Field Gear and SOPs

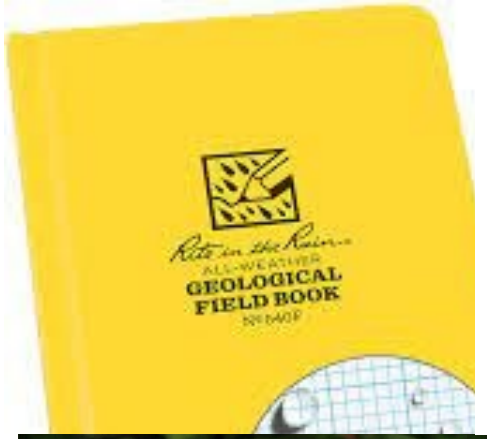
Read chapter one and two of textbook by Friday to back up the first two weeks of class.

Field Gear

- Determined by field site conditions
  - Safety?
  - Geology?
  - Distance to be traveled and mode of transportation?
  - Team/partners?
- Job requirements / what are you trying to accomplish?
  - Surficial?
  - Bedrock?
  - Structure?
- Cost? Time? Scale?

Common field essentials

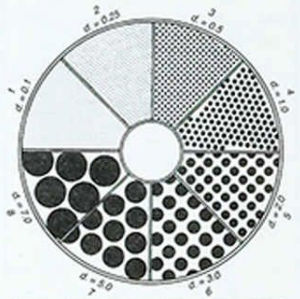
- Field book/journal
  - Hardcover
  - Water resistant / Proof
  - Lines and grids
- Writing/drawing tools
  - Pencils – old school is better
  - Colored pencils
  - Sharpening/erasing
  - Sharpies (normal and thin)



Graph for Determining the Size of Sedimentary Particles

G. V. Chilingar - AAPG Bulletin

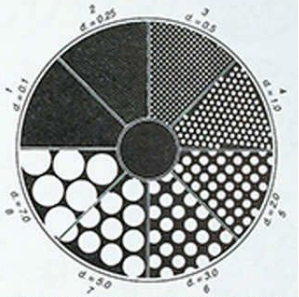
DARK PARTICLES



Place sand grains or rock particles in the central part of the circle. Compare the size of the particles with those on the graph with the aid of a magnifying glass. Record the corresponding number (1, 2, 3, 4, 5, 6, 7, 8) in notebook. For samples with particles of varying sizes, record the most common size first.

Graph for Determining the Size of Sedimentary Particles
G. V. Chilingar - AAPG Bulletin

LIGHT PARTICLES



References: G. V. Chilingar, - AAPG Bulletin, Vol. 40, No. 7, AAPGD 1956, reprinted by permission of the American Association of Petroleum Geologists whose permission is required for future use.

Approximate Volume of Water in Casing or Hole

Diameter of Casing or Hole (in.)	Gallons Per Foot of Depth	Cubic Feet Per Foot of Depth	Liters Per Meter of Depth	Cubic Meters Per Meter of Depth
1	0.041	0.0055	0.509	0.509 x 10^{-3}
1½	0.092	0.0123	1.142	1.142 x 10^{-3}
2	0.163	0.0218	2.204	2.024 x 10^{-3}
2½	0.255	0.0341	3.167	3.167 x 10^{-3}
3	0.367	0.0491	4.558	4.558 x 10^{-3}
3½	0.500	0.0668	6.209	6.209 x 10^{-3}
4	0.653	0.0873	8.110	8.110 x 10^{-3}
4½	0.826	0.1104	10.26	10.26 x 10^{-3}
5	1.020	0.1354	12.67	12.67 x 10^{-3}
5½	1.234	0.1650	15.33	15.33 x 10^{-3}
6	1.469	0.1963	18.24	18.24 x 10^{-3}
7	2.000	0.2673	24.84	24.84 x 10^{-3}
8	2.611	0.3491	32.43	32.43 x 10^{-3}
9	3.305	0.4418	41.04	41.04 x 10^{-3}
10	4.080	0.5454	50.67	50.67 x 10^{-3}
11	4.937	0.6600	61.31	61.31 x 10^{-3}
12	5.875	0.7854	72.96	72.96 x 10^{-3}
14	8.000	1.069	99.33	99.35 x 10^{-3}
16	10.44	1.396	129.65	129.65 x 10^{-3}
18	13.22	1.767	164.18	164.18 x 10^{-3}
20	16.32	2.182	202.68	202.68 x 10^{-3}
22	19.75	2.640	245.28	245.28 x 10^{-3}
24	23.50	3.142	291.85	291.85 x 10^{-3}
26	27.58	3.687	342.52	342.52 x 10^{-3}
28	32.00	4.276	397.41	397.41 x 10^{-3}
30	36.72	4.909	456.02	456.02 x 10^{-3}
32	41.78	5.585	518.87	518.87 x 10^{-3}
34	47.16	6.305	585.68	585.68 x 10^{-3}
36	52.88	7.069	656.72	656.72 x 10^{-3}

1 Gallon water weights 8.33 lbs. = 3.785 Kg
1 Liter water weights 1 Kg = 2.205 lbs
1 Gallon per foot of depth = 12.419 liters per meter of depth
1 Gallon per foot of depth = 12.419 x 10^{-3} cu M per M of depth

$V = \pi R^2 H$ (Volume of a Cylinder)

standing water = (depth to water) - (depth of well)
water column = (water level) - (water depth)
water column vol (Gal) = (water column)
x (casing diameter factor)

