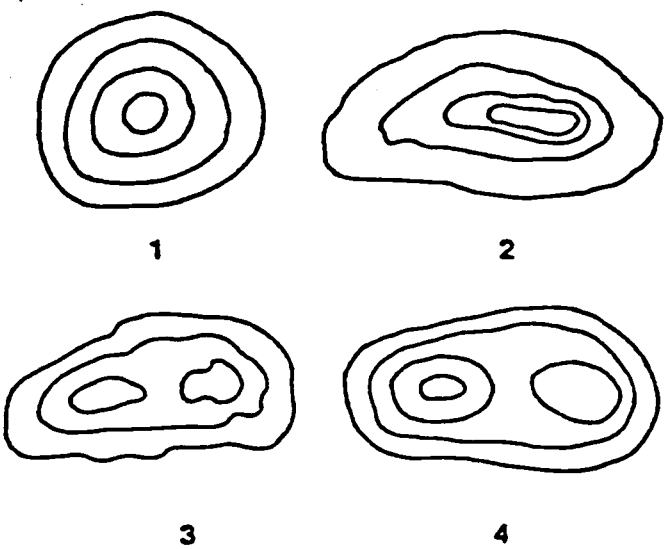
Match the written descriptions and the contour lines.

taken from Larkin and Schoenstein, ***How to Teach Map and Compass Skills,*** *NSTA, Washington, DC*

More on Contour Lines

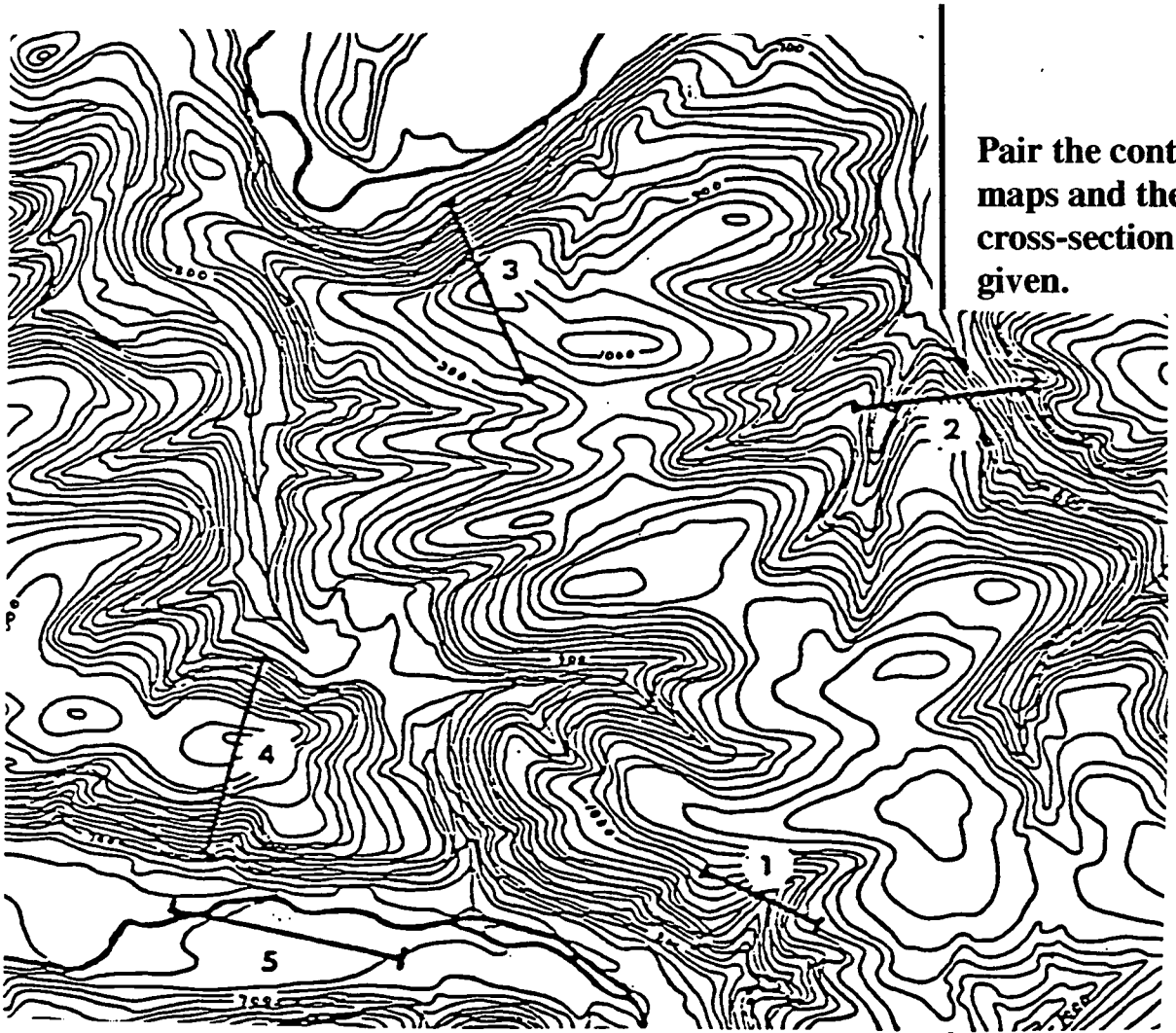
Pair the contour maps and the cross-sections given.





