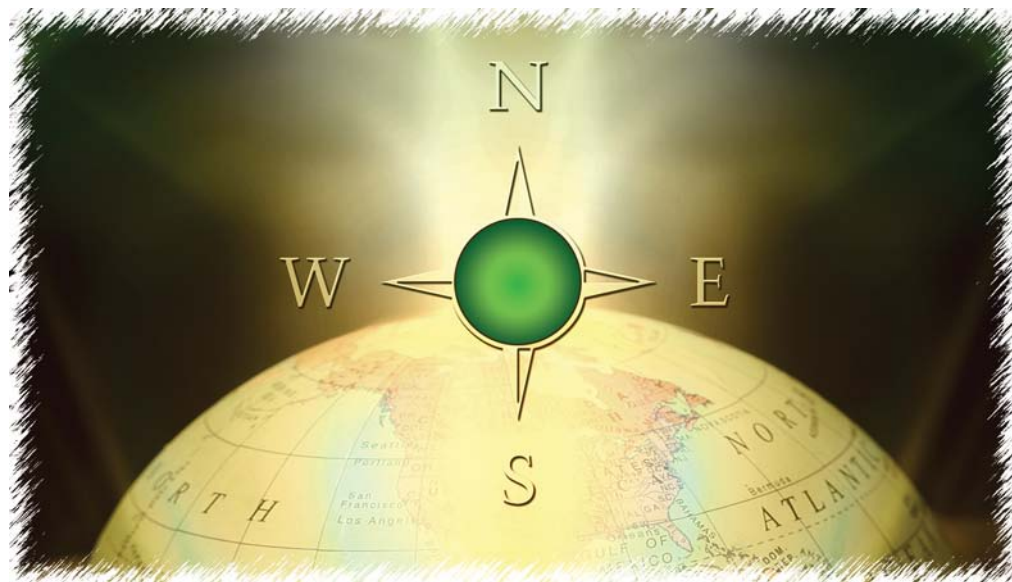


MAP & COMPASS

9



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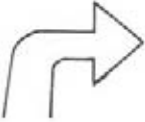








Our lives are "trail signs" to others. Where are we leading them?

"Make Your ways known to me, LORD; teach me Your paths. Guide me in Your truth and teach me, for You are the God of my salvation; I wait for You all day long." (Psalm 25:4-5)

"I will instruct you and show you the way to go; with My eye on you, I will give counsel." (Psalm 32:8)

Trail Signs

Try using the following trail signs for fun on a hike and then remember them for emergency or tracking use later.

Chalk	Rock	Grass
Straight Ahead 		
Turn Right 		
Turn Left 		
Danger or Message Left 		

History of the Compass

The first compass was a magnetized, ore-bearing rock which, when suspended on a thong or vine, would always point in the same direction.

No one knows who first discovered the compass. The Chinese seem to have understood its secrets 3,000 years ago. This was long before the Europeans learned to navigate without the aid of the sun or North Star. According to some authorities, Marco Polo brought back a knowledge of the compass from Cathay in 1260 A.D.



The north end of the magnetic needle of your compass always points to the magnetic North Pole region located in northern Canada.

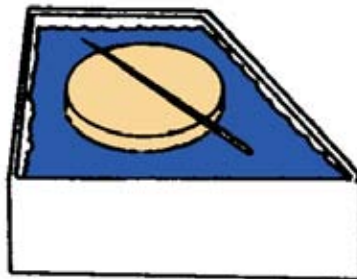
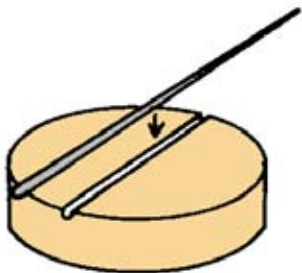
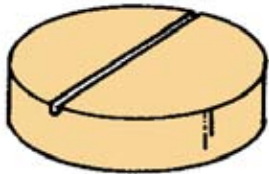
Make a Simple Compass

Try making this simple compass. You will need:

- A dish of water
- A needle
- A thin flat cork
- A magnet

Follow the steps below:

- Carve a small groove in the top of the cork. Make it just large enough for the needle to fit in it.
- Rub one end of the needle on the magnet. Do not rub it back and forth or sideways. Rub the needle in one direction only, from the center to the end of the magnet. Rub it 20 or more times.
- Lay the needle in the groove of the cork.
- Place the cork and the needle in the dish of water. The needle will point to magnetic north and south.



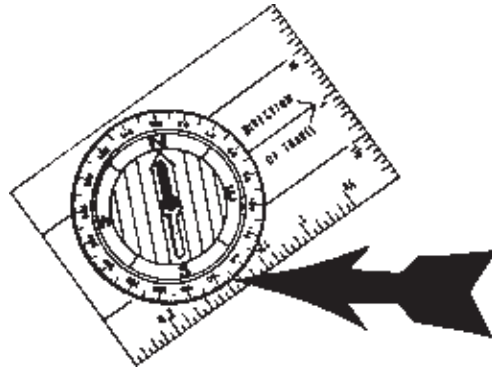
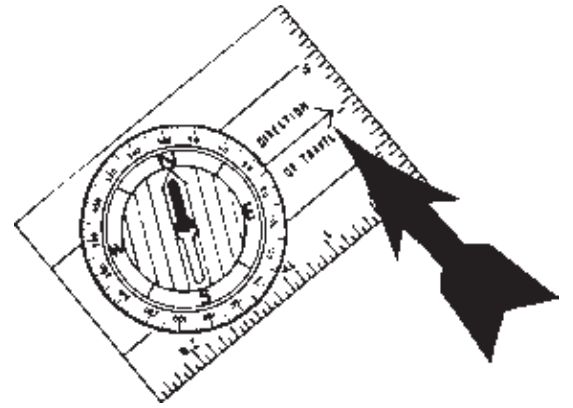
“Remember your leaders who have spoken God’s word to you. As you carefully observe the outcome of their lives, imitate their faith. Jesus Christ is the same yesterday, today, and forever.” (Hebrews 13:7-8)

- Notes -

The compass has several parts; a base, housing and three arrows. The base of the compass can be compared to our relationship with Jesus Christ since He provides our basis for life. The housing can be compared to Christian fellowship that surrounds us and provides reference points. The three arrows can be compared to the Trinity in that they work together to provide the direction that we need in our lives.