Permanent Monitoring Well

Source: Nielsen Environmental Field School, Galena, OH

Schedule 40 PVC Pipe

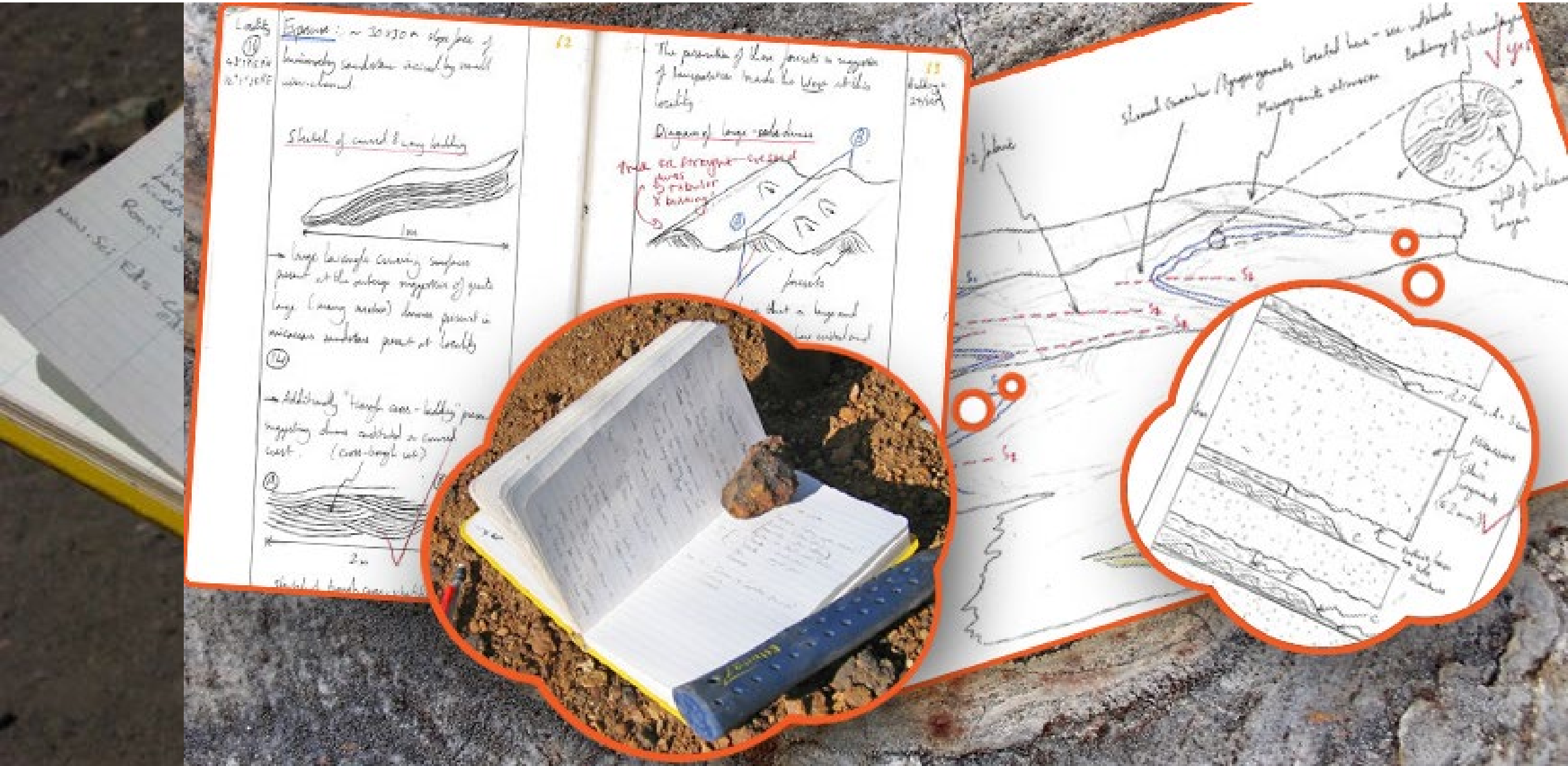
Nominal size	Max PSI at 74° F	OD	ID	Nominal Wall	Nominal Weight per 100
1/2"	600	0.840"		0.109"	16.2Lbs
3/4"	480	1.050"	0.824"	0.113"	21.5Lbs
1"	450	1.315"	1.049"	0.133"	32.0Lbs
1 1/4"	370	1.660"	1.380"	0.140"	43.4Lbs
1 1/2"	330	1.900"	1.610"	0.145"	51.9Lbs
2"	280	2.375"	2.067"	0.154"	69.8Lbs
2 1/2"	300	2.875"	2.469"	0.203"	111.0Lbs
3"	260	3.500"	3.068"	0.216"	145.0Lbs
4"	220	4.500"	4.026"	0.237"	206.9Lbs
5"	n/a	5.563"	5.047"	0.258"	277.0Lbs
6"	180	6.625"	6.065"	0.280"	363.0Lbs
8"	160	8.625"	7.961"	0.332"	563.0Lbs
10"	140	10.750"	10.020"	0.365"	775.0Lbs
12"	130	12.750"	11.938"	0.406"	1030.0Lbs

Schedule 80 PVC Pipe

Nominal Size	Max PSI at 74°	OD	ID	Nominal Wall	Nominal Weight per 100
1/2"	850	0.840"	0.546"	0.147"	20.6Lbs
3/4"	690	1.050"	0.742"	0.154"	28.0Lbs
1"	630	1.315"	0.957"	0.179"	41.3Lbs
1 1/4"	520	1.660"	1.278"	0.191"	57.1Lbs
1 1/2"	470	1.900"	1.500"	0.200"	69.2Lbs
2"	400	2.375"	1.939"	0.218"	95.8Lbs
2 1/2"	420	2.875"	2.323"	0.276"	146.0Lbs
3"	370	3.500"	2.900"	0.300"	196.0Lbs
4"	320	4.500"	3.826"	0.337"	286.0Lbs
5"	n/a	5.563"	4.768"	0.375"	392.0Lbs
6"	280	6.625"	5.761"	0.432"	546.0Lbs
8"	245	8.625"	7.625"	0.500"	830.0Lbs
10"	230	10.750"	9.564"	0.593"	1230.0Lbs
12"	230	12.750"	11.376"	0.687"	1690.0Lbs

