



MEDIEVAL ROUTES

LEARNING UNIT

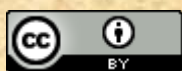
ERASMUS+ KA2 PROJECT
„GREAT ROUTES IN THE MIDDLE AGES AND THEIR
SYMBOLGY“



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Introduction

Long-distance trade played a major role in the cultural, religious, and artistic exchanges that took place between the major centres of civilization in Europe and Asia during antiquity.

Some of these trade routes had been in use for centuries, but by the beginning of the first Century A. D., merchants, diplomats, and travellers could cross the ancient world from Britain and Spain in the west to China and Japan in the East.

The trade routes served principally to transfer raw materials, foodstuffs, and luxury goods from areas with surpluses to others where they were in short supply. Some areas had a monopoly on certain materials or goods. China, for example, supplied West Asia and the Mediterranean world with silk, while spices were obtained principally from South Asia.



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These goods were transported over vast distances – either by pack animals overland or by seagoing ships – along the Silk and Spices Routes, which were the main arteries of contact between the various ancient empires of the Old World. Another important trade



route, known as the Incense Route, was controlled by the Arabs, who brought frankincense and myrrh by camel caravan from South Arabia.

Cities along these trade routes grew rich providing services to merchants and acting as international marketplaces.

Some, flourished mainly as centres of trade supplying merchant caravans and policing the trade routes. They also became cultural and artistic centres, where people of different ethnic and cultural backgrounds could meet and intermingle.

The trade routes were the communications highways of the ancient world. New inventions, religious beliefs, artistic styles, languages, and social customs, as well as goods and raw materials, were transmitted by people moving from one place to another to conduct business.



During this learning unit we will try to study five different topics, allowing us to learn about different subjects:



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1. Drawing of the Medieval Routes
2. Measuring Distances
3. Sailing and Astronomy
4. Current Analysis
5. Trekking Route.

With the proposed activities we will improve our knowledge about the Middle Ages.

It includes information about great medieval routes, commercial or religious, or both.

- The most important of these routes have been recorded.
- There is enough evidence about when, how and why they were made.
- The purpose of running the roads is described.
- The current situation of these routes.

The important role in the development of the cultures of the various countries through which the routes went is highlighted. It is also described how distances were measured and the navigation tools that were used by seafarers.



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This Learning Unit was created during the Erasmus KA2 Project „Great Routes in the Middle Ages and their Symbolology”, during the years 2016-2018 by six countries: France, Greece, Italy, Latvia, Poland and Spain. This project was co-funded by the Erasmus Programme of the European Union. The Schools taking part in the project were:

- Lycée Les Rimaux, Saint-Malo (France)
- 1st General Lyceum of Trikala (Greece)
- ITE Vitale Giordano, Bitonto (Italy)
- Jelvaņa 4. Vidusskola (Latvia)
- Zespół Szkół nr 5 im. Jana Pawła II, Jastrzębie-Zdrój (Poland)
- IES Emilio Jimeno, Calatayud (Spain)

This unit is the result of the work of all partners in a number of related activities.

It includes materials in different formats. Those in digital format are linked with the printed material by several ways:

- With QR codes, possible to read with any QR reader. We will find two types of QR codes in this Learning Units, as we can see in the following pictures:

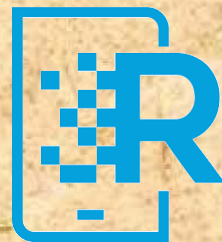


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The one on the left refers to contents present in the web. The one on the right contains materials present in the web but created during the project.

- With short URL, possible to type if necessary producing less errors than usual URL.
- Augmented reality contents, which are linked to images containing the logo of HP Reveal, the app needed to access to them.



To be able to access to these contents, you have to follow the HP-Reveal account „greatmiddleroutes“



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Objectives

1. Analyse great European routes from an integrated perspective which allows understanding its relevance for cultural transmission in all his perspective.
2. Study the reasons of its drawing, its economic, social and human dimension.
3. To find possible routes between different countries and present them on maps.
4. Each country to show its strong points and lacks.
5. Find ways to represent these maps in a digital way.
6. Analise the current situation of these routes
7. Study the way medieval people used to measure various distances using different units
8. Find instruments and units of measurement.
9. Learn about the navigation tools.



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rawing of the Medieval Maps and Current Analysis

In this chapter each partner prepared maps on which all the great routes of their countries are mentioned

- The trade routes (with a red colour)
- The religious routes (with a violate colour)
- The sea routes (with a blue colour)
- The cattle routes (with a green colour)
- The river roads (with a blue colour)

On the map roads were settled red dots to indicate the main cities and black dots to indicate the significant towns.

After it, digital interactive maps were created, and the reader is able to find information or photos or videos related to the mentioned cities and towns, pressing click on the specific signs that are on the screen-map.



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In this way one can see the routes all over the Europe in Middle Ages, to learn about the different ways the people travelled and the reason for it (trade, religious etc.)

The students:

- Studied the current situation of the different Medieval Routes, including the possibility of being used, and finding the best way to do it.
- Studied the correlation of different routes. For example Egnatia Road in Greece was a continuation of Apia road in Italy.
- Took place in a contest among the different countries to search for the cheapest and fastest routes travelling through the different cities involved in the project, following the order of the Meetings.

More specifically we will see:

- The work of each country (following the order of the Meetings)
- The routes they have presented (trade or religious) and the current situation of them.



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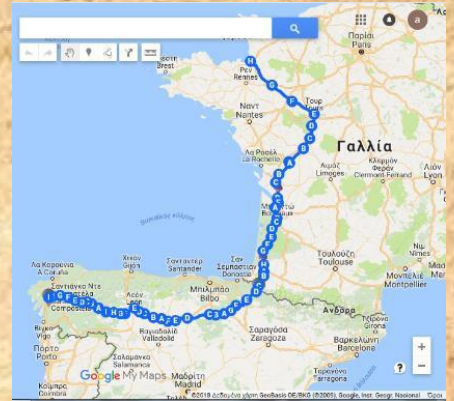


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FRANCE

PILGRIMAGE ROUTE FROM THE MONT SAINT MICHEL TO SANTIAGO DE COMPOSTELA

There were equally plenty of ways of getting to Santiago de Compostela... Ever since the year 813, when the tomb of St. James was claimed to be (re-)discovered there, the city of Santiago de Compostela in northwestern Spain has attracted many thousands of Christian pilgrims from all parts of Europe, particularly in the middle Ages.



The first French pilgrims heading for Santiago de Compostela probably made the journey to Spain in the middle of the 11th Century, but it only became really popular for overseas pilgrims in the 12th Century.



France offered freedom of passage, so it became a popular route for pilgrims from other European countries, and the tourist industry became widespread on these routes as the traders looked to benefit from the passing commerce. For many, the pilgrimage offered a route of penance, where people would atone for their sins by walking to Santiago de Compostela.



