

Backpacking Info

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LINES ON TOPO MAPS

...a guide on understanding the meaning of lines on topo maps.

	Color		Boundary
—————	Black	Above ground oil or gas pipeline	
----- -----	Black	Small park, cemetery, airport, etc. Fence or field line Trail Underground oil or gas pipeline Telephone or telegraph line	X
—————	Black (bold line)	National boundary	X
-----	Black	State boundary	X
-----	Black	County, parish, municipal boundary (LONG dash) Inc. city, village, town, hamlet (shorter dash)	X
-----	Black	Civil township, precinct, town, barrio	X
— • — •	Black	Reservation, national or state	X
— • • — • •	Red	Land grant	X
—————	Red (bold line)	Twp or range line (US Land Survey)	
—————	Red	Section line (US Land Survey)	
.....	Red (bold dots)	Township line (not US Land Survey)	
.....	Red	Section line (not US Land Survey)	
-----	Red (bold line)	Twp or range line (approx) (not US Land Survey)	
-----	Red	Section line (approx) (not US Land Survey)	

US LAND SURVEY - An Introduction to Understanding Markings on Topo Maps

The United States is divided by north-south and East-West lines to form Townships six miles square (six miles on each side). These Townships are further divided into 36 sections, each containing (as nearly as possible) 640 acres. Parts of Canada have a similar subdivision.

In the lower 48 states, there are 31 “Initial Points” for land survey, representing the intersection of an east-west “Base Line” with a north-south “Principal Meridian”. Every 24 miles north and south of the Base Line, there are “Standard Parallels”; e.g., First Standard Parallel North, etc. Approximately every 24 miles east and west of the Principal Meridian, there are “Guide Meridians”; e.g., First Guide Meridian East, etc. Due to the curvature of the earth, these Guide Meridians tend to converge as they get closer to the north pole. At the Base Line and at each Standard Parallel, these Guide Meridians jog (or are offset) a bit to the east or west in order to maintain approximately the same area for subdivisions.

Each of the following blocks represents one township. The Base Line is between T1N and T1S. (The I5-H14 junction is in a townships designated as: (T3N,R16W,SBBM), (T=Township; R=Range; SBBM is the initial point of the survey).

Principal Meridian		First Guide Meridian East				
	T5N					First Standard Parallel North
	T4N					
	T3N					
	T2N					
R1W	T1N/R3W	R2E	R2W		R3E	Base Line
	T1S					
	T2S					

Townships are divided into 36 sections; approximately one mile square, and numbered as shown below. The grid below represents 3 townships wide and 2 high. The I5-H14 junction is in section 24,T3N,R16W.

6	5	4	3	2	1	6	5	4	3	2	1	6	5	4	3	2	1
7	8	9	10	11	12	7	8	9	10	11	12	7	8	9	10	11	12
18	17	16	15	14	13	18	17	16	15	14	13	18	17	16	15	14	13
19	20	21	22	23	24	19	20	21	22	23	24	19	20	21	22	23	24
30	29	28	27	26	25	30	29	28	27	26	25	30	29	28	27	26	25
31	32	33	34	35	36	31	32	33	34	35	36	31	32	33	34	35	36
6	5	4	3	2	1	6	5	4	3	2	1	6	5	4	3	2	1
7	8	9	10	11	12	7	8	9	10	11	12	7	8	9	10	11	12
18	17	16	15	14	13	18	17	16	15	14	13	18	17	16	15	14	13
19	20	21	22	23	24	19	20	21	22	23	24	19	20	21	22	23	24
30	29	28	27	26	25	30	29	28	27	26	25	30	29	28	27	26	25
31	32	33	34	35	36	31	32	33	34	35	36	31	32	33	34	35	36

Section subdivisions are designated as shown at the right: (e.g., read the center top block as W 1/2 of the NE 1/4).

A more complete designation is: W 1/2 NE 1/4, section 24, T3N, R16W, SBBM.