Field notes

Beyond data are legally binding



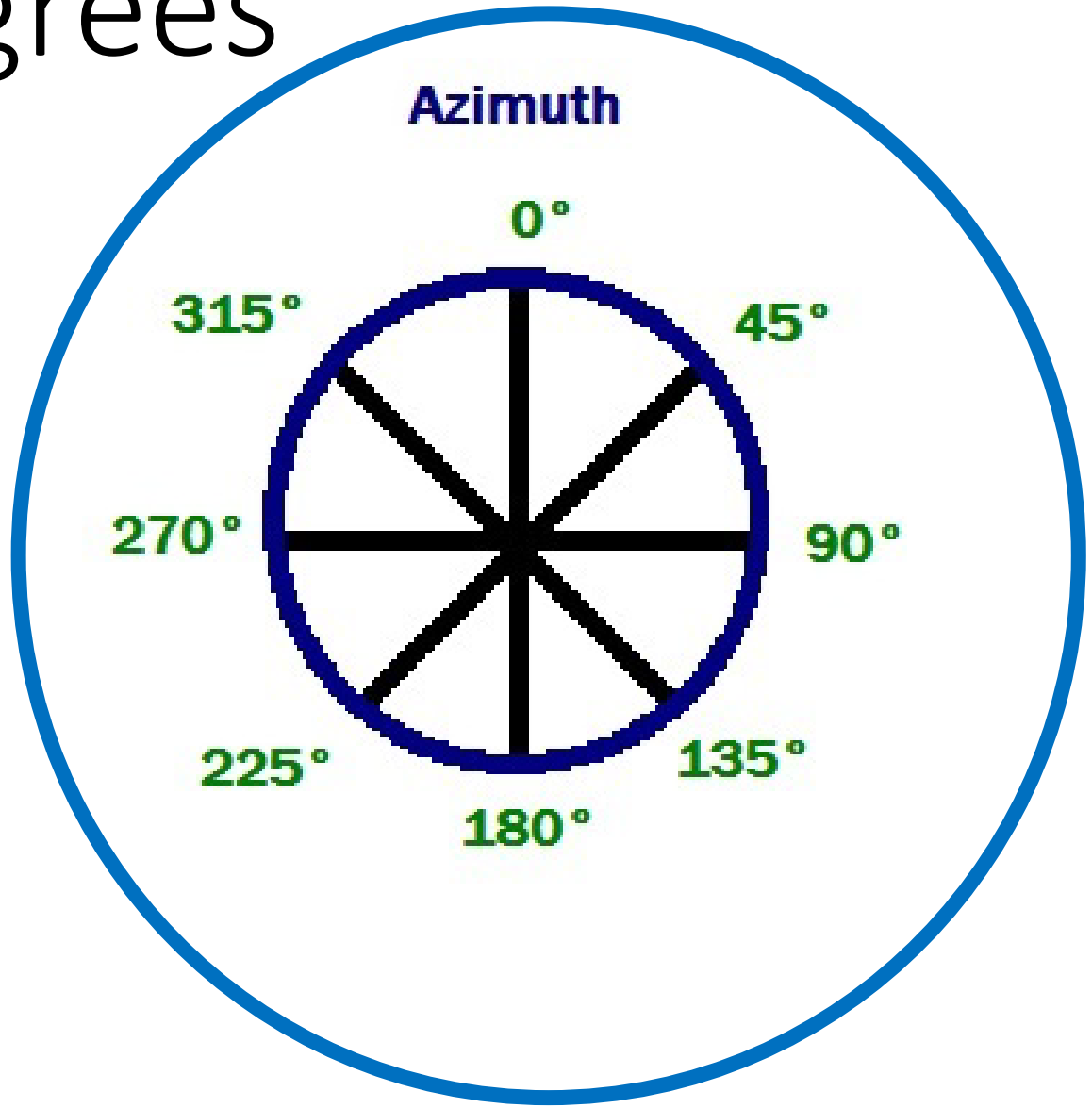
Hand lens

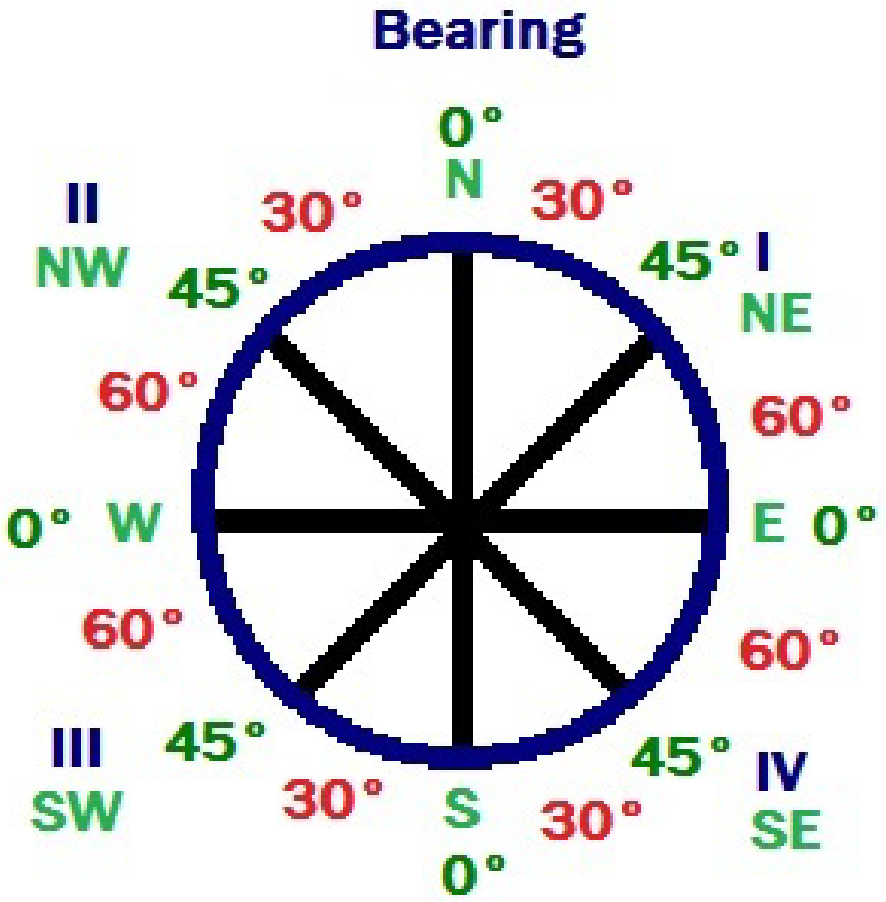
- An essential piece of equipment for the detailed observation of all rock types and fossil material
- Frim footing or while seated
  - Frist scan the sample with your eyes
  - Identify areas of interest that are ‘fresh’
  - Move the sample toward your eye and hand lens, within about 1 to 4cm to view