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Almost every West European country has an association, society or confraternity dedicated to pilgrimage to Santiago de Compostela, often carrying the name of the apostle involved St. James. These organisations all provide information on the pilgrimage to their members, and also issue an official internationally recognized 'pilgrim pass'. Having collected the correct stamps in route, pass-holders are entitled to the official 'Compostela' certificate to prove that the pilgrimage was accomplished as intended.



The St James' current routes of the pilgrimage to Santiago de Compostela are almost identical to those which were used by pilgrims in medieval times. In 2017, 300,000 pilgrims travelled to Santiago de Compostela, compared to 277,000 in 2016. The proportion of men and women is almost equal (51 % men / 49 % woman). In terms of age, over half of the pilgrims are between 30 and 60 years old. Their motivation is primarily for religious purposes, although a good number also value the cultural aspect.



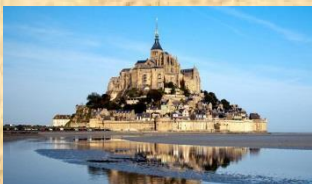
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PILGRIMAGE ROUTE FROM THE MONTE GARGANO IN ITALY AND THE MONT SAINT MICHEL IN FRANCE.

In Italian, it's known as the Via Micaelica, and it links different places of worship linked with the name of Saint Michael from Skellig Micheal in Ireland to St Michael's Mount in Cornwall, England and the Mont Saint Michel in France. It is also known as the „Cult of the Angel“.



The appearance of the Archangel Michael in the Gargano consecrated

this area of Puglia as a religious site. During the middle Ages, in fact, a variation was imposed for the route taken by pilgrims from Rome directed to the Holy Land: the portion of the Sanctuary of St. Michael, the Archangel warrior who was dear to the Lombards. The legend surrounding the Sanctuary of San Michele in Gargano, Puglia in Southern Italy proved to be an inspiration for the Mont Saint Michel in Northwestern France. Both are attributed to Saint Michael's apparition, telling a local priest to build a chapel on top of the mountain. Kings, Popes and Emperors all travelled the route to Gargano on their way to Jerusalem.



There is even an extension of this route to cover Saint Michael's



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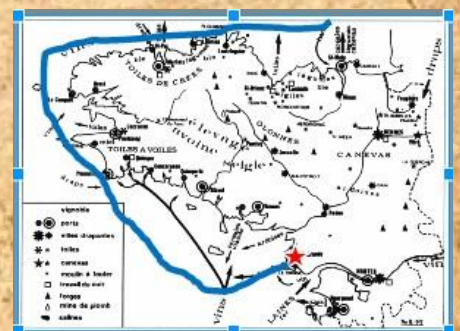
Mount in Penzance, which the Normans had built after conquering England. The Archangel Saint Michel became known as a guardian angel, and many chapels were dedicated in his honour in many countries across Europe.

The St Michael's Route of today is still made up of the same paths as those used in the Middle Ages. The cross-border links of the Saint Michel Pathways initiated the networking of several Michael sites: Mont Saint-Michel, Saint-Michel chapel of Aiguilhe and Saint-Michel-de-Cuxa in France, Monte Gargano and the Sacra di San Michele in Italy, St Michael's Mount in England, the Skellig Islands in Ireland and, in Belgium, the city of Brussels, under the patronage of the Archangel.

Between 20,000 and 30,000 pilgrims use this route every year. The Routes of Saint Michael were declared Cultural Route by the Council of Europe in 2007. However, a significant number out of the 2.5 million visitors to the Mont each year, come purely for tourist purposes and use other modern means of transport. In the middle Ages, virtually all who journeyed to the Mont Saint Michel, did so for religious reasons.

SALT ROUTE — GUÉRENDE

The transport of salt was via internal rivers and also via the sea to export it to other countries.



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Guérande salt has a very long history, having been harvested on the peninsula since the Iron Age. The first salt works to use the storage capacity of the lagoon goes back to the third century, shortly after Roman conquest.



The real inspiration behind the use of salt marshes came from the monks from Landévennec Abbey, who, in 945, founded Batz Priory in the region. By studying the tides, wind and sun, the monks mapped out a plan for the salt works, which still exists today.

An enormous, laborious project, this open-air factory brought prosperity to Guérande for many centuries and opened up the first trading routes in Europe, becoming the „Eldorado“ of Brittany. Salt production and trading has been carried on in Beyond for two thousand years.

The Salt Route in the Camargue region of France was an essential route for merchants to keep their meat deliveries fresh on their long journeys. Salt from the "salines" in the Camargue was transported by boat along the Mediterranean coast, and then inland through the mountains by mule. The routes often avoided the main roads so as to avoid the "brigands". The main purpose of the salt was to act as a preservative for meat to keep it fresh on its journeys inland.



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Today the original use of the salt, became pretty much obsolete. Nowadays, salt is used to season foodstuffs, in agriculture, and consumers also use rock salt to dye fabrics, such as clothes, in a washing machine.



We now use it also to grit the roads when there is freezing weather or snow on the way. Salt has many other modern uses, too.



The invention of refrigerated Lorries replaced the role of the mules. Distribution is mainly achieved with Lorries using the existing road/motorway network covering the entire country. Trains were also used, but the line was discontinued.

WINE ROUTE

BORDEAUX: The history of Bordeaux wine spans almost 2000 years to Roman times when the first vineyards were planted.



In the middle Ages, the marriage of Henry Plantagenet and Eleonor of Aquitaine opened the Bordeaux region to the English market and eventually to the world's stage.



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The name Bordeaux derives from the French *au bord de l'eau* which means "along the waters" and makes reference to the Gironde Estuary and its tributaries, the Garonne and the Dordogne rivers which play a pivotal role in the history and success of the region.

LOIRE VALLEY: By the 11th century the wines of Sancerre had a reputation across Europe for their high quality. In the High Middle Ages, the wines of the Loire Valley were the most esteemed wines in England and France, even more prized than those from Bordeaux.



The Wine Route—Sea nowadays: 6 of the 7 more important French harbours are situated on the Atlantique facade. The old



wine road is nowadays followed by lots of vessels transporting goods ... going then to Rotterdam and Ports of northern Europe.

The Wine Road — Land is now: A62 from Bordeaux to Toulouse — A61 from Toulouse to Narbonne — Then it joins A9 from Narbonne to Perpignan who is the main road between France and Spain.

Trading Routes Merchants travelled on trade routes between north and south that followed the Meuse, Saône, and Rhône Rivers. However, a more direct route between the Rhône Valley and West Flanders later emerged. It ran from the Saône across the upland of Langres to the headwaters of the Paris Rivers, and then north toward Lille and Arras.