Letter	Number
A	
B	
C	
D	

Still More on Contour Lines



Pair the contour maps and the cross-sections given.

A

B

C

D

E

Letter	A	B	C	D	E
Number					

Declination

—the difference between map north and compass north—

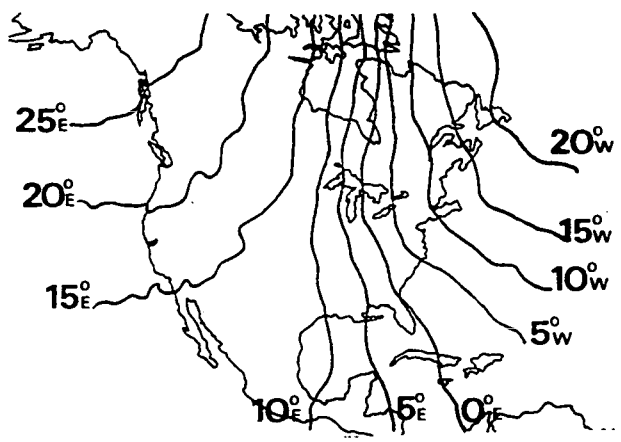
Compass needles do not usually point to the north on a map. Actually, there are two norths; one you get from a map, called grid north, and the other you get from the compass, called magnetic north.

Grid North is the north you observe from a map, up is always north on a map. Maps are made so that up on the map points to the North Pole.

Magnetic North is the north you get from a compass reading. The compass needle is made to point in the direction of the earth's magnetic pole. The earth's magnetic lines of force operate over the entire earth and only in few places do they allow the compass needle to point towards the North Pole. The compass needle points to the Magnetic Pole which is located somewhere just north of the Hudson Bay in Canada. The Magnetic Pole moves with time (about 2 minutes per year!) and is not located at the North Pole.

In the sketch below you will see that there is a line from the Hudson Bay area down through the eastern US, along which the grid north and magnetic north are the same. If we were there we wouldn't have to have declinations corrections! Those west of the line must subtract the declination degrees from the direction degree found from the map. Those east of the line must add the declination degrees from the direction degree found from the map. This correction angle is given in degrees on the legend of the map.

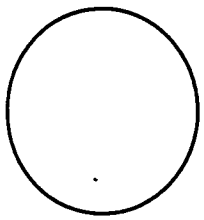
Approximate declinations across North America.



Declination Determination

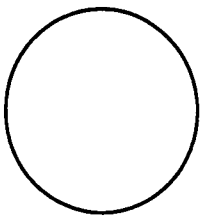
Day Time Determination

- At 12:00 noon, mark on the ground the shadow of a straight tree.
- Place the compass on the shadow line so that the direction of travel arrow is parallel to the shadow line. Hold the compass tightly to the ground and turn the dial until the orienteering arrow is under the north end of the needle. Read the degrees off north. Subtract from 360 degrees.



Night Time Determination

- Locate the north star.
- In your mind drop a perpendicular line to some object on the earth. Hold the compass so that the direction of travel arrow points to that object. Turn the dial until the orienteering arrow is under the north end of the needle. Read the degrees off north. Subtract from 360 degrees.

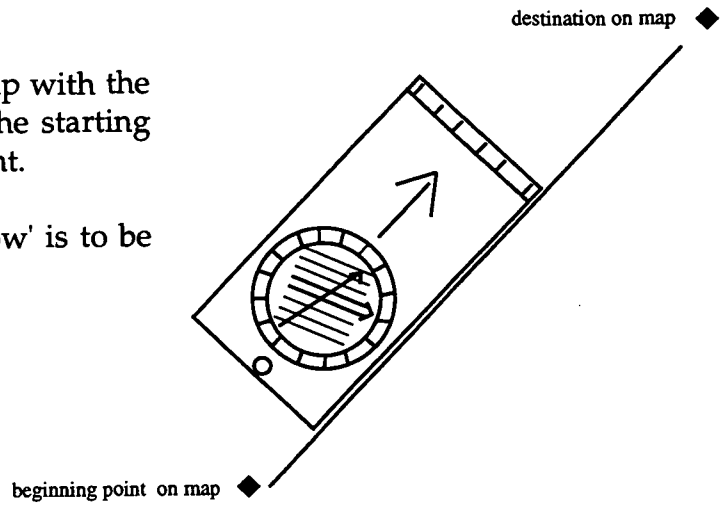


If you don't consider the declination, you may well end up miles and miles from your destination.