Compass w/Clinometer

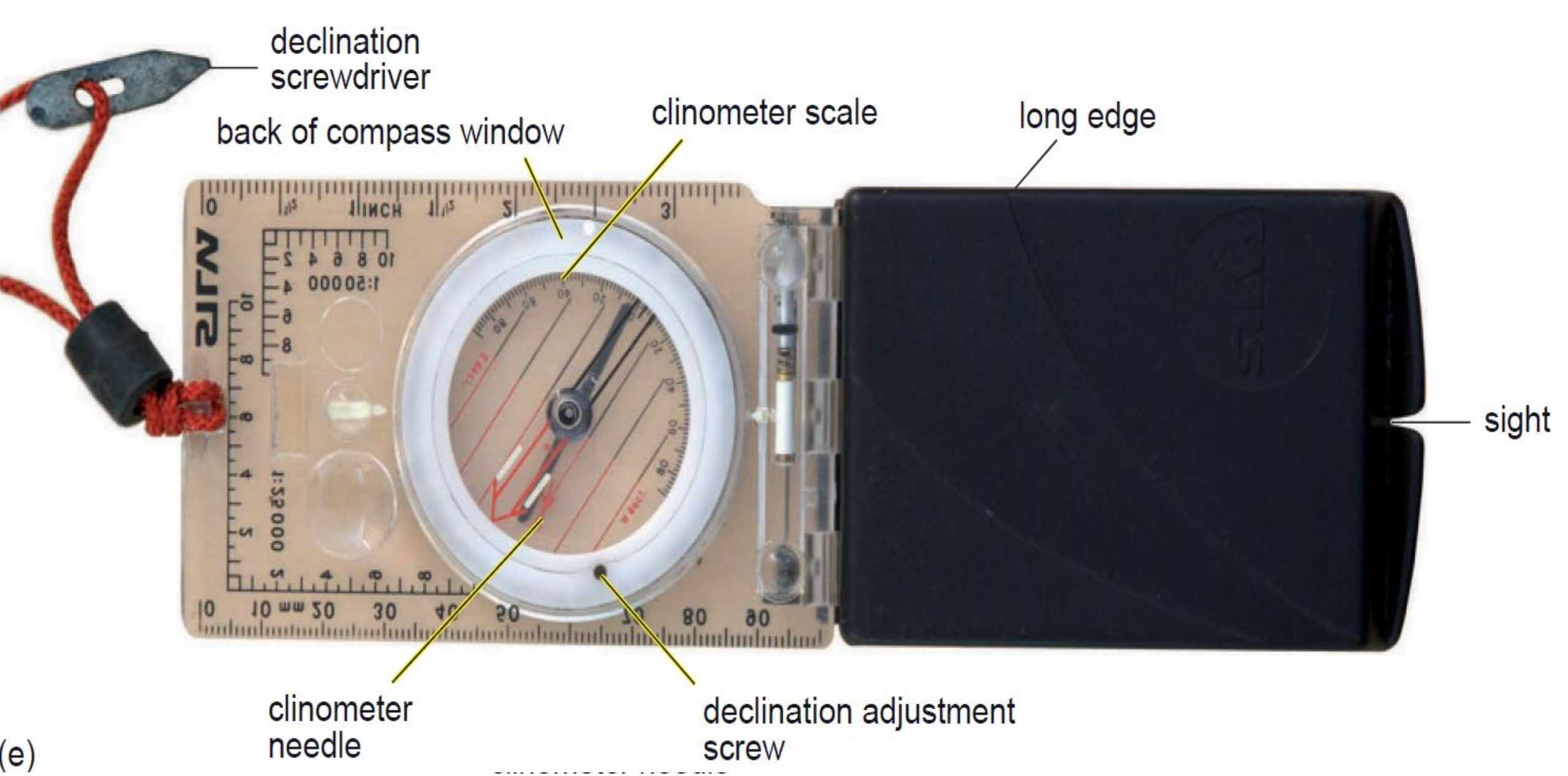
- Used to measure: (1) the orientation of geological planes and lineations with respect to north; and (2) the angle of dip of geological features with respect to the horizontal.
- Can help navigate your way out of the field.

Degrees



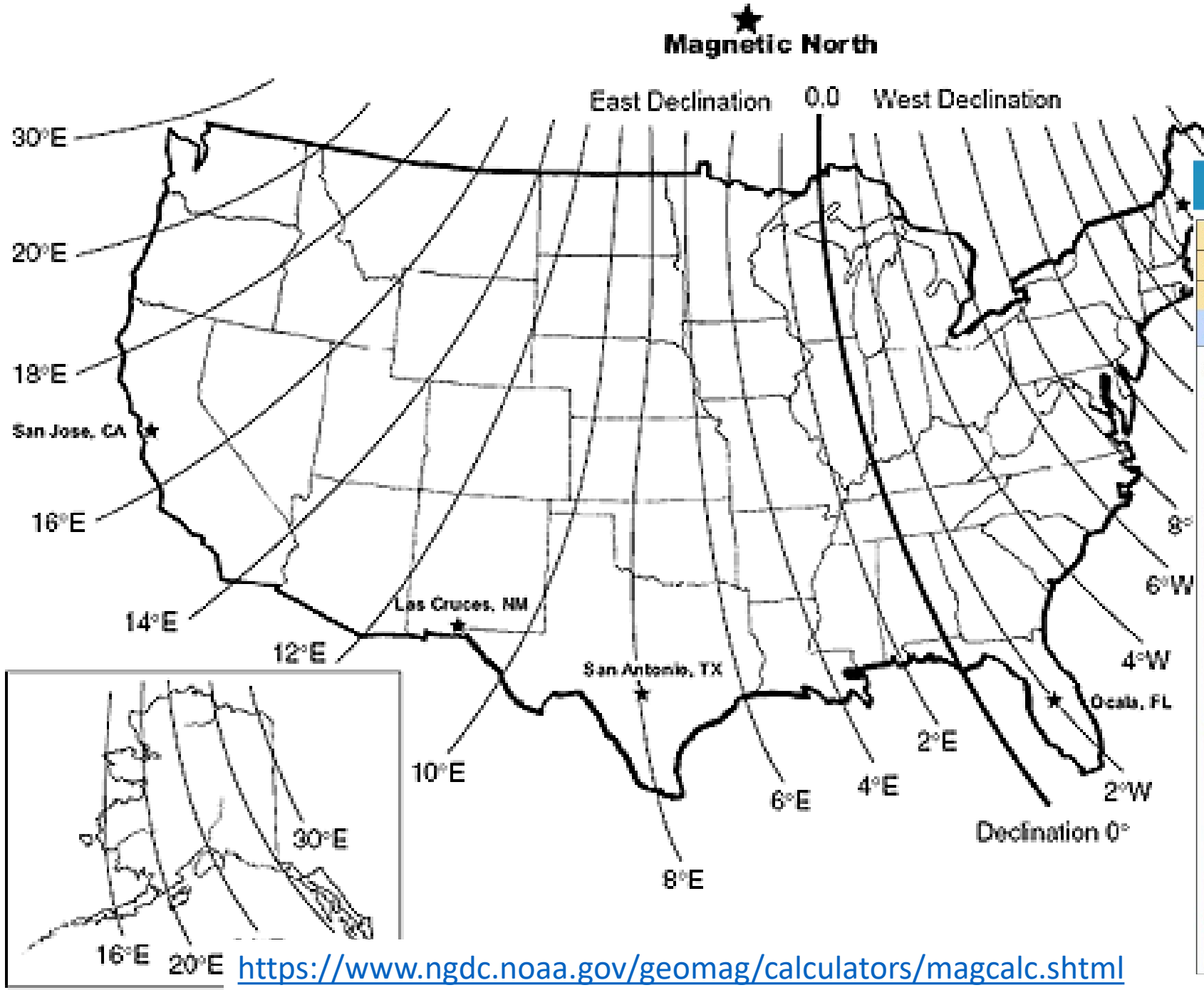


Quardant I: NE, angle from North
Quadrant II: SE, angle from South
Quadrant III: SW, angle from South
Quadrant IV: NW, angle from North


declination screwdriver
back of compass window
clinometer scale
long edge
sight
clinometer needle
declination adjustment screw

(e)