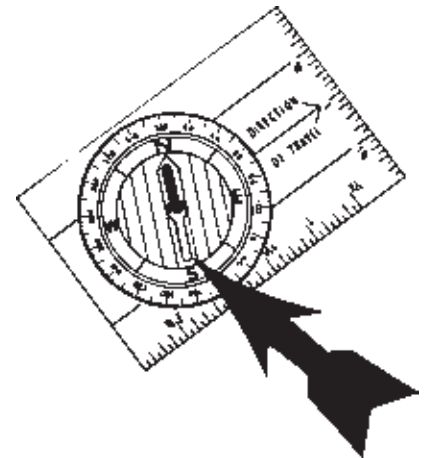
The Basic Compass

There are several parts to the basic compass. The **direction of travel arrow** is on the plastic base. This is the arrow that shows which way to walk after the compass is set.



This is the **housing**. It turns - try it. The numbers around the outside of the housing are degrees. The degree number at the direction of travel arrow is the degree setting of the compass.

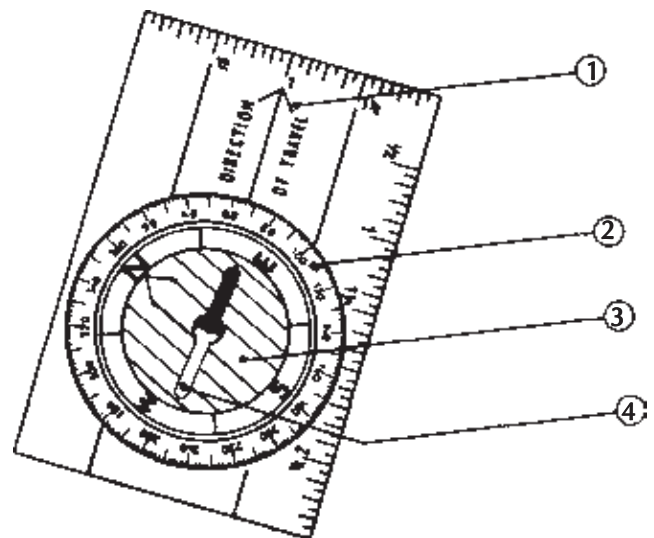
Inside the housing is a needle which swings on a pin. It is the **magnetic needle**. The colored end (usually red, sometimes blue) points in the general direction of North and does **not** indicate the direction of travel. The direction of travel arrow points the way to go.



Under the magnetic needle is a colored arrow (usually red, sometimes blue). This is called the **orientation arrow**. It moves with the housing.

Be sure you know the four main parts of a basic compass, then write them below.

- 1.
- 2.
- 3.
- 4.



Orienting Your Compass

Orienting a compass means lining up the orientation arrow with the magnetic needle to help you determine which way to travel.

To walk north (360°):

1. Turn the **housing** of the compass so N (North) (360°) on the **housing** is in line with the **direction of travel arrow**.
2. Hold the compass with both hands, keeping your elbows tight against your sides and the **direction of travel arrow** pointing straight ahead.
3. Turn your body around until the **magnetic needle** lines up with the **orientation arrow**.
4. Walk in the direction of the **direction of travel arrow** which is pointing North.



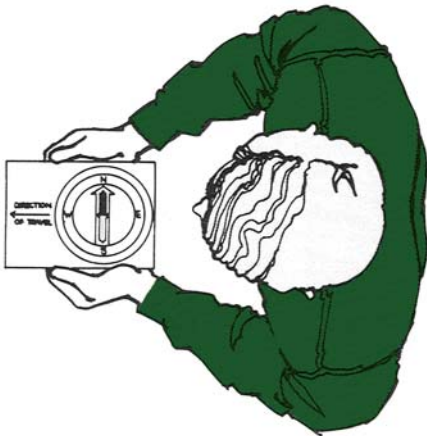
- Notes -

God's word provides direction for our lives.

*"Trust in the LORD with all your heart, and do not rely on your own understanding; think about Him in all your ways, and He will guide you on the right paths."
(Proverbs 3:5-6)*

To Walk West (270°):

1. Turn the compass **housing** until the W (270°) on the **housing** is in line with the **direction of travel arrow**.
2. Turn your body around until the **magnetic needle** lines up with the **orientation arrow**.
3. Walk in the **direction of travel arrow** which is pointed west.
4. Keep the compass oriented by keeping the **magnetic needle** in line with the **orientating arrow**.



To walk any other direction:

1. Turn the **housing** so that the direction (or degree reading) in which you want to walk is in line with the **direction of travel arrow**.
2. Turn your body around until the **magnetic needle** is in line with the **orientating arrow**.
3. The **direction of travel arrow** will be pointing in the direction you wish to walk.