This is read as West 1/2 of the NE 1/4 of section 24, Township 3 North, Range 16 West, SBBM Initial Point.

NW 1/4 (160 acres)		W 1/2 NE 1/4 (80 acres)	E 1/2 E 1/2 (160 acres)
NW 1/4 SW1/4 (40 acres)	NE 1/4 SW 1/4 (40 acres)	NW 1/4 SE1/4 (40 acres)	
S 1/2 SW 1/4 (80 acres)		SW 1/4 SE1/4 (40 acres)	

WATER PURIFICATION INFO

All water obtained in the wilderness should be considered contaminated and should be treated. Before treatment, strain through a clear cloth (e.g., T-shirt) to remove large

particles. **Summary:** The surest ways to treat water: either (1) boil or (2) treat with iodine, then use a 0.2 micron filter.

NOTE: All the following information is based on listed references and assumes a healthy immune system.

TABLE I - METHODS

Boiling	Kills all pathogens at approx 180°F	Below 6000', vigorous boil for 1 min; above 6000', for 3 min. Above 14,000', need pressure cooker (as water boils at less than 180°F)	After boiling, add a pinch of salt – or aerate to improve taste. (Time is safe estimate - All parts of water need to get to 180°F.)
Iodine	Kills everything except cryptosporidium (& (possibly cyclospora)	Cryptosporidium appears to be very uncommon; therefore, iodine, by itself, may be adequate most of the time. Remember to treat cap and threads as well as canteen.	Do not use iodine if: allergic, pregnant, thyroid disease. Otherwise, use for several months is considered reasonably safe.
Filter (0.2 micron)	Removes everything except viruses	Filters do not remove viruses (including hepatitis)!	

TABLE II - PROCESS

PUR Explorer filter	Allegedly removes or kills all pathogens	(uses iodine)	
Iodine crystals - 4 to 8 gm USP grade resublimed Iodine crystals (covered with water) in a one oz leak proof medicine bottle	Nearly fill the one oz bottle with water; shake vigorously for 1 min to get saturated solution; let settle. Temp of this solution determines amount of iodine it holds. Qty at right is amount to obtain proper 4 parts per million concentration in one qt of water.	Qty (cc) 10 12 13 16 20	Temp °C / °F 40 / 104 30 / 86 20 / 68 10 / 50 3 / 37
		Time (min) 15 15 15 30 40	Temperature of untreated water determines contact time after solution is decanted into untreated water. Solution listed will treat approximately 1000 quarts before crystals are all dissolved. (Ref #4) CAUTION: Iodine crystals are poisonous!
Iodine solution	2% tincture	5 drops/qt clear water (10 if cloudy)	
Tetraglycine hydroperiodide tablets - easiest & most effective	One tablet/qt clear water (two if discolored). After tablet dissolves, shake, then allow solution to contact threads of cap. Wait 10 min (20 or 30 min if below 40°F)	AFTER treatment, a tablet of vitamin C gets rid of iodine taste. Any supplements should be added only after the purification has been completed.	Discard unopened bottle after 4 yr; opened bottle after 1 yr. Immediately recap container tightly. Use tablets immediately after removing from bottle as air deactivates. Store in refrigerator.
Halazone (chlorine) tablets	Two tablets/qt clear water (4 if cloudy); wait 30 min)		– not as effective as iodine

TABLE III - MISC

Cryptosporidium (protozoan micro-organism)	Causes transient diarrhea	Boiling kills; iodine & chlorine do not kill cyst. Cyst small enough to pass thru municipal water supply.
Giardia lamblia (protozoan micro-organism)	Giardiasis may cause explosive, watery, foul-smelling bowel movements, lack of appetite, nausea, gas, abdominal bloating, chills & vomiting; bulky but bloodless stools	Treatment: See your doctor, who may recommend - atabrine (100 mg 3x/day for 5-10 days), flagyl (avoid alcohol - 2 gm single dose for 3 days or 750 mg 3x/day for 5 days or 250 mg 3x/day for 5-10 days), or furoxone