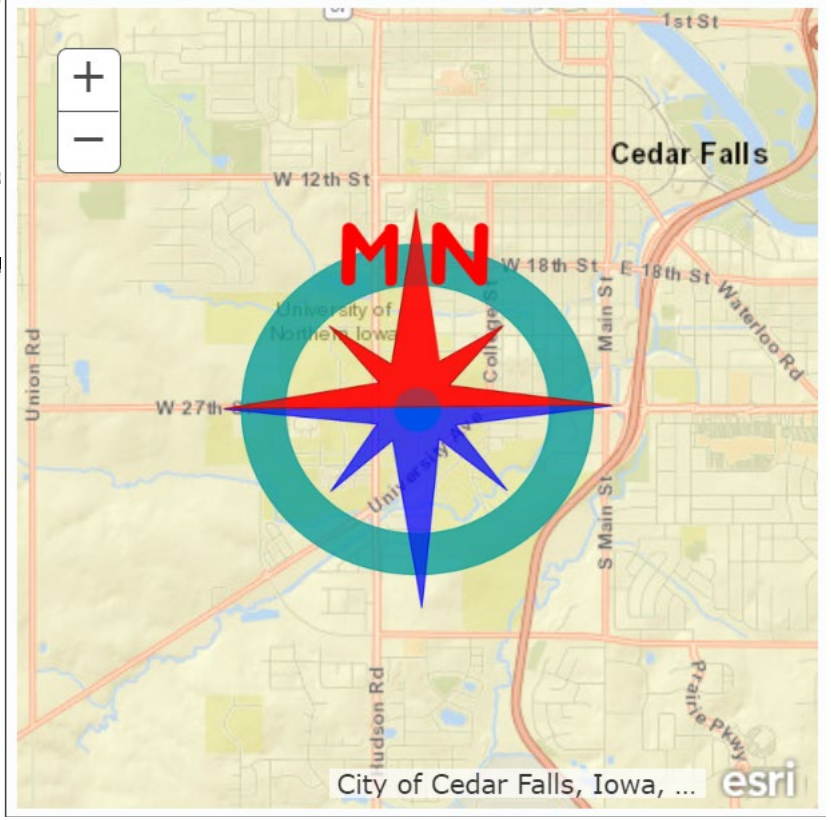
Declination



https://www.ngdc.noaa.gov/geomag/calculators/magcalc.shtml

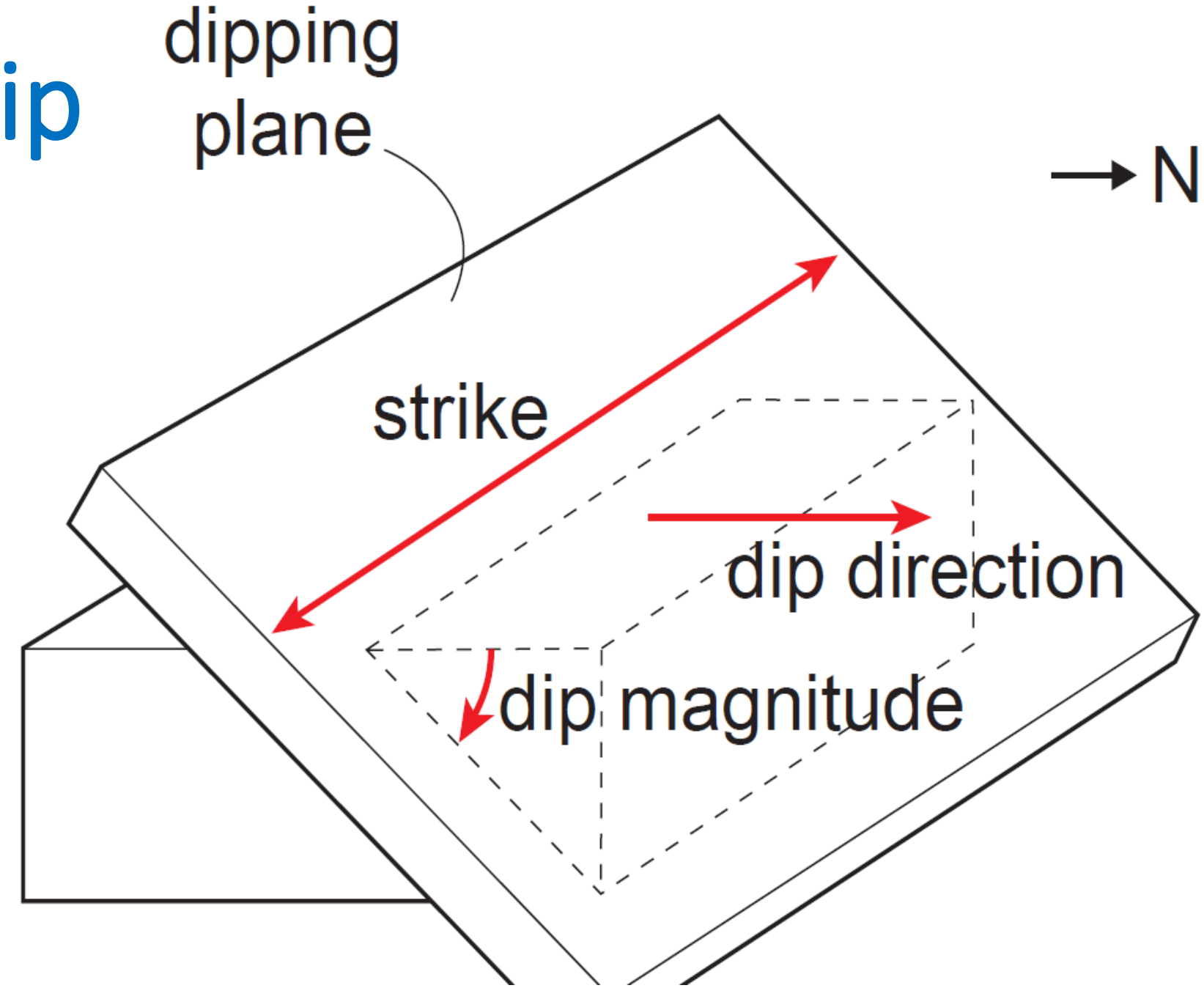
Declination

Model Used:	WMM-2020
Latitude:	42° 30' 47" N
Longitude:	92° 27' 43" W
Date	**Declination**
2022-08-28	0° 26' W ± 0° 24' changing by 0° 4' W per year



Strike and Dip

- Strike is parallel to the bedding plain
- Dip is perpendicular to strike

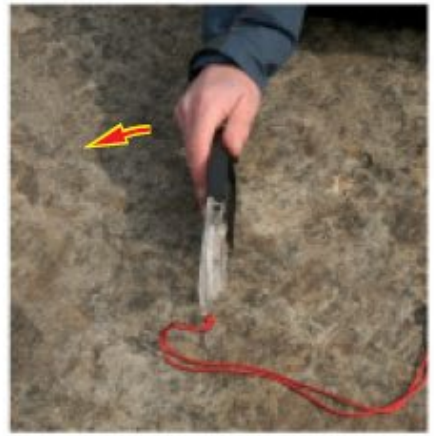


1. General orientation

Find a good surface that is representative of the overall dip of the plane to measure. Determine the general direction of dip by looking at the plane or you can pour fluid over the bedding plane to see which way it runs. In some cases it may be necessary to smooth out the variations on the surface by placing a notebook or clipboard on the bedding plane, but take care to ensure that this is not biased by a small irregularity. Hammer near left hand side shows the plane chosen in this case.