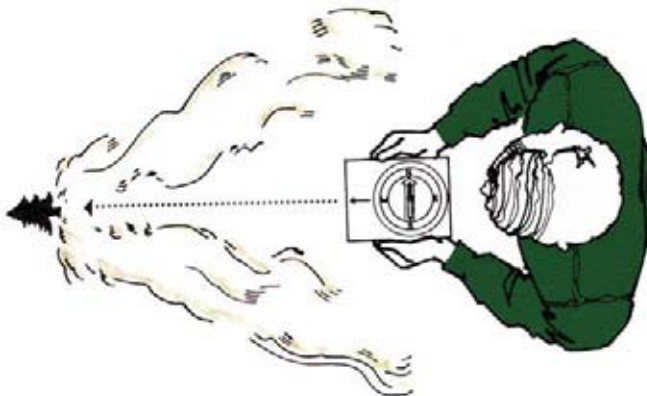
- Notes -

"Jesus told him, 'I am the way, the truth, and the life. No one comes to the Father except through Me.'" (John 14:6)

Keep your eyes focused on Christ.

Choosing A Sighting Point

1. Orient your compass for a desired direction such as west, for example.
2. Choose a sighting point - that is a tree, rock, house, post, or other object which is in line with the **direction of travel arrow**.
3. Walk to this sighting point.
4. Choose another sighting point which is in line with the **direction of travel arrow** and walk to it.
5. Do this each time until you reach the place you want to go.

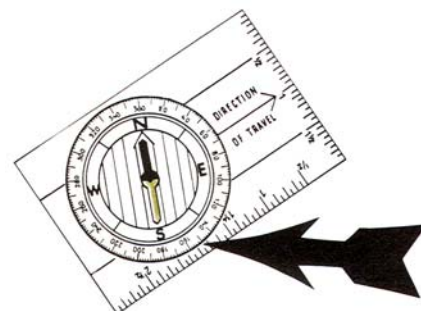


Finding Compass Degree Reading or Bearings

Look at the compass **housing**. The number and letters (20, 40, 60, etc. and N, E, S, W) indicate specific directions or bearings.

The letter "N" stands for North and its degree direction can be either 000° or 360° . The letter "E" stands for East and its degree direction is 090° . "S" is for South and its degree direction is 180° . "W" is for West and its degree heading is 270° .

Halfway between North and East would be the direction "Northeast" usually written "NE". Its degree direction is 045° . Halfway between East and South is "Southeast" or "SE" with its degree direction of 135° . Halfway between South and West is "Southwest" or "SW" at 225° and finally halfway between West and North is "Northwest" or "NW" at 315° .



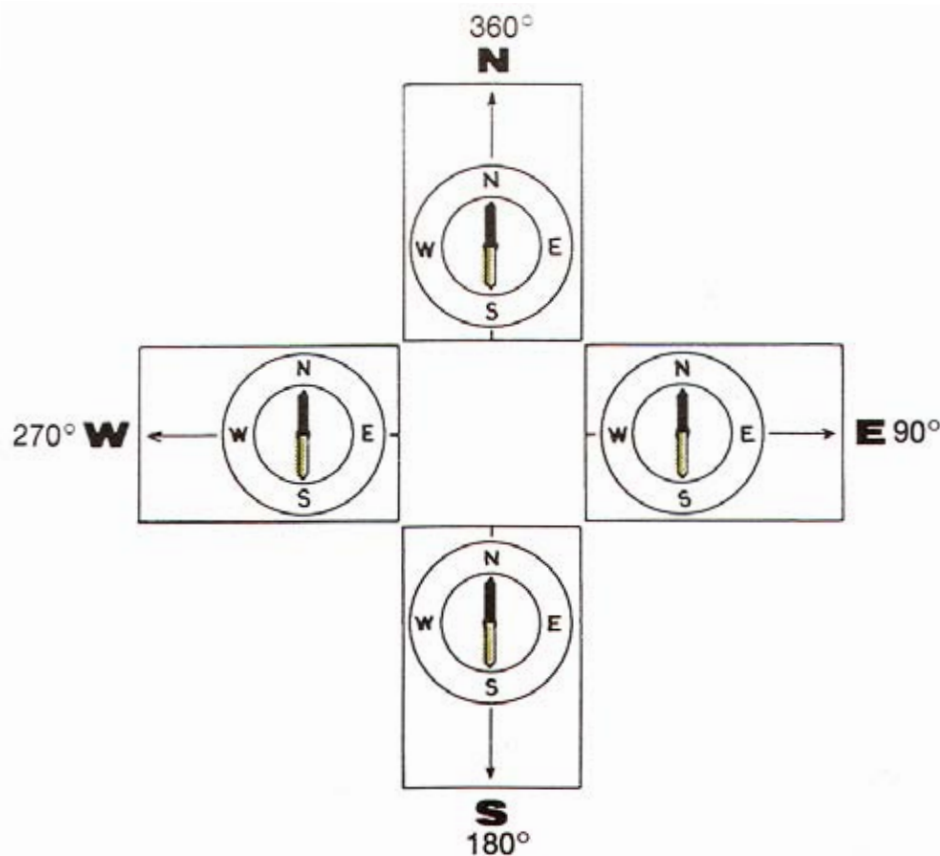
Look again at the compass **housing**. The numbers indicating the directions between North and East are usually printed as "20, 40, 60, 80." It is **highly recommended** that you get into the practice of referring to these directions as three digit numbers "020, 040, 060, 080, etc." rather than two digits. Thus, 020° would be stated a "zero-two-zero degrees." Why? Because if you always write down or say the direction as being three digits "007° - zero-zero-seven degrees" you will have less chance of making a mistake of confusing one direction with another. For example, if you saw that the direction listed on a piece of paper is "2". Is that 002° , 020° , or 200° ? There is a big difference and knowing or telling someone else the correct direction may mean the difference between life and death.