Filters to use: Reverse osmosis filters or Membrane filters (less than one micron; 0.2 preferred – PUR Explorer, Katadyn)

3. Filters that meet NSF standard 53 for cyst removal (call 1-800-673-8010 to check on make & model of your filter)

If filter does not use iodine, treat filtered water with iodine to kill viruses. The PUR Explorer is advertised to use iodine and to kill all pathogens. However, if water is cold, additional treatment with iodine may be necessary, especially in high-risk areas.

Filters are expensive, bulky, weigh one pound (or more), & require proper maintenance. If dropped, ceramic

elements can crack & become ineffective. If manufacturer (e.g., First Need) provides test kit, test filter periodically.

References:

1. Mountain Medicine, Darvill, 14th ed, 1998, pp 66-74
2. Wilderness Medicine, Auerbach, 3rd ed, pp 1092-1109
3. Backpacker magazine, March 1997, Liquid Assets
4. Off Belay, June 1977, pp 23-24, based on Western Journal of Medicine, May 197?, 122-5, "Water Disinfection in the Wilderness" Drs. K??? & Visscher (??? Indicates can't read copy)

SNOW CAMP CLOTHING USAGE HANDOUT

Ten Essentials: <u>Extra Clothing</u> , <u>Extra Food</u> and <u>Water</u> , <u>Fire Starter</u> , <u>First Aid Kit</u> , <u>Flashlight</u> (extra batt/bulb), <u>Map</u> and <u>Compass</u> , <u>Matches</u> (waterproof), <u>Pocketknife</u> , <u>Sunglasses</u> (extra)	Wear Friday Night (when you get off bus)	In Pack	Wear Inside Sleeping Bag Fri Nite	Sat Morning (fixing breakfast)	Sat (hiking)	In Day Pack (while hiking Sat or Sun)	Sat (fixing dinner)	Wear Inside Sleeping Bag Sat Nite	Sat Morning (fixing breakfast)	Sun (hiking)
Ten Essentials		X				X				
Sunglasses (#2 is spare)		#1, #2			#1	#2				#1
Sunscreen, Lip Protection, Toilet Paper		X				X				
Light Weight Camera (in plastic bag)		Optional				Optional				
Day Pack		X				Use				
Ski Pole	Carry	Attachable			Carry	Attachable				Carry
Shovel		Attached				Attached				
Snowshoes		Attached				Attached				
Balaclava	X		Maybe	X		X	X	Maybe	X	
Hat with Brim		X			X					X
Ear Muffs (head band-for use with hat)		X				X-Note 1				
2 Polypro Shirts (lite or mid-weight)	#1	#2	#1	#1	#1		#2	#2	#2	#2
Wool (button) shirt	X		Maybe	X	X		X	Maybe	X	X
Sweater or Expedition wt polypro		X-Spare				X-Spare				
Warm Jacket or coat		X-Note 1	(pillow)	X			X		X	
Rain Jacket		X-Note 2		Maybe		X-Note 2	Maybe		Maybe	
Rain Pants		X-Note 2		Maybe		X-Note 2	Maybe		Maybe	
Gaiters	X				X		Maybe			X
2 Undershorts	#1	#2	#1	#1	#1		#2	#2	#2	#2
Long Underwear bottoms	X		Maybe	X		X-Note 1	X	Maybe	X	
Nylon Outer Pants	X			X	X		X		X	X
2 Inner polypro socks	#1	#2	Maybe	#1	#1		#1	Maybe	#1	#1
2 Outer wool socks	#1	#2	Maybe	#1	#1	X	#1	Maybe	#1	#1
Optional Booties (down or synthetic)				X			X		X	
Hiking Boots	X			X	X		X		X	X
Lt wt wool gloves	X			X	X		X		X	X
Heavy wt wool mittens		X-Note 1				X-Note 1				
Waterproof overmittens		X-Note 1				X-Note 1				
2 Handkerchief	#1	#2			#1					X
Toothbrush/paste,small towel		X								
Sml Foam Pad to Stand or Sit On		X		X		X	X		X	
2 Plastic bag to cover backpack (+spare)		#1, #2	(over pack)		(over pack)			(over pack)		(over pack)
2 Plastic bags for boots inside sleeping bag		X								
Plastic bag for inside day pack		X				X				
Food		X		Breakfast		Lunch/Snacks	Dinner		Breakfast	
Water - 2 quarts		X				X				
Extra canteen for water storage		X								
Sleeping Bag		X	Use					Use		
Foam Pad (for under sleeping bag)		X	Use					Use		
Ground Cloth (for under tent or foam pad)		X	Use					Use		
Tent		X						Use		
Stove, pot, handle, utensils		X		Maybe			Use		Use	
Paper towels &lastic garbage bag				Maybe			Use		Use	

