

" MEASUREMENT AND ORIENTATION ON THE GROUND WITHOUT A MAP"

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**Annotation**

This article provides information on measurement and orientation on the ground without a map.

**Keywords:** Orientation map, voxel, angular-position.

To navigate the terrain means to determine your location and directions to the sides of the horizon relative to the surrounding local objects and landforms, to find the specified direction of movement and accurately withstand it on the way. When orienting in a combat situation, they also determine the location of the unit relative to their troops and enemy troops, the location of landmarks, the direction and depth of actions.

The essence of orientation. Orientation on the terrain can be general and detailed.

General orientation consists in approximate determination of one's location, direction of movement and the time required to reach the final destination of movement. Such orientation is most often used on the march, when the crew of the car does not have a map, but uses only a pre-compiled scheme or a list of settlements and other landmarks along the route. In order to maintain the direction of movement in this case, it is necessary to constantly monitor the travel time, the distance traveled, determined by the speedometer of the car, and monitor the passage of settlements and other landmarks according to the scheme (list).

Detailed orientation consists in accurately determining your location and direction of movement. It is used when navigating on a map, aerial photographs, ground navigation devices, when moving in azimuth, mapping or mapping explored objects and targets, when determining the boundaries reached, and in other cases.

When navigating the terrain, the simplest methods of orientation are widely used: by compass, celestial bodies and signs of local objects, as well as a more complex method – orientation by map.

2. Orientation on the terrain without a map: determining the sides of the horizon by celestial bodies and signs of local objects.

To find the direction of the cardinal directions, the north-south direction is first determined; after that, facing north, the determinant will have the right — east, the left — west. The

cardinal directions are usually found by the compass, and in the absence of it — by the Sun, Moon, stars and by some signs of local objects.

### 2.1 Determination of directions to the sides of the horizon by celestial bodies

In the absence of a compass or in areas of magnetic anomalies, where the compass can give erroneous readings (readings), the sides of the horizon can be determined by celestial bodies: during the day — by the Sun, and at night — by the Polar Star or Moon.

#### By the Sun

In the northern hemisphere, the places of sunrise and sunset according to the seasons are as follows:

in winter, the sun rises in the southeast and sets in the southwest;

In summer, the sun rises in the northeast and sets in the northwest;

In spring and autumn, the sun rises in the east and sets in the west.

The sun is approximately at 7.00 in the east, at 13.00 — in the south, at 19.00 — in the west. The position of the Sun at these hours will indicate the directions to the east, south and west, respectively.

The shortest shadow from local objects happens at 13 o'clock, and the direction of the shadow from vertically positioned local objects at this time will point to the north.

To more accurately determine the sides of the horizon by the Sun, a wristwatch is used.

#### By the Sun and the clock

In the horizontal position, the clock is set so that the hour hand is pointed at the Sun. The angle between the hour hand and the direction to the number 1 on the watch face is divided in half by a straight line that indicates the direction to the south. Before noon, it is necessary to divide in half the arc (angle) that the arrow must pass before 13.00 and in the afternoon — the arc that it passed after 13.00

#### By the Polar Star

The north star is always in the north. To find the North Star, you must first find the constellation Ursa Major, resembling a bucket made up of seven fairly bright stars. Then, through the two rightmost stars of the Big Dipper, mentally draw a line on which to postpone the distance between these extreme stars five times, and then at the end of this line we will find the Polar Star, which, in turn, is located in the tail of another constellation called the Little Dipper. Facing the North Star, we will get a direction to the north.

On the Moon  
For approximate orientation (see Table 1), you need to know that in summer, in the first quarter of the Moon at 19 a.m. is in the south, at 1 a.m. — in the west, in the last quarter at 1 a.m. — in the east, at 7 a.m. — in the south. When the moon is full at night, the sides of the horizon are determined in the same way as by the Sun and the clock, and the Moon is taken for the Sun.

By melting snow

It is known that the southern side of objects heats up more than the northern side, respectively, and snow melting from this side occurs faster. This is clearly visible in early spring and during thaws in winter on the slopes of ravines, holes in trees, snow stuck to rocks.

By shadow

At noon, the direction of the shadow (it will be the shortest) points north. Without waiting for the shortest shadow, you can navigate in the following way. Stick a stick about 1 meter long into the ground. Mark the end of the shadow. Wait 10-15 minutes and repeat the procedure. Draw a line from the first shadow position to the second and extend it a step beyond the second mark. Stand with the toe of your left foot opposite the first mark, and with your right foot at the end of the line you have drawn. Now you are facing north.

In local subjects

It is known that the resin protrudes more on the southern half of the trunk of a coniferous tree, ants arrange their homes on the southern side of a tree or bush and make the southern slope of the anthill more gentle than the northern one

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