2. Set the clinometer mode

Prepare the compass-clinometer for the clinometer mode by setting the top of the clinometer part so that it is parallel to the long edge of the compass-clinometer (i.e. put the compass dial at 90–270°).



3. Dip magnitude

Place the long edge that is at the base of the clinometer scale on the bedding plane, with the long edge of the compass-clinometer parallel to where you estimate the maximum dip direction lies (i.e. pointing down the slope). While looking at the clinometer reading, carefully rotate the compass-clinometer device slightly (as shown by the arrows) to find the line of maximum dip.

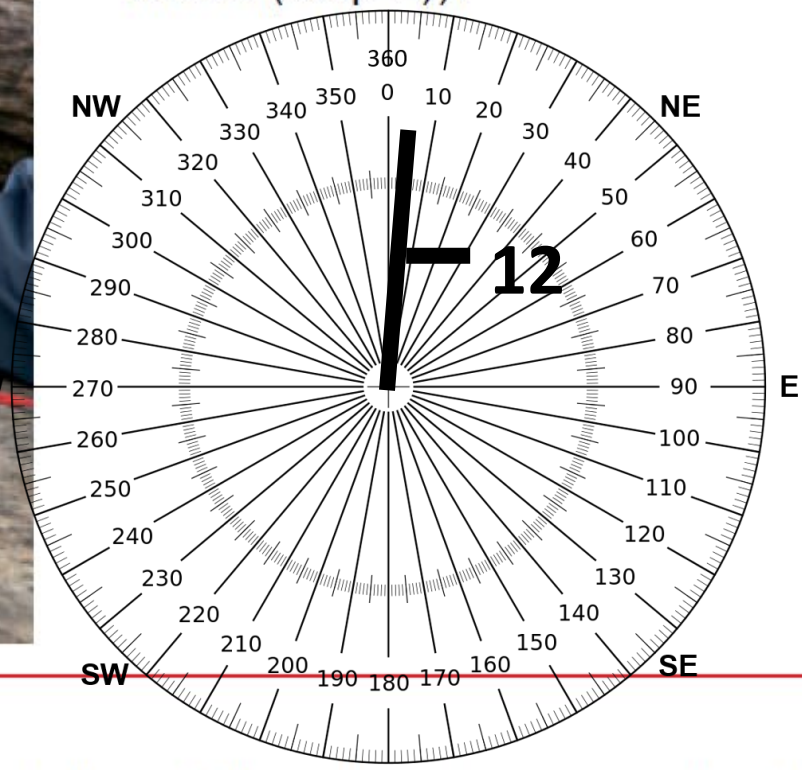
Read off the maximum dip. In this case it is 12°. Note that the dip can be read from either side of the Silva-type compass-clinometer.

4. Strike direction

The strike direction is exactly perpendicular to the dip direction, so remembering where the maximum dip lies, lift the compass-clinometer and place the long edge of the compass-clinometer along the line of strike. Pivot the compass-clinometer window (as shown by the red arrow) until it is horizontal.

Rotate the compass dial so that the compass needle lines up with the red outline for the north direction, checking that the compass-clinometer is still horizontal. Take the reading of the strike from the dial. In this case it is 008° or the other end of the line, 188°.

You can double check that the strike direction is correct by placing the compass on its long edge along the strike line and checking that the dip is 0° (don't forget to adjust the compass to the clinometer mode (step 2)).



5. Dip direction

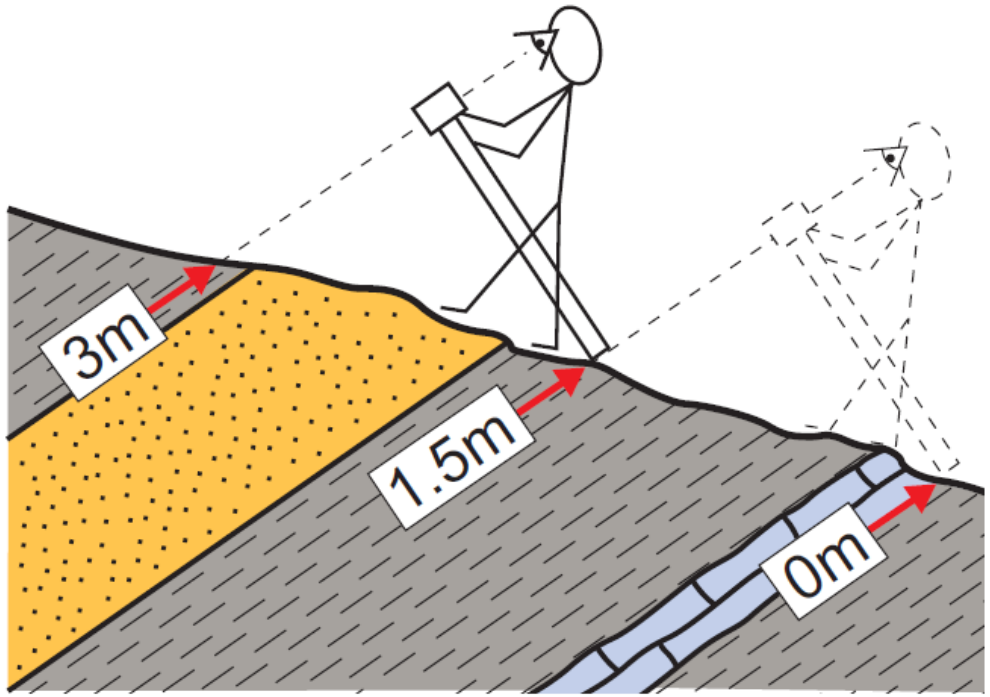
The last measurement is the direction of dip to the nearest cardinal point (e.g. NW or SE, E or W).
In this case it is E.