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LATVIA

Latvia is a famous ancient trading point. Trade in the territory of Latvia rapidly developed in the second half of the 1st millennium, when the precious metal (silver, gold...) appeared in trade more and more. Across the European continent, Latvia's coast was known as a place for obtaining amber. In the Middle Ages amber was more valuable than gold in many places.



The Livonians and Latgallians used the Daugava and Gauja waterways to trade with the Eastern Slavs, but for the trade with the ancient Scotties and Scandinavians - the Baltic Sea. The Livonians were courageous and spiritually strong seafarers.

The furry leather was mainly exported, but salt was gaining more importance in import (until the 2nd half of the 19th century, salt and herring were the most important import goods in Latvia).

The Baltic Sea provided maritime connections with the rest of the world. Trade routes between Scandinavia and Byzantium, as well as Western Europe and Russia, went through the territory of Latvia.



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The famous route from the Vikings to the Greeks' mentioned in ancient chronicles stretched from Scandinavia through Latvian territory along the river Daugava to the Kievan Russ and Byzantine Empire.

The Hanseatic League was a commercial and defensive confederation of merchant guilds and market towns in Northwestern and Central Europe. Growing from a few North German towns in the late 1100s, the league came to dominate Baltic maritime trade for three centuries along the coast of Northern Europe. It stretched from the Baltic to the North Sea and inland during the Late Middle Ages and declined slowly after 1450.

The league was created to protect the guilds' economic interests and diplomatic privileges in their affiliated cities and countries, as well as along the trade routes the merchants visited.



The Hanseatic cities had their own legal system and furnished their own armies for mutual protection and aid. Despite this, the organization was not a state, nor could it be called a confederation of city-states; only a very small number of the cities within the league enjoyed autonomy and liberties comparable to those of a free imperial city.



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The most significant city of the union was Lübeck that became a central node in the seaborne trade that linked the areas around the North and Baltic seas. Lübeck was a city next to the Traves River that flows into the Baltic Sea, so it was the ideal cargo reloading place for the hanseatic cargo ships "Koges". It became a leading city in the union and maintained its „free city“ status from the year 1226, until 1937. The hegemony of Lübeck peaked during the 15th century.



In time, the cities of Livonia also became members of the Hanseatic Union. The inclusion of the Latvian cities in the Hanseatic Union was done mainly because of the infrastructure of the waterways – the Baltic Sea and the rivers that went through Latvia such as the Daugava, Venta and Gauja.

Hanse traders used also big rivers as trade routes:

Ventas waterway at Kurzeme starts near Ventspils and was available for sea-going ships up to Ventas rumba near Kuldīga, which was an important road point of intersection. Road extension attempts were made to build a channel around the hub, but the project was not completed. To guard and monitor the road, were built in Ventspils (1290), Piltenes (1309) and Kuldīgas (1242) fortresses.



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The Venta River has a length, in Latvia, of 176km, roughly half of its entire course; the rest, including its source, is in North-Western Lithuania. It culminates in Ventspils, a historic town on Latvia's Baltic Sea coast.



Nowadays, above and below the town of Kuldīga, the Venta River is distinguished by a variety of biotopes — hillside forests, sandstone and dolomite cliffs, meadows, protected plants and animals, and diverse landscapes. There is popular tourism

objects in this part of Kurzeme — the Venta dam, the stone bridge of Kuldīga, the Veckuldīga castle hill, etc. An ecological tourism trail runs along the banks of the Venta, and a bicycling trail has been installed on its left bank.

Daugavas waterway started at Rīgas port at the mouth of the river Rīdzene. River Daugava has its spring in Russia, close to those of River Volga. It was once part of the Berezina waterway which started at Riga and led to the Black Sea. Daugava road terminus was originally at Smolenska, and later Polocka and Vicebska. The Vikings were aware of the river during the 5th century AD. Krāslava is the site of an ancient castle hill, and the fearless sailors were well aware of it in that downriver from it, the ships could



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sail with raised sails.

Goods from the East sailed down the river to Riga, where it was reloaded into seafaring ships for delivery to Europe. Many powers wanted to control and govern the process, as is seen in the large number of castle hills, castles and populated areas around the river's banks. The majestic ruins of the Koknese Castle, Krustpils, the grassy and mighty castle hill at Aizkraukle, another one at Daugmale.

Today the river is only navigable on its first 10 km. The last few years impressive power stations with their barrier lakes were developed on its underflow. Therefore, navigation on the once proud river is cut off the mouth at Riga on three positions. Under the water in the Daugava are the ruins of the ancient Ikšķile Castle that was built by St Maynard himself. It is seen as the first brick building in the Baltic States. The curves of Daugava are unique. The village of Slutišķi is particularly known because the Daugava there is just like it has been in the past.

Gaujas waterway trough Turaida and Cēsis led to Tērbata. The Hanseatic time was mostly used as a land route for trade with Pskov and Novgorod cities. Before 13th century the Gauja River served as a merchant's route and waterway for ships. Merchants would ship a multitude of goods via the Gauja River, including herring, spices, salt, weapons and jewelry. Along the way, they purchased honey, wax and furs from the locals.



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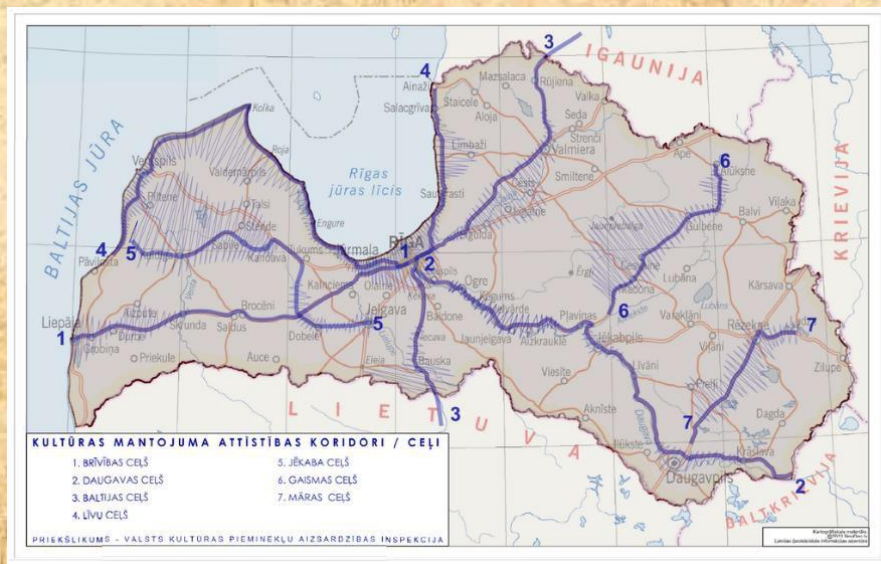


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One branch of the road went along the Gauja to Cēsis town, from which a land route along the Rauna, Smiltene, Gaujiena and Alūksne palaces of Izborsk and Pskov cities.