This illustration shows the four main directions with the bearing for each. Practice moving the **housing** to each direction until you know the degree reading for each. Draw on the illustration the direction and degree bearing for NE, SE, SW, and NW. Practice with a friend and answer these questions about degree reading using the compass.

- What is the degree bearing for N? _____
- What is the degree bearing for S? _____
- What is the degree bearing for E? _____
- What is the degree bearing for W? _____
- What is the degree bearing for NE? _____
- What is the degree bearing for SE? _____
- What is the degree bearing for SW? _____
- What is the degree bearing for NW? _____

Then try answering these questions with a friend.

- Which point of the compass is at 180° ? _____
- Which point of the compass is at 135° ? _____
- Which point of the compass is at 225° ? _____
- Which point of the compass is at 360° ? _____
- Which point of the compass is at 270° ? _____
- Which point of the compass is at 315° ? _____
- Which point of the compass is at 045° ? _____
- Which point of the compass is at 090° ? _____



Using The Compass

Now let's practice what we have learned. We will suppose that we want to hike to a specific campsite for the night. In the woods there are no street signs or road markers to show the way, so your leader simply says that the campsite is at 055° degrees and 1000 feet from the entrance gate to the Jones farm.



The **First** thing we must do is determine where 55° is on the compass **housing**. Between N and E the direction numbers printed on the compass **housing** are 20°, 40°, 60°, and 80°. Where is 055°? Notice on the **housing**



there are a bunch of short lines, then a long line, followed by some more short lines, then another long line. This sequence repeats all the way around the **housing**. The long lines are halfway between the printed numbers so they indicate 010°, 030°, 050°, 070°, and so on until you come to 350°. This would now mean that 050° is the long line halfway between 040° and 060°. But where is 055°?

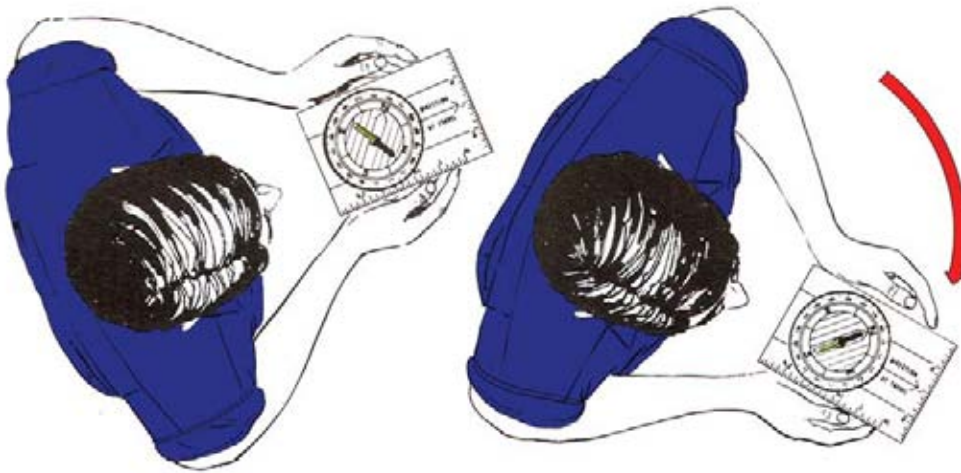
Next we must look at the groups of

short lines between the long lines. When we count how many short lines there are between the long lines our answer is four. This tells us that each short line is 2 degrees (2°) from the next line. Finally we can now determine where 055° is on the housing. Look at the illustration. The long line between 040° and 060° is 050°. The short line to the right after 050° is 052°, the next short line to the right is 054° and the next short line is 056°. Where is 055°? It is halfway between the two short lines indicating 054° and 056°. Do you see that all the lines (short and long) indicate even-numbered directions such as 006°, 040°, 050°, 056°, and so on and the spaces between two lines indicate odd-numbered directions such as 007°, 041°, and 055°.



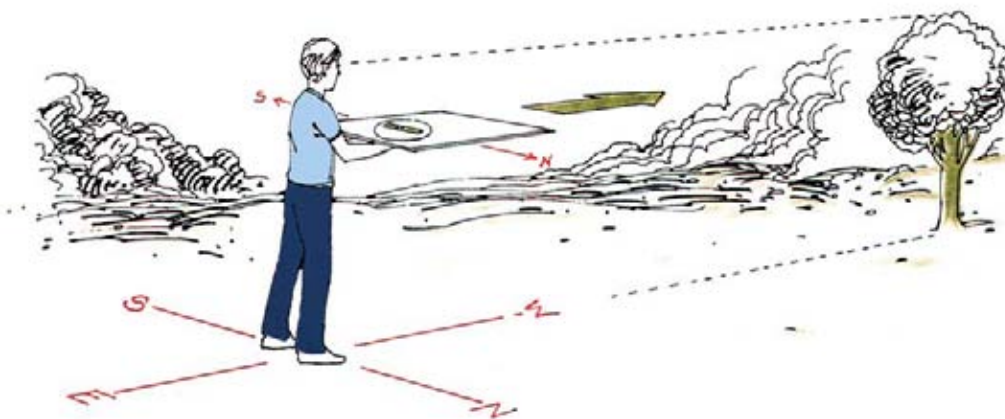
Now that we know where 055° is on the **housing**, turn it until the space between 054° and 056° is on the extension of the direction of travel arrow. The compass is now “set” - do NOT turn the **housing** any more.