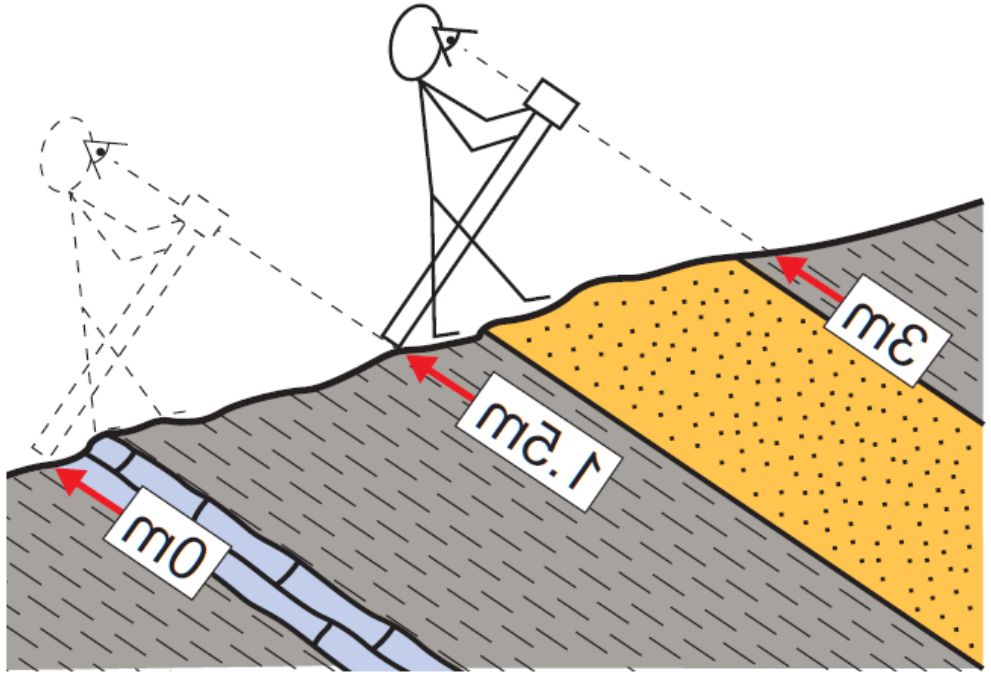
6. Record

Record the orientation of the plane in your notebook; in this case 008/12E. Note that the strike is always recorded as a 3-digit number to avoid any confusion and that the degree symbols are not normally shown to prevent any confusion with zeros.