The second branch of Turaida led to Limbaži, along Burtnieki and Rūjienas castle and the city of Viljandi.

The third branch through Straupe town led to the city of Valmiera, Valka further along the castle of the city of Tartu river. In ancient Latvian, Gauja means 'large quantity' thus the Large River.



The Gauja is the only one of Latvia's large rivers to begin and end in Latvia. The total length is 460 kilometers, from which one fifth, or 93.5 kilometers, is within Gauja National Park.

In Gauja National Park, the river flows through a 1-2.5 kilometer wide ancient valley which is at its deepest around Sigulda at 85 meters.

Back when the Liv language was spoken in the area, the river was called Koivo-birch or sacred.

Today the rivers' network is well-developed in Latvia. Although it has lost its importance as a part of trade routes, rivers are important drinking water source and energetic resource. The Gauja



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River and rowing track "Goat rapids" attract water fun lovers. The paths along the steep shores of the Gauja River are places full of the feelings of nature!

End of Livonia

In the 13th-15th centuries forest products, fodder products and cereals were quite a bit exported, but in the 16th century the situation changed. The price revolution in Western Europe, triggered by the discovery of America, the economic and social processes in Europe, created favorable conditions for the export of Livonia's agricultural goods and timber. At the end of the 15th century, due to the Great Geographic Discoveries, colonial goods appeared on the Livonian markets - pepper, nutmeg, raisins, and other exotic items. Before then there were no overseas goods in Livonia. In the economic life of Livonia, local trade, which was manifested mainly as exchanges between cities and countryside was very important. In this trade important role was played by local non-German merchants.

After Livonia ceased to exist (1561), Riga was ruled by Poland (from 1569 to Zhitomir) and later by Sweden (from 1629). The both countries significantly supplemented their richness with new customs duties and licenses. The small towns of Latvia were used as a collection places of goods for Riga foreign trade



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In the middle of the 17th century the Duke of Kurzeme and Zemgale Dukedom Jacob Ketler strived to develop more extensive foreign trade through Ventspils and Liepāja. The turnover of the port of Liepāja increased



especially after Riga became subordinated by the Swedish jurisdiction.

Through the port of Liepāja, they exported crops, flax, hemp, meat and leather, butter to the West, but imported herring, salt, textiles, iron, wines, spices and jewellery. These trade links between Liepāja and West were maintained by the German city Lübeck ship owners.

After the annexation the territory of Latvia to the Russian Empire in the 18th century Riga became one of the empire's foreign trade centers (from 1800 to 1860, 10-25% of all Russian exports went through the port of Riga). In the first half of the 18th century the main foreign trade partner of Riga was the Netherlands, but in the end of the century - Britain (England)

In 19th century, local trade in Latvia developed slowly. The exchange of goods among towns and countryside in the conditions of subsistence was negligible. It became more active since the second half of the 18th century, when agriculture developed producing goods



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for trading.

In the first half of the 19th century the Great Guild lost its significance, the Riga Stock Exchange became the main organization of Riga merchants. In the second half of the 19th century, trade turnover continued to increase. Through the ports of Latvia, timber, cereals, linen, linseed, leather, hemp, fodder cabbles, as well as butter and eggs were exported, but from the 80-s it imported coal, cotton, machinery, rubber, cork and colored wood, fertilizers, tea, coffee, copra, jute and, of course, salt and herring.

In 20th century, all major means of transport were developed in Latvia: rail, car, sea, river, air and pipeline transport. In Riga, Daugavpils and Liepāja, passengers were transported by electric transport - trams, and from 1946 in Riga were also trolleybuses. The first gas pipeline Dašava-Riga was built in 1962, but the first oil pipeline in Polotsk-Ventspils was 1968. The Latvian railways transport was partially, while maritime transport and oil pipelines were fully operational for the export and import of the USSR.

HANZA NOWADAYS

In 1980 after the initiation of Zwolle, a city in Netherlands a modern „City League the Hanse“ was founded, thereby also the historical tradition of Hansa Days was renewed. 183 cities from 16 states have joined the modern „City League the Hanse“.

The aim of modern „City League the Hanse“ is to promote the cooperation of its member cities, in order to invest in the



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development of their economic, social, cultural, and tourism. Since September, 2000 the city of Riga has officially entered the modern „City League the Hanse“.



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GREECE

VIA EGNATIA (COMMERCIAL ROUTE)

Via Egnatia was constructed by the Roman proconsul of Macedonia Gnaeus Egnatius in the 2nd century BC. This is where its name comes from. It was constructed in order to link a chain of Roman colonies stretching from the Adriatic Sea to the Bosphorus. The route gave the colonies of the southern Balkans a direct connection to Rome.



It was also a vital link to Roman territories further to the east. It was the biggest commercial road during the ancient times covering a distance about 535 miles (1120 km) and its width was about 3 meters, while in the big cities it was 5 meters long. It was repaired and expanded several times but experienced lengthy periods of neglect due to Rome's civil wars.

Since its construction, the Egnatia road was the „continuation“ of Appia Road in Italy. Egnatia started from Dirrahiu and ended in Constantinople. It was used till the early 20th century.

Today the AutoRoute A2, also known as „Egnatia Road“, is part of the European street 90. This auto route is the biggest one in Greece. It starts from Igoumenitsa and ends on the borders of Greece with Turkey, in Kipoi, Evros. Its length is about 670



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km. It was named after the Ancient Egnatia Road that was crossing almost the same area. The construction of the Egnatia road started in 1994 and its bigger part was completed in May 2014. It is connected to four ports, six airports and includes many tunnels, bridges and grade-separated junctions.



Great effort of the Greek State to give prominence to the archeological sites and



monuments, they are about 270 on the sides of the contemporary road, either in the same parts with the ancient road or to some approximate locations



Students, researchers, professors and amateurs from the organization FuoriVia and the IUAV University work on the project Via Egnatia that is going to be completed in 2019. The main goal of the Via

Egnatia project is the strategic designing that aims at the development of the Egnatia road through the maintenance, the exploitation and the reexamination of the historical and cultural route under a participatory approach.

THE TRADE ROUTE FROM THE VARANGIANS TO THE GREEKS was a medieval trade route that connected Scandinavia, Kievan Rus' and the Eastern Roman Empire. The route allowed merchants along



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its length to establish a direct prosperous trade with the Empire, and prompted some of them to settle in the territories of present-day Belarus, Russia and Ukraine. The majority of the route comprised a long-distance



waterway, including the Baltic Sea, several rivers flowing into the Baltic Sea, and rivers of the Dnieper river system, with portages on the drainage divides.