Second, hold the compass level, about waist high - or a little higher - and be sure the **direction of travel arrow** points straight ahead of you - not towards you or to one side. If you hold the compass with both hands and keep your elbows tight against your sides, you will hold it much steadier.



To travel in a straight line, sight on something immovable and unchanging. God is consistent and provides direction for our lives.

Third, rotate your body and watch your compass. Keep turning until the red end of the **magnetic needle** lines up with the **orientation arrow** or points to the letter N. Keep the **direction of travel arrow** pointed straight in front of you at all times. You are now facing the correct direction to walk. Look up and sight an object straight ahead, such as a tree. Then put the compass in your pocket and walk to that object. When you arrive there, repeat the process and pick out a new objective. Repeat until you reach your destination. Practice this until you can set the compass to a degree reading and determine your direction of travel.



Measurement of Distance

The compass shows the direction of travel but usually it is also desirable to know how far to travel. Therefore, you should learn to measure and judge distance accurately.

Timing. One method is by timing your walk. If you normally walk 4 miles per hour, and your destination is two miles away, you will reach it in a half hour of normal walking speed. In woods or places where walking speed is more difficult, you must estimate your slower speed. If, for example, you think you are walking about one-half normal speed, you will allow yourself an hour to reach the destination two miles away.

Mental Measurement. Another method is by estimating or judging actual distances. Use several distances with which you are acquainted and apply them to unfamiliar places. For example, if you know that your home is one-fourth mile from the main road or street, you probably have a very good idea how far away one-fourth mile would be. Then use it as a mental measuring stick when judging distances. Almost everyone knows how far the length of a football field looks. It is 100 yards and you can use that as a mental measuring stick.

Stepping. For shorter distances, stepping is ideal and can be one of the most accurate methods to estimate distances. Measurement is done by walking at your normal speed and counting your steps as you walk. Then if you know the length of your step, you can convert into feet, yards, or miles as desired. For example, if the distance is 200 steps, and your step is 3 feet long, the distance is 600 feet.

Finding the Length of Your Step. Measure off a straight distance of 100 feet with a tape measure, marking each end of the distance with stones or stakes. A trip down and back will be 200 feet or 2,400 inches. Now walk down the course and back again at your normal speed, counting your total steps. Divide 200 by the number of steps you counted. This will give you the length of your steps in feet. For example, if you counted 80 steps then your step is 2.5 feet. Your stride (2 steps) would be 5 feet.

Finding Directions

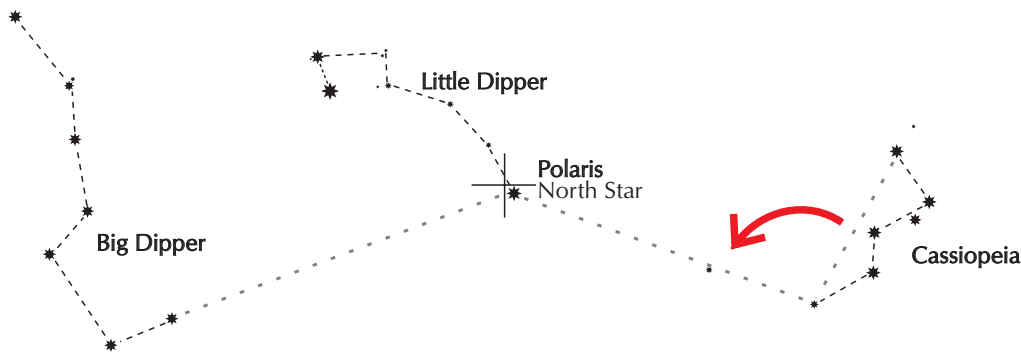
By The Stars

Here is an easy method to find the North Star (Polaris). Look up in the northern sky to find the "Big Dipper." Notice that there are 3 stars in the handle and 4 stars for the pan. The 2 stars on the far side of the pan opposite of the handle (Dubhe and Merak) are called the "pointer stars" because they point almost directly to Polaris. Hold one hand up in the sky and measure how many fingers is the distance between the 2 pointer stars.

*"He counts the number of the stars; He give names to all of them."
(Psalm 147:4)*

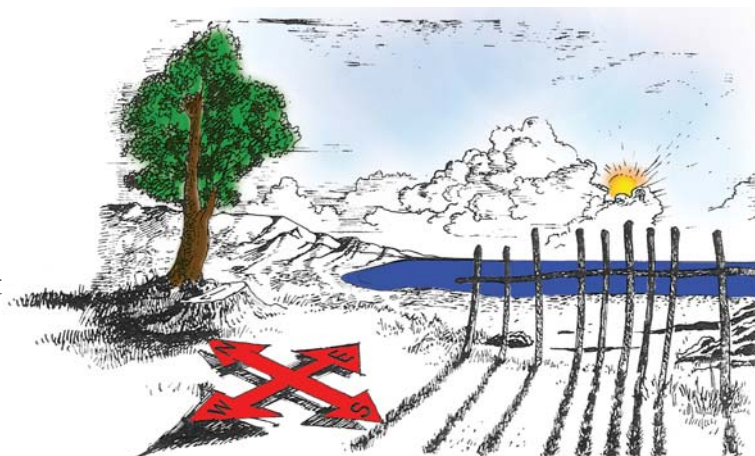
Usually it is 3 fingers. Now move your hand so that one side of your group of fingers is up against the “lip” star of the two pointer stars. The so-called “lip” star is the one at the top or open end of the Big Dipper’s pan. Finally, in the direction that the two pointer stars are pointing measure off 5 1/2 of your finger groups and you will arrive at the North Star (Polaris). Polaris is within 3/4 degree of true, exact North. Now that you know where Polaris is you can hold a rope or straight stick on Polaris and look down at the point where the rope or stick intersect the horizon. That is North on the ground for you.