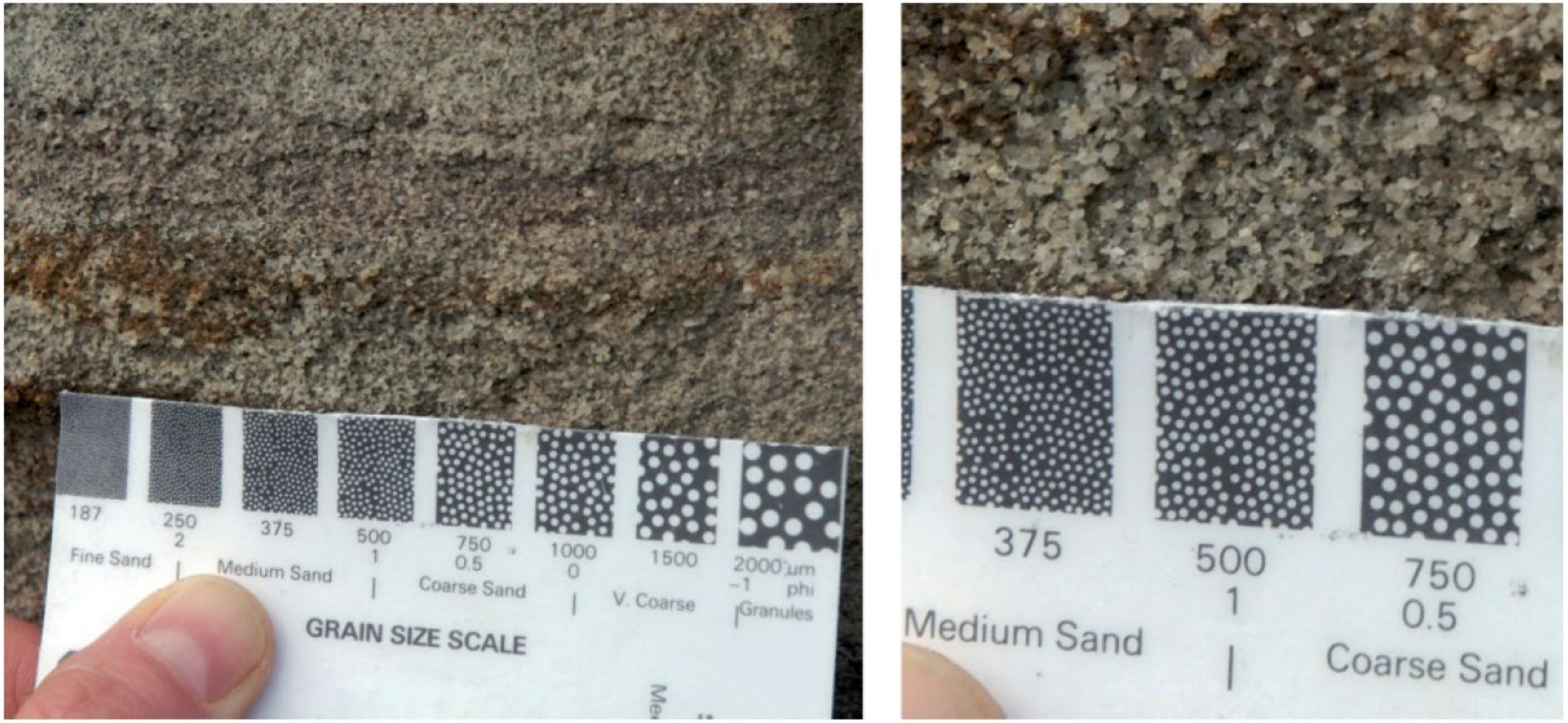
Measuring well

Measure twice , cut once


3m
1.5m
0m


3m
1.5m
0m

Grain size cards

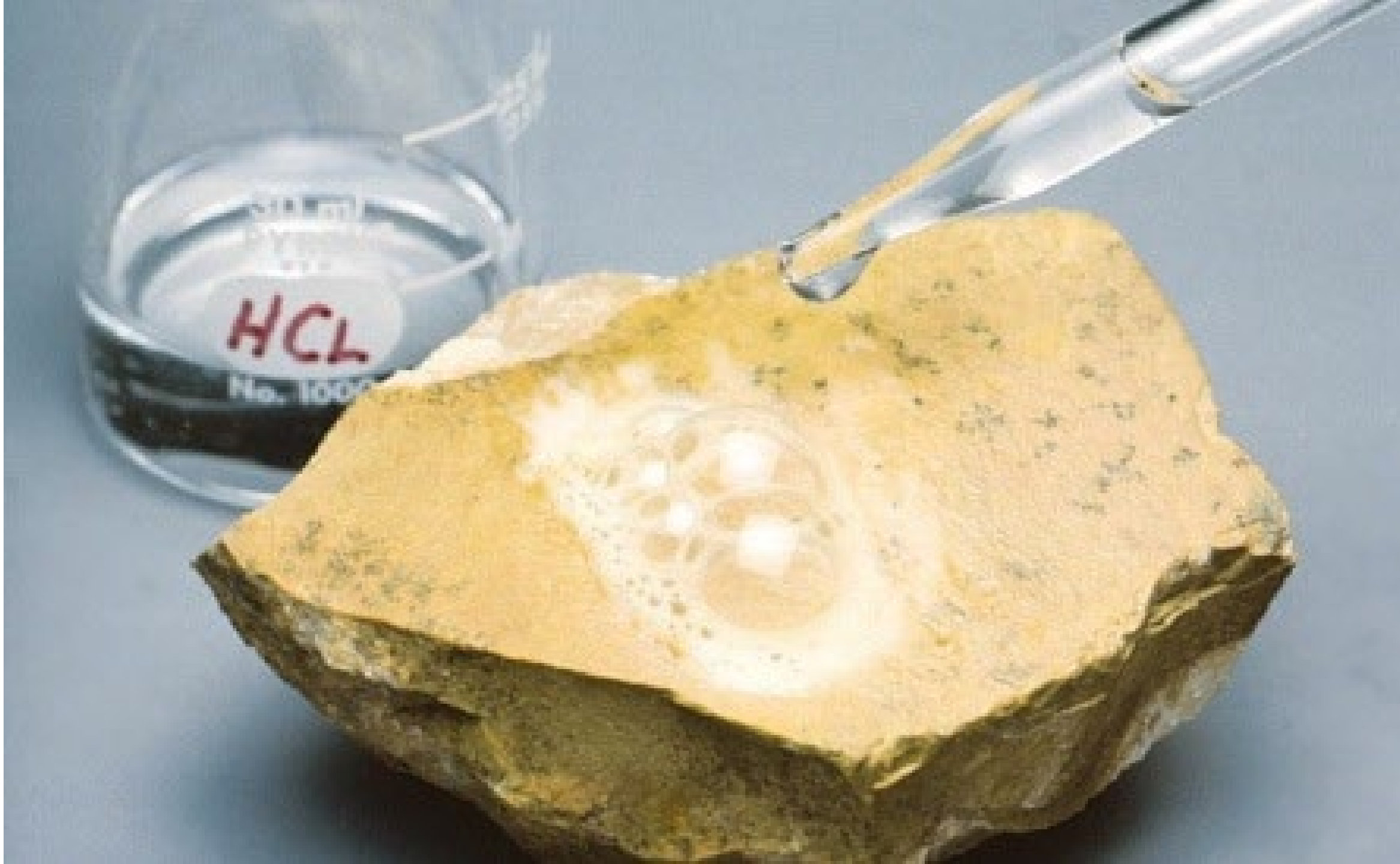


(a) (b)

Figure 2.16 Use of a grain-size chart to determine the average grain size. (a) In this case the average grain size is 500 µm. The grain size varies between 375 and 750 µm. (b) Close up view of (a).

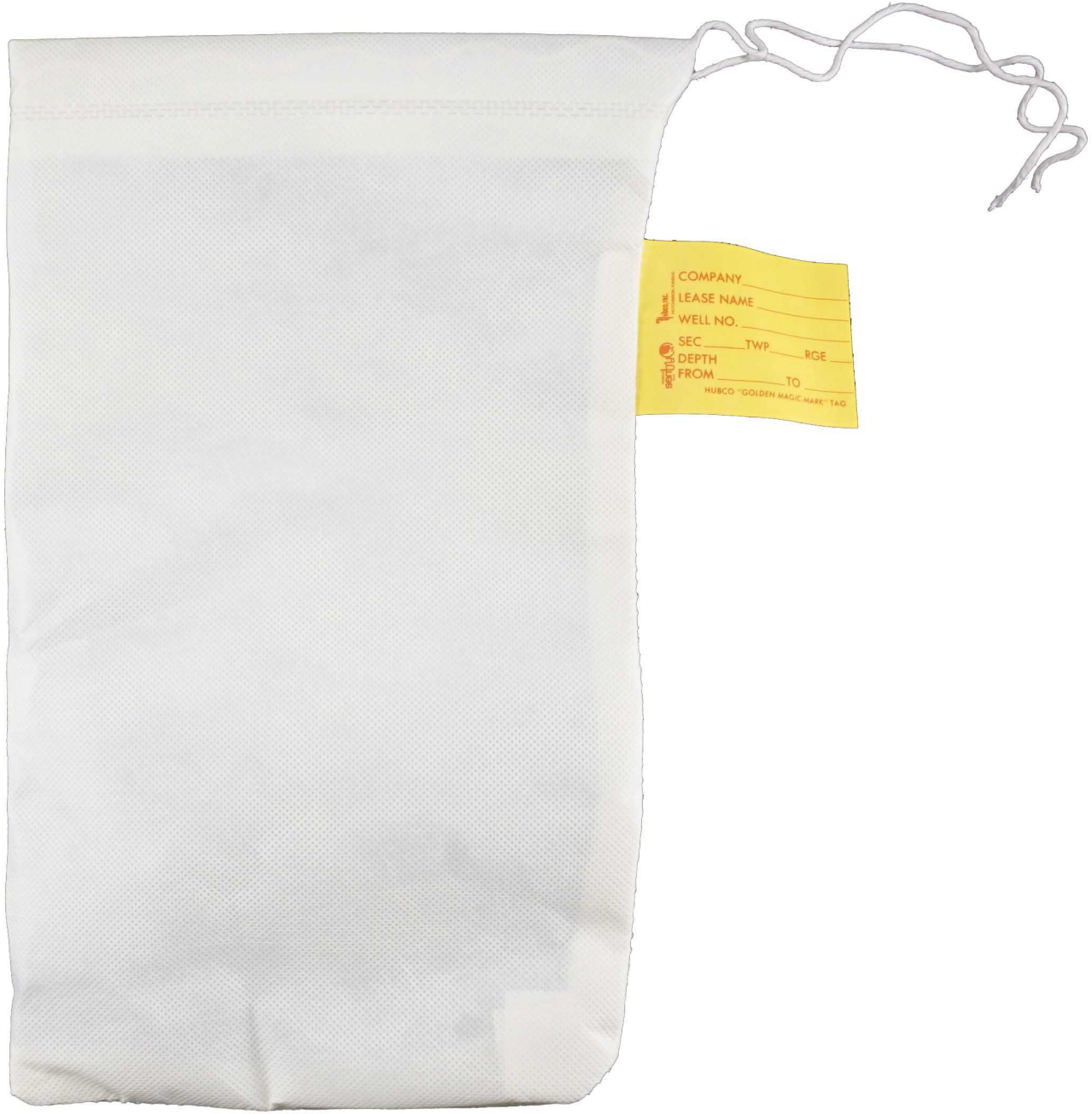
Hammers and Trowels

HCL



Sight and Photographs

Sampling


COMPANY
LEASE NAME
WELL NO.
SEC TWP RGE
DEPTH
FROM TO
HUBCO "GOLDEN MAGIC-MARK" TAG

Clothing gear review

Safety review