An alternative route was along the Dniester River with stops on the Western shore of Black Sea. These more specific sub-routes are

sometimes referred to as the Dnieper trade route and Dniester trade route, respectively. Those were the critically important trade links at that time, connecting Medieval Europe with wealthy and developed Arab Caliphates and the Byzantine Empire; Most of the silver coinage in the West came from the East via those routes.

The Trade Route from the Varangians to the Greeks was used to transport different kinds of merchandise. Wine, spices, jewelry, glass, expensive fabrics, icons, and books came from the Byzantine Empire. Certain kinds of weapons and handicrafts came from Scandinavia. Northern Rus' offered timber, fur, honey, and wax, while the Baltic tribes traded amber.



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In the second half of the eleventh century, the Crusades opened more lucrative routes from Europe to the Orient through the Crusader states of the Middle East. By that time, Rus' had strengthened its commercial ties with Western Europe, and the route from the Varangians to the Greeks gradually lost its significance.

Nowadays about 30 Greece runestones, containing information related to voyages made by Norsemen to the Byzantine Empire have been found in modern-day Sweden.



"In memory of his kinsman-by-marriage. (He) travelled competently; earned wealth abroad in Greece for his heir."

They were made during the Viking Age until about 1100 and were engraved in the Old Norse language with Scandinavian runes. On these runestones the word Grikkland appears in many inscriptions. Among the

runestones of the Viking Age, 91 — 10% report that they were raised in memory of people who went abroad, and the runestones that mention Greece constitute the largest group of them. The reasons for the tradition include inheritance issues. Several runestones explicitly commemorate inheritance such as the Ulunda stone and the Hansta stone. Most of the Greece runestones are from Uppland and relate it to the fact that it was the most common area to start a journey to Greece, and the area from which most Rus' originated.



"These landmarks are made in memory of Inga's sons. She came to inherit from them, but these brothers — Gerðarr and his brothers — came to inherit from her, they died in Greece."



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THE SILK ROAD was an ancient network of both the terrestrial and the maritime routes connecting Asia with the Middle East and southern Europe. The Silk Road derives its name from the lucrative trade in silk carried out along its length, beginning in the Han dynasty.



Trade on the Road played a significant role in the development of the civilizations of China, Korea, Japan, the Indian subcontinent, Iran/Persia, Europe, the Horn of Africa and Arabia, opening long-distance political and economic relations between the civilizations. Though silk was the major trade item exported from China, many other goods were traded, as well as religions, syncretic philosophies, and technologies. Diseases, most notably plague, also spread along the Silk Road. In addition to economic trade, the Silk Road was a route for cultural trade among the civilizations along its network.



There were many caravanserais along the Silk Road where travelers could rest and recharge. Caravanserais were oasis-like way stations located roughly a day's journey apart along the vast expanse of the Silk Road. At these

roadside oases, travellers could rest themselves and their animals, replenish supplies, chat with fellow travellers, and generally gain respite from their arduous tasks.



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The Bactrian camel helped make the Silk Road possible by transporting goods across the harsh terrain of Central Asia. The Bactrian camel is a remarkable creature. Well-adapted to the harsh conditions of Central Asia, it could easily withstand temperatures ranging from minus 40 degrees Fahrenheit in winter to over 100 degrees Fahrenheit in summer. The Silk Road's significance steeply declined after the fall of the Yuan Dynasty. Old silk road had stopped serving as trade route in about 1453 when Ottoman empire's supremacy re-rose.

Today, it is used as a tourism route and seldom trade is made along the road. In 2013, President Xi Jinping announced that the Silk Road would be reborn as the Belt and Road Initiative, the most ambitious infrastructure project the world has ever known—and the most expensive. Its expected cost is more than a trillion dollars. When complete, the Belt and Road will connect, by China's accounting, sixty-five per cent of the world's population and thirty per cent of global G.D.P. So far, sixty-eight countries have signed on. In June 2014, UNESCO designated the Chang'an-Tianshan corridor of the Silk Road as a World Heritage Site

THE MARINE ROUTES

Greece is a country surrounded by water, and the sea has always played an important role in its history. The ancient Greeks were active seafarers seeking opportunities for trade and founding new independent cities at coastal sites across the Mediterranean Sea.



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Trading stations played an important role as the furthest outposts of Greek culture. Greek goods, such as pottery, bronzes, silver and gold vessels, olive oil, wine, and textiles, were exchanged for luxury items and exotic raw materials that were in turn worked by Greek craftsmen.

The exchanges in the Aegean area were intense; products from regions nearby (Asia Minor coast) or more distant (Tunisia) arrived in Istanbul, the Aegean Islands, Crete and Cyprus.

THE WAY TO THE HOLY LAND (RELIGIOUS ROUTE)

Religious trips were the most common:

many pilgrims were departing for the Holy Land while others visited temples, monasteries and holy places with miraculous saints.

The Byzantines considered Sinai as an integral part of the Holy Land. In the region of Mount Sinai, ascetics flocked to dedicate their life to the divine.

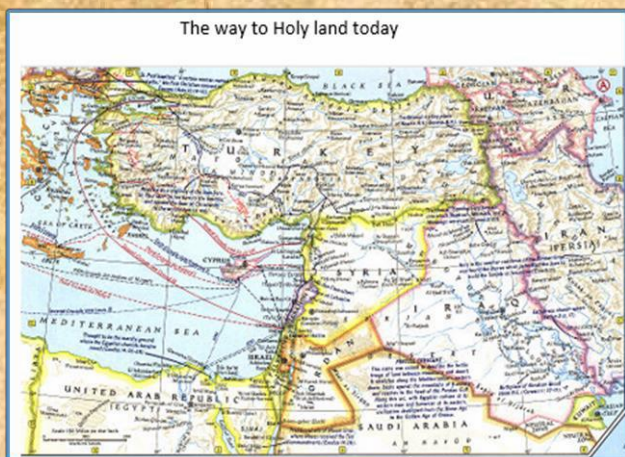


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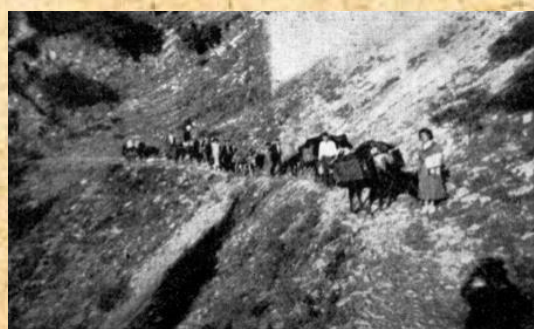


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Many pilgrims, who arrived in Jerusalem and Bethlehem to see the parts of the Birth, Passion and Resurrection of Christ, also visited the Sinai because they considered the place also Holy Land due to the presence of the "Blasted and Not Damaged Vatus" And the tradition of Decalogue to Moses, according to the biblical text.