During the winter months, most of the Big Dipper is below the horizon making it difficult to locate the North Star. To find the North Star, locate the large “W” (Cassiopeia). With your arm extended, use your index and pinky fingers; place your fingers on the tips of the “W” to measure the distance. Rotate your hand using your pinky as a pivot point until the locator star is covered, then move your hand in-line twice the distance and you will be pointing at the North Star.



By The Sun

Generally, the sun is in the East in the morning and is in the West in the afternoon. If you face the sun in the morning, North will be on your left and South on your right; the reverse will be true if you face the sun in the afternoon. You must understand that this is not an accurate way to find directions but gives you only general directions.



*“God made the two great lights—the greater light to have dominion over the day and the lesser light to have dominion over the night—as well as the stars.”
(Genesis 1:16)*

God has shown in nature how to find direction. His word gives direction in our lives.

*“As far as the east is from the west, so far has He removed our transgressions from us.”
(Psalm 103:12)*

*“From the rising of the sun to its setting, let the name of the LORD be praised.”
(Psalm 113:3)*

Your map is the Holy Word of God, the Bible. Follow it through life and consult it daily.

Maps

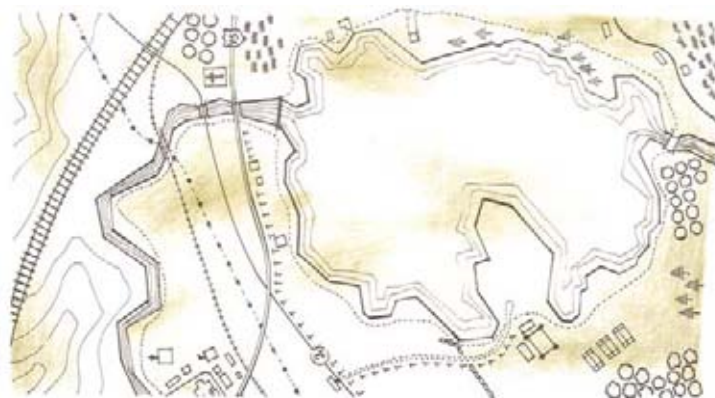
Pathfinding in the old days was an art. There seemed to be a great mystery behind the ability of the Indians, the pioneer scout, the guide, the tracker or the explorer, to find his way without using a map. The old-timer knew how to read the signs of mountain ridges, rivers, and vegetation. He watched wind directions and cloud movement. He noticed continually the position of the sun, moon and stars.

Where the old-timer learned his skill the hard way over a great number of years, the outdoorsman of today can learn the secrets of pathfinding easily with a good map and compass.

Knowledge of how to use the map and compass will help on all your outdoor activities. You will feel safer in wilderness territory. You can cut down travel distance and time with shortcuts. You can explore out-of-the-way places. You can find the way to new camp sites, lakes and exploring grounds. You can also get satisfaction from helping others in their cross-country travel.

Everyone knows what a map is, and yet, a simple definition may make map study easier. A map is a picture of the terrain viewed from above. In fact, if we photograph the ground from an airplane, we get a photomap. But photographs do not always show everything we want to know. For example, hills are not clearly visible. Roads and streams sometimes disappear beneath trees, and reappear going in a different direction. On the other hand they may show too much detail and become confusing to read. Consequently, drawn maps are often better!

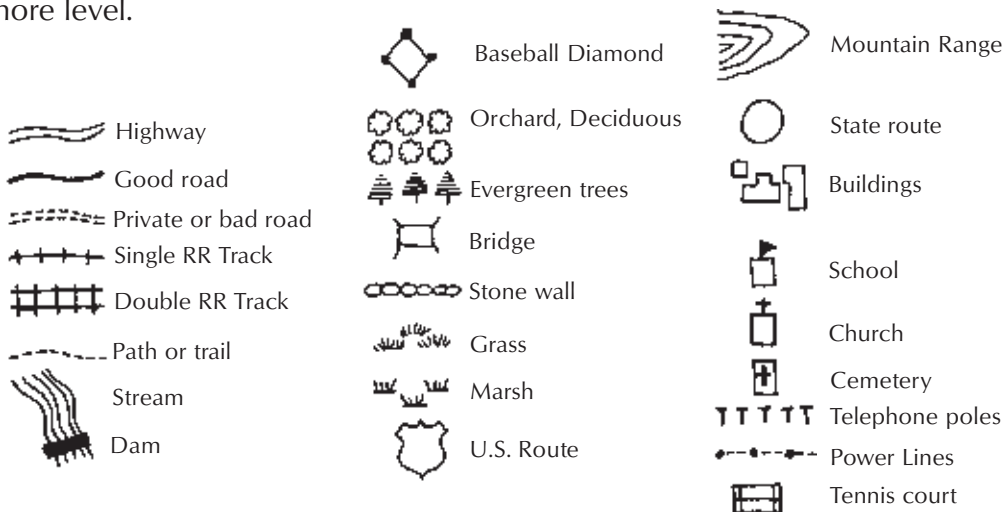
A drawn map still is a picture view from above. Keep that in mind. It may emphasize the things we want to show and omit unimportant details. For example, road maps ordinarily show roads, towns, and cities, but not houses, woods, and marshes. Other maps such as topographical maps may emphasize the countryside itself. A very simple map like this one may be sufficient.