SUMMER OUTING CLOTHING LIST

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TRANSITION TO SUMMER / PACK WEIGHT REDUCTION

- In summer, leave the heavy-weight winter gear (snow shoes, shovel, ski pole, down parka, down booties) at home. Substitute summer items: water filter, insect repellent, mosquito net hat, cord & bag for hanging food. Modify list to suit your personal needs.
 - Switch from winter- to summer-weight sleeping bag, tent, foam pad.
 - Avoid the temptation to take multiple backups. Just make sure you have what you need - and provide adequate protection to avoid damage. (Plastic bags do not weigh much.)
 - Take a light-weight camera unless you are sure you will need a heavier SLR.
 - Coated-nylon rain jacket and pants probably weigh half that of equivalent Gore-tex items (14 oz savings).
 - With a lighter pack, you will enjoy outings more - and will be able to hike further with less energy expended.
- # = skip to save another 2 lb.

Item	Snow Camp Weight lb/oz	Saving if Tent, Stove, etc. are Shared	Weight for Weekend Summer Backpack
(with Snow Camp Subtotals)			
Wear (10 lb 1.3 oz)			
Cap, insulated	3.7		3.7
Sunglasses (without case)	1.1		1.1
Rain jacket, Goretex	14.0		14.0
Polypro shirt lightweight	7.0		7.0
Wool shirt	11.4		11.4
Wool gloves (or equiv)	1.8		1.8
Handkerchief	0.5		0.5
Under shorts	2.5		2.5
Pants, nylon pants	8.0		8.0
Pants alternate: Lt wt long under-wear (6 oz)+ Nylon running shorts (3 oz)			
Wallet & Keys	8.5		8.5
Gaiters, waterproof	9.0		9.0
Inner socks	1.8		1.8
Wool socks	3.0		3.0
Mountaineering boots, snow sealed	89.0		89.0
Weight (Wear) (oz)	161.3		161.3
Weight (Wear) (lb)	10.1	0.0	10.1