„VLACHOSTRATES“ (LOCAL STREETS OF VLACHS).



In the central areas of Greece, the transportations were organized in caravans. The transportations of the Vlachs of Pindos as nomads occurred two times per year: one in April and one in October. The same

paths were used during the whole year for the transportation of a variety of products and commodities. The annual movement of sheep and goat flocks between summer and winter pastures was at the heart of the cultural and social composition of mountain farming communities, and has greatly contributed to shaping the landscape of historically developed areas. Moving farmers were carriers of knowledge and practices that related to optimal utilization of available natural resources (meadows, water resources, etc) and climate data, and on the other hand to the production of quality agri-food products.



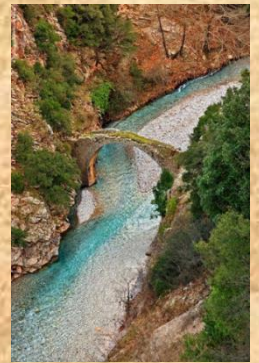
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In modern times, the routes of trade and tourism have



remained the same, but the „means“ have changed a lot. Due to the new



roads, the old ones were abandoned in several areas, while the old bridges left there to remind us their major role in the transportation routes in the past. The routes of the nomads Vlachs in Pindos are now abandoned, as a reminder of their glorious past.

The sports today follow the ancient routes! A great variety of activities „give life“ to the monuments and people has the chance to discover the old routes with new ways. The old paths of the monks and „quieters“ of the past in Meteors offer a revitalizing contact with the nature.

ITALY



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THE VIA FRANCIGENA is the ancient route that in medieval times connected Canterbury to Rome and to the harbors of Apulia.



The final part of Via Francigena which joined various European Countries was the Southern Via Francigena, which crossed part of Puglia and included the ancient Via Appia and the Via Traiana.

APPIA WAY is one of the earliest and strategically most important Roman roads of the ancient republic. It connected Rome to Brindisi, in southeast Italy. The road is named after Appius Claudius Caecus, the Roman censor who began and completed the first section as a military road to the south in 312 BC during the Samnite War.



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The Appian Way was the first long road built specifically to transport troops outside the smaller region of



greater Rome. By the late Republic, the Romans had expanded over most of Italy and were masters of road construction. Their roads began at Rome, where the master itinerarium, or list of destinations along the roads, was located, and extended to the borders of their domain — hence the expression, "All roads lead to Rome".

As the main highway to the seaports of southeastern Italy, and thus to Greece and the eastern Mediterranean, the Appian Way was so important that during the empire it was administered by a curator of praetorian rank.

The road averaged 20 feet (6 meters) in width and was slightly convex in surface in order to facilitate good drainage.



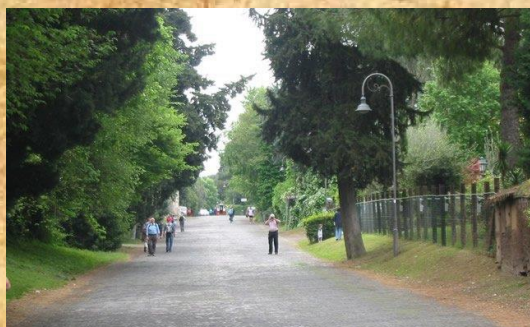
Today the first few miles of the Appian Way outside Rome are flanked by a striking series of monuments, and there are also milestones and other inscriptions along the remains of the road.



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The Via Appia Antica, near Rome, is now part of a nature and archaeological park, the Parco Regionale dell'Appia Antica. As well as being a genuine attraction, it is a delightful contrast to the traffic and bustle of

Rome just a couple of miles away.

Walking along the Via Appia Antica is a refreshing change from the city. The road is attractive and atmospheric, with plenty of grassy spots where you can picnic. The Parco Regionale dell'Appia Antica is a big place, you can even go on long bike rides of over 30km within the park.

VIA TRAIANA was an alternative to the Via Appia that was built by Emperor Trajan in 109 AD.



Strabo notes that the new coastal road was a day's travel shorter between Benevento and Brindisi. It wasn't actually shorter in distance, but the geography is mainly flat once the road makes it into Puglia and it was much easier going, thus faster.



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During the Lombard times Via Traiana, part of Via Francigena, was used by pilgrims going to San Michele Arcangelo (Monte Sant'Angelo sul Gargano).

The Templars and Hospitaliers built hotels and hospices for travellers along its path and ensured the safety of the journey.

Along this road there were numerous post stations used to take care of carriages, change horses and for travellers.

Today, the towns and sites along the Via Traiana make up an interesting travel itinerary for the tourist with a car.

The ancient routes correspond to the traces of modern roads that are

used for tourism and can be traveled by cars (for example, la Via Aurelia, which is also part of Via Francigena and that

is one of the most important Italian roads,

the S.S.1)



The southern Francigena way corresponds to the route of the Via



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Appia and the Via Traiana. There are itineraries to do on foot or by bike. Along the way there are artistic places and monuments to visit, hostels and hotels, archaeological sites.

LA VIA SACRA

The mysterious and evocative St. Michael's Sacred Line joins seven monasteries dedicated to the Archangel

Michael for over than 2 000 km crossing Europe. This line is one of the so-called 'ley lines', straight lines that touch important points of the world, very exclusive places already considered in prehistoric times.



The seven shrines of the Sacred Line of St. Michael are:

- Skellig Michael (Ireland),
- St Michael's Mount (Great Britain),
- Mont Saint Michel (France),
- The "Sacra" of San Michele (Piedmont, Italy),
- San Michele (Apulia, Italy)
- St. Michael's Monastery (Simi -Greece),
- Monastery of Mount Carmel (Israel).



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They are high symbolism and spiritual places.



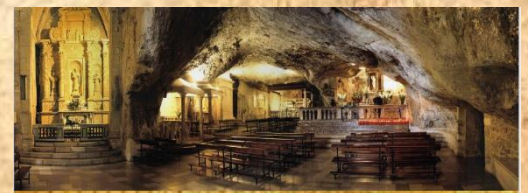
According to the legend, the Holy Line of St Michael is the sword thrust that he inflicted to the Devil to send him back to the hell. The Sacred Line is



in perfect alignment with the sun on the day of the Summer Solstice. St. Michael is venerated by the Christian tradition as a defender of the Christians; represented as a warrior, he is called in defense against the enemies of the Church.



The Emperor Constantine I, since the year 313 showed him a special devotion,



Santuario di San Michele Arcangelo,
Monte Sant'Angelo - Puglia

dedicating him the Micheleion, an imposing shrine erected in Constantinople.