You can secure a topographical map from a map store or contact the United States Geological Survey, 1200 South Eads Street, Arlington, Virginia 22202 (for areas east of the Mississippi River) and Denver Federal Center, Denver, Colorado 80225 (for areas west of the Mississippi River).

Map Symbols

Because pictures use much space and are sometimes hard to draw, most maps use symbols to designate buildings, streams, roads and other details. These symbols have become standardized and now almost everyone drawing maps uses the same set of symbols. Most of them are very suggestive of the objects they represent. For example, a house is a black rectangular or square marking; a school is the same but has a flag on it; a church has a cross; railroads have ties; power lines have dots like poles. A contour line represents a given height. It would wind around and eventually connect to itself as it gets around the hill. Your map will tell the difference in altitude between various contour lines. So contour lines of the map will reveal not only the height of a hill but also its shape. Where contour lines are close together, the hill is steep; where they are far apart, the land is more level.



Map Scale

Another important part of the map is the scale. It is the device to tell "how far." A map scale, as a rule, is located on the map or its border. It is usually divided into segments and at the end of each segment a certain distance is shown. For example, 25 feet or 1,000 yards or a mile. If, for example, the distance of one mile is written at the end of the segment, that means that the length of that segment on the map represents one mile on the ground.

Orienting the Map

It is always desirable to orient the map. Orienting a map simply means placing the map so that the northerly direction on the map coincides with the ground's North. Maps are usually drawn with the top of the map pointing to true North (Geographic North or the Earth's North Pole). They are usually NOT drawn pointing to Magnetic North. An orientated map always gives us a better understanding of the relationship between ground and map because the directions are then the same. There are two ways to orient a map – by compass and by inspection.

"Very early in the morning, while it was still dark, He got up, went out, and made His way to a deserted place. And He was praying there. Simon and his companions went searching for Him. They found Him and said, 'Everyone's looking for You!' And He said to them, 'Let's go on to the neighboring villages so that I may preach there too. This is why I have come.' So He went into all of Galilee, preaching in their synagogues and driving out demons."
(Mark 1:35-39)

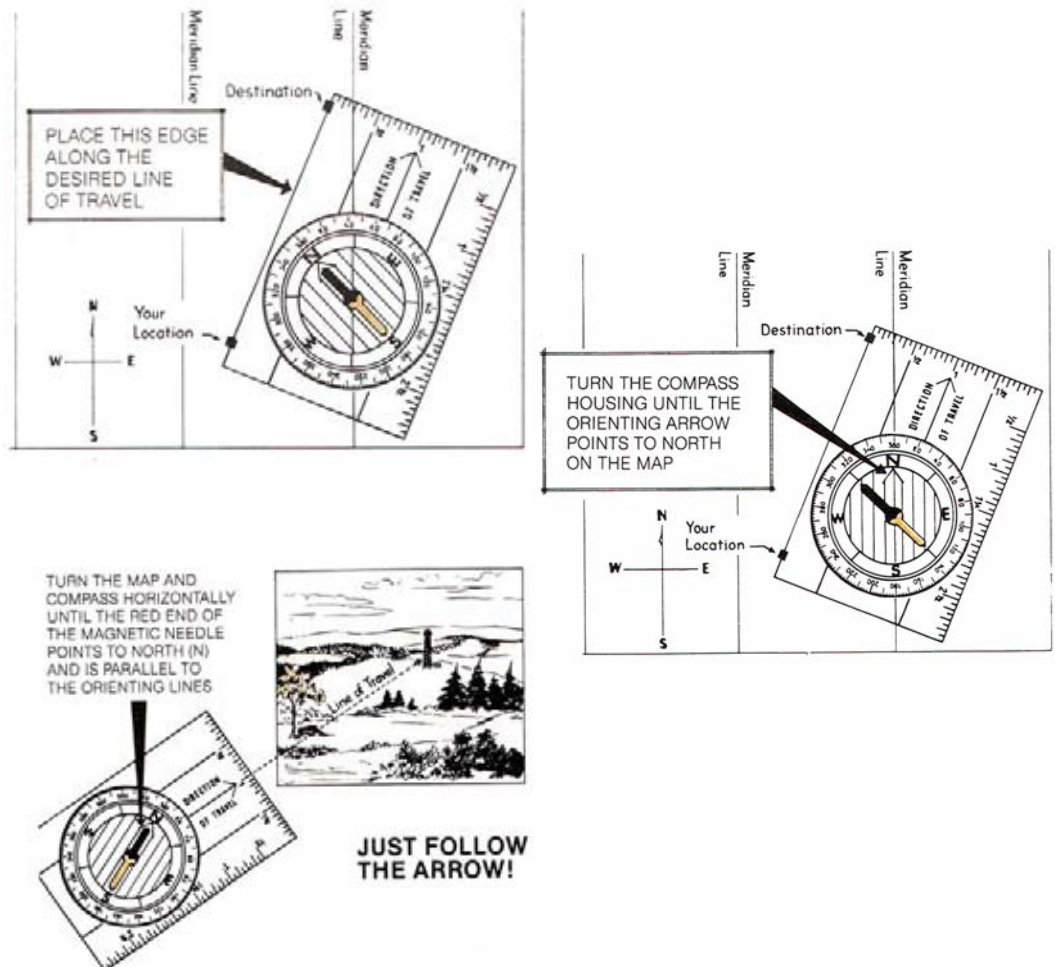
By Compass is usually a much easier and more reliable method, especially if you haven't yet identified on the map objects you see on the ground. The top of your map points in the general direction of north. The vertical lines, or Meridian lines, point to true north. Your map should show a north-south line in the margin or on the map itself. Turn the **housing** on your compass until the letter N (000° or 360°) is on the **direction of travel arrow**. Lay your compass on or near this line and then turn your map and compass together until the compass needle - or N-S line of compass - is parallel with the N-S line of your map, and the north end of the needle is pointing towards the top of the map. Try this. Your map is now orientated to within a few degrees (10°-20°) of final orientation. Now improve on the orientation by inspection.