Item	Snow Camp Weight lb/oz	Saving if Tent, Stove, etc. are Shared	Weight for Weekend Summer Backpack
(with Snow Camp Subtotals)			
Clothing in Pack (6 lb 4.2 oz)			
Hat with wide brim	2.9		2.9
Balaclava (Capilene)	1.9		
Hat, mosquito net			0.7
Sunglasses (extra) in case	3.1		3.1
Down parka	31.0		
Polypro top expedition weight	10.4		10.4
Polypro shirt (spare) lightweight	6.5		6.5
Handkerchief (extra)	0.5		0.5
Overmittens, waterproof	3.3		3.3
# Wool mittens (Dachstein or equiv)	4.5		4.5
Rain pants, Goretex	14.0		14.0
Long underwear bottoms polypro midweight	7.8		
Wool socks (spare)	4.5		4.5
Inner socks (spare)	1.8		1.8
Booties down	8.0		
Camp (10 lb 12.2 oz)			
Groundcloth	5.8	2.9	5.8
Tent	51.6	25.8	51.6
Tent Poles	8.4	4.2	8.4
Tent Stakes	8.0	4.0	4.0
Sleeping bag	59.4		36.0
Sleeping bag compression bag	4.1		4.1
Sleeping bag plastic bag	0.5		0.5
Foam pad 28" wide with strap	20.0		7.0
Foam sit pad (old ensolite)	2.2		
Headlamp + extra bulb	5.1		5.1
Travel (13 lb 14.8 oz)			
Backpack	65.0		65.0
Cover for pack	4.0		4.0
Daypack	19.0		19.0
Shovel	45.0		
Ski pole (1)	7.5		
Snow shoes (small size)	62.0		
# Camera Bag	4.0		4.0
# Camera with film	9.0		9.0
# Camera - Film extra roll	1.0		1.0
Maps (in Ziploc bags)	2.3		2.3
First aid kit (1 lb 7 oz)			
Batteries (extra)	2.0		2.0
Candle or fire starter	1.0		1.0
Face mask (Goretex)	0.6		
Nail clipper	0.7		0.7
Scissors, folding	1.3		1.3
First aid supplies	17.4		17.4

TRANSITION TO SUMMER / PACK WEIGHT REDUCTION

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	Item	Snow Camp Weight lb/oz	Saving if Tent, Stove, etc. are Shared	Weight for Weekend Summer Backpack
	(with Snow Camp Subtotals)			
	Belt pack (11.4 oz)	2.7		2.7
	Compass	1.0		1.0
	Chapstick	0.3		0.3
#	Altimeter			6.0
	Moleskin	1.0		1.0
	Sunscreen	3.0		3.0
	Insect Repellent			1.7
#	Whistle	0.1		0.1
	Pocket knife	3.0		3.0
#	Comb	0.3		0.3
	Food snacks (see Food)			
	Accessories (1 lb)			
	Pack, light weight to hang food			2.9
	Cord/rope to hang food			5.0
	Carabiner to hang food			1.7
#	Carabiner to hang food			1.7
	Paper towels	1.4		1.4
	Plastic bags misc	4.0		4.0
	Straps, 2 dark blue	1.0		1.0
	Straps, 2 lt blue extra	1.0		1.0
	Straps, 2 yellow	1.5		1.5
	Pack towel	1.7		1.7
	Wash cloth	1.2		1.2
	Toothbrush/paste	3.0		3.0
	Toilet paper	1.2		1.2
	Cooking (3 lb 2.7 oz)			
	Stove pouch	1.2	0.6	1.2
	Stove	10.5	9.5	10.5
	Stove wind screen	2.0	1.0	2.0
	Stove reflector	0.8	0.4	0.8
#	Stove bag - pot handle	1.4	0.7	1.4
	Stove bag - base	3.0	1.5	
	Stove bag - Matches	0.6	0.3	0.6
	Cardboard base for stove	2.8	1.4	
	Fuel can Isobutane	10.0	5.0	10.0
	Fuel can Isobutane	10.0	5.0	
	Pot for cooking	8.0	4.0	8.0
	Waterproof matches	0.4	0.2	0.4
	Eating - Eqpt (10.9 oz)			
	Bowl	2.9		2.9
	Cup	2.6		2.6
	Utensils misc	1.0		1.0
	Container, sandwich	2.2		2.2
	Container, sandwich	2.2		2.2