THE TRATTURI are the mountain grassy paths that shepherds traditionally used two times a year for transhumance (precisely at the end of the summer and the beginning of the spring) to move their herds from the mountains in Abruzzo to the Tavoliera, or Plain, of the Apulias, and back. In 1155 the Norman King William I stated the constitutional rules concerning the use of pastures and the rents. He declared the area of the "Tavoliere delle Puglie" his property and large areas of the regions of Abruzzo, Apulia and Basilicata.



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were used as grazing land.

The shepherds used to live outdoors and



spent many months with their flock in order to meet the water needs of the cattle and the specific characteristics of the pasture.

Along the ancient greenways, the transhumance shepherds brought with them the tools they needed which were carried by mules and donkeys.

They used instruments often built by hand, such as bowls, stools made with ferrule, wooden buckets, and collars to keep the wolves away, saddle bags and cloaks.



They ate herbs and fruits that were found along the way. If a sheep or a lamb died, they ate the meat



after cooking it with wild herbs. The life of shepherds was very hard: they were always in danger for the attacks of wolves or for snake bites.

Over the centuries many churches have been built along the tracks, characterized by a strong link with the pastoral world: the shepherds often found in the religious support the strength to face the difficulties along the way.



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The tracks were scattered with a number of facilities useful to bring comfort to shepherds, religious people, pilgrims and wayfarers such as taverns (regarded as the transhumance motel), fountains and rest places.

The opening and closing of the transhumance period coincided with two important pilgrimages to the cave of San Michele Arcangelo in Monte Sant'Angelo (29 September and 8 May). The shepherds were happy to participate to these two pilgrimages as St. Michael was considered by the shepherds the patron of the animals.

The masserie are old Apulian farmhouses where both farming and sheep and cattle rearing were practiced. Those situated along the medieval tracks were built on the sites



of ancient post houses and they often hosted the pilgrims of the Via Francigena, while the MASSERIE located along the Tratturi (sheep- tracks) were used to give shelter to the transhumance herd.

Today, tourists can walk the same ancient paths that shepherds once followed with their herds (some still do), coming to intimate terms with the transhumance lifestyle: sheeps, cows and donkeys transported along the Tratturi the furnishings and fittings that shepherds would use upon settling at their temporary destination. The green ways today are used for:



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- sustainable tourism, and ecotourism
- slow and walking tourism
- horse riding
- green activities and trekking on natural routes

The ancient Romans have passed through history also for the construction of important roads, but it is difficult today to get a precise idea of the network of streets that connected Rome to the other cities of the Empire.

Sasha Trubetskoy, geographer and statistician of Washington, D.C., selected the main cities - the capitals of the provinces in the II century AD - and he treated them as subway stops.



Travel times varied depending on the vehicle used, the available money and the season. In summer, you could go from Rome to Byzantium in two months, on foot, and in a month on horseback. In the map, however, the movements on the water are missing: those by sea were faster and cheaper. A combination of horse and navigation could take from Rome to Byzantium in 25 days.



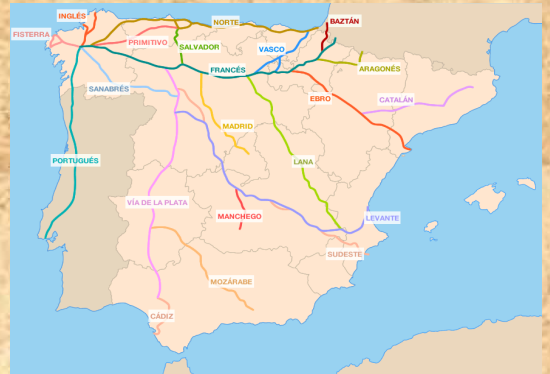
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SPAIN

WAY OF ST. JAMES (RELIGIOUS ROUTE)

The Way of St. James has existed for over a thousand years. It was one of the most important Christian pilgrimages during medieval times. It was considered one of three pilgrimages on which all sins could be forgiven: the others are the Via Francigena to Rome and the pilgrimages to Jerusalem.



The route is not unique, and we have an important amount of singular ways, some of them considered main routes

Pilgrims travelled to Santiago de Compostela to meet the supposed burial place of the apostle James the Great. During the



Middle Ages, the route was highly travelled. The earliest record of visits to Santiago de Compostela date from 8th century, in the time of the Kingdom of Asturias.

The daily needs of Pilgrims were met by a series of hospitals and hospices, with royal protection.

The Way of Saint James has been a European Route that has been traversed by millions of pilgrims since the middle Ages. During the



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Middle Ages, it was very busy, later, it was almost forgotten, but in the last times it has recover the most part of its height.

It has been declared World Heritage by UNESCO as Cultural European Itinerary (1993 and 1998) and it has the honorary title of „European Main Street“.



The Way of Saint James is easily distinguishable by the yellow arrows and



scalloped shells that allows identifying different routes. The amount of people travelling through the Way of Saint James has increased during the last years.

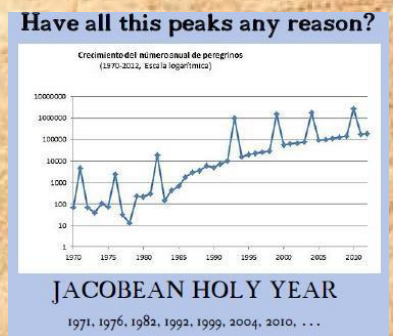


Each time Saint James Day (25th July) falls on a Sunday, this year is considered Jacobean Holy Year.

These years are special because: The Holy Door in Santiago's Cathedral (Porta Santa) is opened

on 31st December officially and closes at the end of the year. It allows pilgrims to enter through it. The pass in throught the Holy Door has the meaning of welcoming the pilgrims.

A full plenary indulgence can be obtained, forgiving all the sins. It is necessary to visit the Cathedral, pray and attend Mass and go to Confession within the 15 days before or after the visit.



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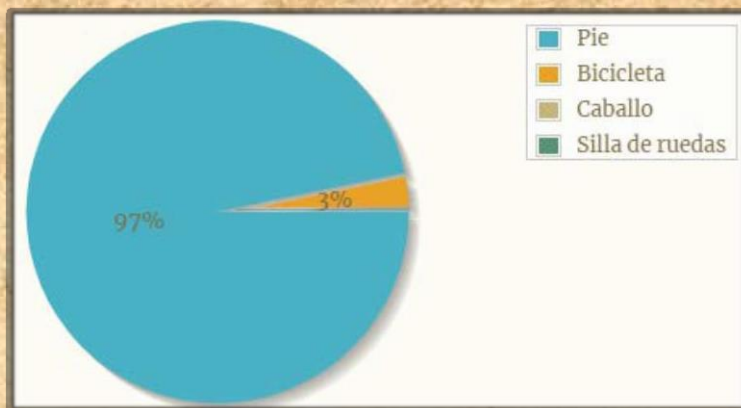




In the Way, especially in the last steps, is possible to see the tombs of pilgrim's death while trying to reach the indulgence. In Villafranca Del Bierzo, just before pilgrims enter to Galicia, it's also possible

to win the indulgence. The „door of forgiveness“ (Puerta Del Perdón) is only opened in Holy Year.