Finding Directions with Map and Compass

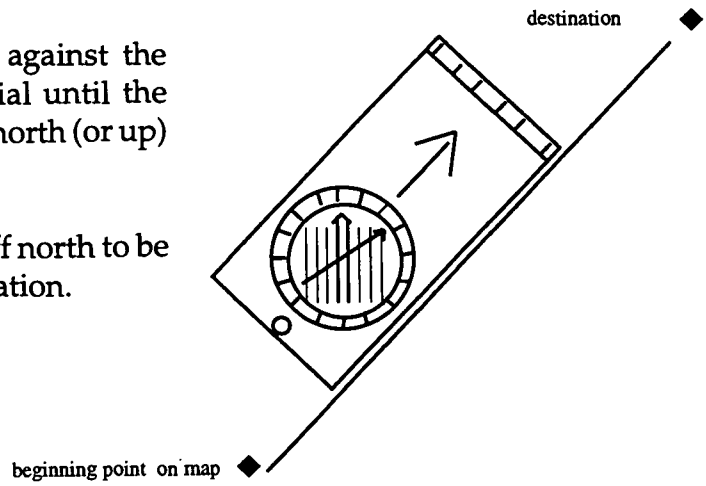
1.

- Place the compass on the map with the baseplate edge connecting the starting location with the ending point.
- The 'direction of travel arrow' is to be pointing to the destination.



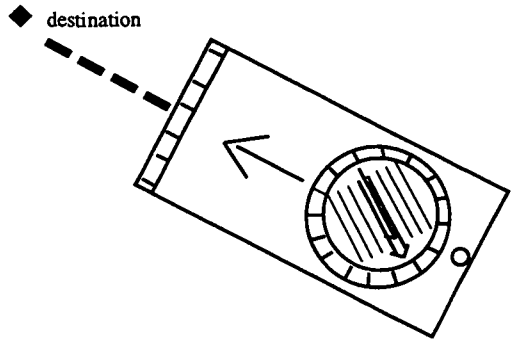
2.

- Press the compass firmly against the map. Turn the compass dial until the 'orienteering arrow' points north (or up) on the map.
- This will give the degrees off north to be traveled to reach the destination.



3.

- Adjust the dial for the declination correction.
- Hold the compass level in front of you with the 'direction of travel arrow' pointing straight ahead.
- Turn your body along with the compass until the red end of the needle is directly over the 'orienteering arrow'.
- The 'direction of travel arrow' now points precisely to your destination.
- Look up, sight on a landmark and walk to it. Repeat this procedure until you reach your destination.



The Great Races

The Barton Flats Course

The object of this course is to find the orienteering markers in the quickest time possible. Each group will be given a topographical map of the area with the locations marked on the map. After adequate time to study the map, the groups will be sent out in 2 minute intervals. The markers can be pursued in any order which the group decides. Record the following information:

time in:

time out:

running time:

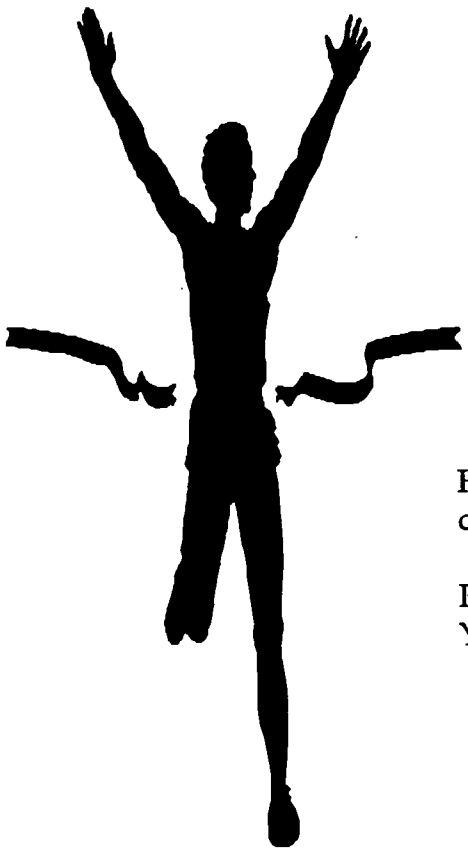
The Super Course

This course involves the setting up of a course by the groups for other groups. Each group will place one flag in the woods. The location of these will be marked on a master topographical map. Each group will copy the position from the master map. This course will be run similar to the Barton Flats Course.

time in:

time out:

running time:



The Great Dessert Walk

Follow your leader and your compass to interesting views and a delicious dessert.

Put up at least one seed on this walk. Put in plastic bag provided. You will need this for future class work.

Resources for Orienteering

United States Geological Survey
PO Box 25286
Denver, CO 802255
suppliers of topographic maps and materials on the teaching of maps

Forestry Suppliers, Inc.
205 West Rankin Street
PO Box 8397
Jackson, MS 39284-8397
provides a wide selection of compasses from all the major manufacturers and books on use of map and compass.

Canadian Orienteering Service
446 McNicoll Avenue
Willowdale, Ontario
publishes a variety of orienteering materials.

Frank Schaffer Publications, Inc.
1028 Via Mirabel
Palos Verdes Estates, CA 90274
publishes classroom material dealing with teaching of map skills.

United States Orienteering Federation
35 W 344 Elmwood Ave
St. Charles, IL 60174
provides information on orienteering clubs in the U.S. and materials to assist in teaching orienteering.

Silva Company
PO Box 1604
Binghamton, NY 13902
supplier of compasses and orienteering materials.

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