By Inspection you can improve the orientation of your map if you are observant and look at the terrain around you and compare it with your map. When you recognize on the map the objects that you see on the ground check to see if you need to turn the map to more accurately line up those visible objects with those same object on the map.

Steps To Get Directions from a Map

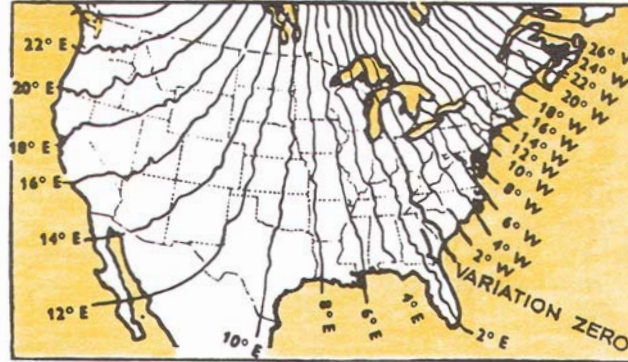
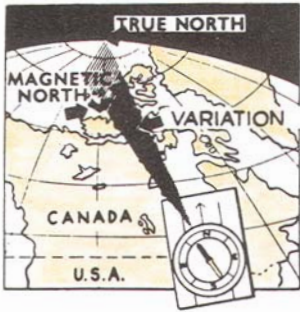
Secure a topographical map of your area and use for a practice map. Determine your location on it. Determine where you want to go on the map. Follow the illustrations below.

Knowing how to use a compass and map may help find and rescue people who are lost or need to find direction. We can point them in the right direction for their lives by sharing God's Word and love.



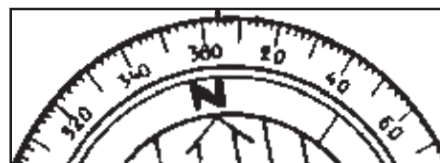
Adjust for Declination or Variation

We have now learned how to take a bearing from a map. However, a slight readjustment of the degree reading must be made in most areas if we wish to be perfectly accurate. This readjustment is necessary because the compass needle does not necessarily point to the true geographic North Pole. It points to the magnetic North Pole which is located in Northern Canada.



The difference between True North and Magnetic North is usually called **magnetic declination or variation** and the amount of this difference for any specific area is often shown in degrees on your map. If you happen to be on an extension of a line connecting the true and magnetic North Poles, there would be no variation and it is called the zero variation line. The zero line is not perfectly straight, but runs approximately along the eastern coast of Lake Michigan, through southeastern Indiana, through central Kentucky and Tennessee, then into northern Georgia and hits the Atlantic Ocean about two thirds of the way up the Georgia coast line. If you are located east of this line the compass needle points west of True North and is called westerly variation. If you are located west of the line, you have an easterly variation. The further away from the line you get, the greater is the variation. When adjusting the compass for this variation, first find the number of degrees of variation in your vicinity and also whether it is easterly or westerly.

If you have an easterly variation you subtract the amount of variation from the degree reading of your compass. If your compass setting is 014° and you have a 010° easterly variation, you reset your compass to 004° degrees. ($014^\circ - 010^\circ = 004^\circ$)



- Notes -

"Can two walk together without agreeing to meet?" (Amos 3:3)

If you have an westerly variation you add the amount of variation from the degree reading of your compass. If your compass setting is 014° and you have a 010° westerly variation, you reset your compass to 024° . ($014^{\circ} + 010^{\circ} = 024^{\circ}$)



Determine your magnetic variation for your area. Secure a topographical map of your area and it will designate it. Make the necessary variation and tell the degree reading. Do this two or three times from various points on the practice map.

Global Positioning Systems

While maps and compasses have faithfully guided travelers for centuries, modern technologies have offered new means of navigating. The premier method is the NAVSTAR GPS, an acronym standing for **N**avigation **S**ystem with **T**ime **A**nd **R**anging **G**lobal **P**ositioning **S**ystem. This system, created by the United States Department of Defense, offers highly accurate, reliable, continuous 24-hour, worldwide coverage for position reporting. Now operated by the US Air Force, the system is made up of 24 satellites circling the earth about every 12 hours at an altitude of approximately 12,500 miles. Each satellite transmits a signal giving a precise timing code, the date and the current and immediate future locations of all the other satellites. GPS receivers can compute their horizontal locations on the earth by receiving signals from as few as three satellites. 3-dimensional location (the addition of altitude) is possible after acquiring a signal from a fourth satellite.



Initially used by the military and made popular in Operation Desert Storm, the airlines and ship lines quickly took advantage of the new technology. With the innovation of small and relatively inexpensive, hand-held GPS receivers, GPS is no longer just for soldiers, pilots or ship captains. In fact, GPS receivers are in cars, computers and even cell phones.

While GPS receivers are extremely accurate, they are not without limitations. Like any electronic device, they have limited battery life. GPS units also need an unobstructed view of the sky. Many GPS are marketed as water resistant, but extreme outdoor activities can cause leaks during rain or high humidity, rendering the unit useless. Dense forests, tall outcroppings or deep valleys can prevent the GPS from receiving the satellite signals. Spare batteries should always be carried and if precise navigation is required, have a back-up GPS, map and compass available.