	Item	Snow Camp Weight lb/oz	Saving if Tent, Stove, etc. are Shared	Weight for Weekend Summer Backpack
	(with Snow Camp Subtotals)			
	Food (2 lb 3 oz)			
	Snack: Beef, dried	1.5		1.5
	Snack: Carrots, bag	3.3		3.3
	Snack: Peanuts, bag	1.2		1.2
	Snack: Fruit, dried	2.0		2.0
	Snack Sat: Granola bar	1.1		1.1
	Snack Sun: Granola bar	1.1		1.1
	Extra: Fruit, dried	2.0		2.0
	Extra: Sandwich (peanut butter & honey)	2.8		2.8
	Extra: Granola bar	1.1		1.1
	Extra: Muffin, small bran	1.0		1.0
	Lunch Sat: Sandwich	2.8		2.8
	Lunch Sun: Sandwich (peanut butter & honey)	2.8		2.8
	Sat eve: Cup of Noodles	3.0		3.0
	Sat eve: Sandwich	2.8		2.8
	Sun breakfast: Muffin, small bran	1.0		1.0
	Sun breakfast: Oatmeal packet	1.6		1.6
	Sun breakfast: Raisins	0.6		0.6
	Sat/Sun: Coffee in plastic bag	0.4		0.4
	Water (6 lb 8.8 oz)			
	Canteen, empty	4.0		4.0
#	Canteen, empty	4.0		4.0
	Canteen + qt water	39.0		39.0
	Canteen + qt water	39.0		39.0
	Gatorade packet (Sat)	2.2		2.2
	Gatorade packet (Sun)	2.2		2.2
	Filter, water (First Need)			21.0
	Belt bag, insulated flap top	4.0		
	Belt bag, insulated open top	2.5		
	Belt bag, insulated zip top	3.5		
	Belt to hold belt bags	2.2		2.2
	Belt bag, regular (1.5 oz)			1.5
	Belt bag, regular (1.5 oz)			1.5
	Pack weight (oz)	730.8	66.5	542.3
	Pack weight (lb)	45.7	4.2	33.9
	Sat breakfast (8.2 oz)			
	Banana	5.0		5.0
	Muffin, small bran	1.0		1.0
	Oatmeal packet	1.6		1.6
	Raisins	0.6		0.6
	Possible heavy weight pack add-ons			
	Apple or orange	6.0		6.0
	Space blanket, aluminized	2.4		2.4
	Gaiter, neck (for COLD weather)	2.0		
	Can of beer or cold drink	13.5		13.5
	Straps, bungee	6.0		6.0

DISTANCE SCALE ON TOPO MAP (in Arkansas)

7-1/2 Minute Topo Maps (1 : 24,000 scale)

One inch on the map represents 24,000 inches on the ground.

24,000 inches / 12 in/ft = 2000 feet; therefore,

One inch on the map represents 2000 feet on the ground.

2000 feet / 5280 ft/mi = 0.38 mile; therefore,

One inch on the map represents approximately 0.4 mile on the ground.

One mile on the ground equals approximately 2.5 inches on the map.

1/10 (0.1) mile on the ground equals approximately 0.25 inch on the map.

TIME CALCULATIONS

Hiking on a good trail with a light pack:

$T \text{ (hours)} = 1/3 D \text{ (miles)} + 1/2 H \text{ (elevation gain in thousands of feet)}$

At 3 miles an hour, you travel 1 mile in 20 minutes or 0.1 mile (approx. 500 feet) in 2 minutes.

It will take 2 minutes to walk between two objects 0.25" apart on the map.

Example: A hike of 6 miles with 2000' of gain and 1000' of loss will take:

$(6 \text{ miles} / 3 \text{ mi/hr}) + (2000 \text{ feet} / 2000 \text{ ft/hr}) = 3 \text{ hr}$ (Disregard elevation loss.)

Backpacker's Rule

$T \text{ (hours)} = 1/2 D \text{ (miles)} + H \text{ (elevation gain in thousands of feet)}$

Example: A hike of 6 miles with 2000' of gain and 1000' of loss will take:

$(6 \text{ miles} / 2 \text{ mi/hr}) + (2000 \text{ feet} / 1000 \text{ ft/hr}) = 5 \text{ hr}$ (Disregard elevation loss.)