People travel to Santiago de Compostela riding, cycling or walking mainly. If they use one of these modalities, they have access to the official hostels through the Way.



People that can prove walking or riding for more than 100 km (the last 100 km to arrive to Santiago), or cycling for 200 km, can have a document to certify it. It's called Compostela.



To get your Pilgrim Certificate or Compostela, one have to visit the Pilgrim Office in Santiago de Compostela.

The first accreditation for pilgrims ending the Way was a badge in their clothes or the scallop shell (this is the reason why it became the symbol of the pilgrimage).

The pilgrim must collect stamps or „sellos“ throught the Way in churches, cathedral, convents, but also in other



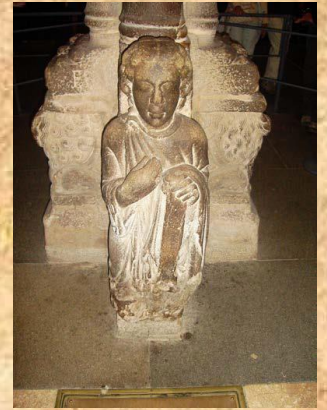
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places. Stamps are collected in the Pilgrim's Credential.

Apart from getting the Compostela as a symbol of the pilgrimage, there exist a series of rituals some of the pilgrims continues fulfilling when they travel to Santiago:

- Hugging the Apostle
- Hitting with your head, Maestro Mateo's Head (The Saint of the Bumps)
- Placing your right hand over the central column in Portico de la Gloria, called the Tree of Jesse.
- Introducing your arms in the mouth of two crouching beast in the Tree of Jesse.
- All of them are Medieval Traditions



At the beginning of the 11th Century, it started to be used Bota-fumeiro, to camouflage the smell the tired and unwashed pilgrims left into the Cathedral. As it was thought the incense smoke had a prophylactic effect, it was also used to prevent plaques and epidemics. Bota-fumeiro can still be seen in the Cathedral, operated by Tiraboleiros. It

is one of the most wanted spectacles to be seen in the Cathedral.

The number of places available for pilgrims to sleep and rest has increased incredibly. In summer, when the official hostels are full, schools or sport centers are available to sleep there. There are more places to sleep, but also more facilities. Now it's easy



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to find places with WIFI and places to charge your mobile phone.
The eternal difference between real pilgrims and „turilgrims“.

THE WAY OF VERA CRUZ (RELIGIOUS ROUTE)

It goes from the Pyrenees to Caravaca de la Cruz, where a fragment of „Lignum Crucis“ is venerated.

Caravaca is dominated by the medieval Santuario de la Vera Cruz (Sanctuary of True Cross) and contains several convents. It is the Fifth Holy City of Catholic Christianity.



It was known during the Middle Ages and a lot of Pilgrims also travelled through it.

Currently, nearly 900 km have been recovered, and pilgrims travel again through it.



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SPICES ROUTE (COMMERCIAL ROUTE)

The Spice Routes, also known as Maritime Silk Roads, is the name given to the network of sea routes that link the East with the West. They stretch from the west coast of Japan, through the islands of Indonesia, around India to the lands of the Middle East - and from there, across the Mediterranean to Europe.



It is a distance of over 15,000 kilometers and, even today, is not an easy journey.

As early as 2000 BC, spices such as cinnamon from Sri Lanka and cassia from China found their way along the Spice Routes to the Middle East.

Other goods were exchanged too - cargoes of ivory, silk, porcelain, metals and dazzling gemstones brought great profits to the traders who were prepared to risk the dangerous sea journeys.



But precious goods were not the only points of exchange between the traders. Perhaps more important was the exchange of knowledge: knowledge of new peoples and their religions, languages, expertise, artistic and scientific skills.



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The ports along the Maritime Silk Roads (Spice Routes) acted as melting pots for ideas and information.

The Mediterranean Sea was the nexus between Orient and Occident and was the route through which the trade of spices took part. The spice trade was initially conducted by camel caravans over land routes.

MEDITERRANEAN ROUTES (COMMERCIAL ROUTES)

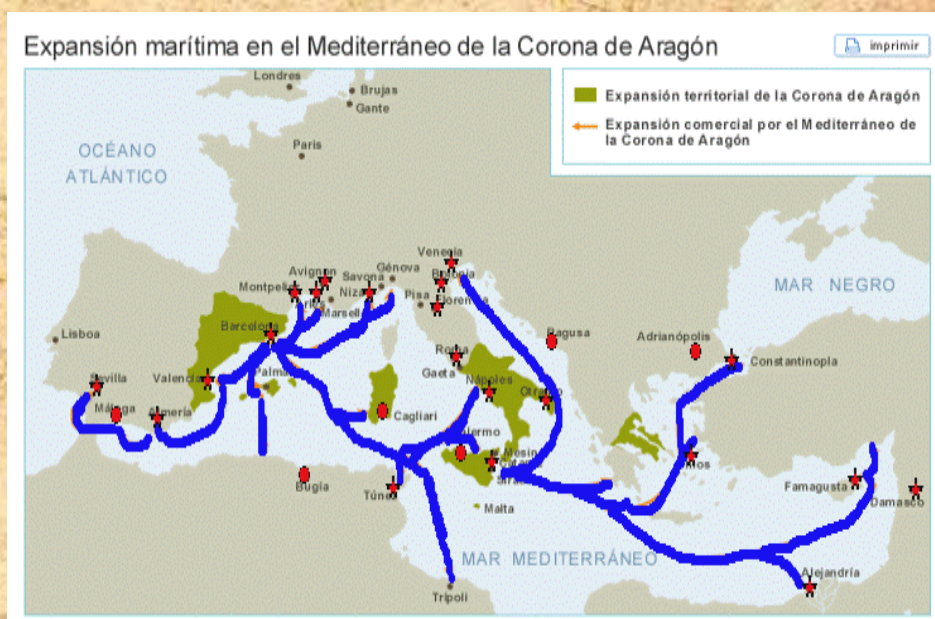
During the 13th Century, kings from Aragon started their expansion throughout the Mediterranean.

They had political reasons, but also artisans could find their raw material.

Manufactured products could also be exported.

From southern European ports to Eastern Turkey. To exchange manufactured products and metals by silk, coffee and luxury articles.

It arrived to the ports of Bizantium, Egypt and Syria, but also to ports in South France, Sardinia and Sicily.



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OTHER ROUTES

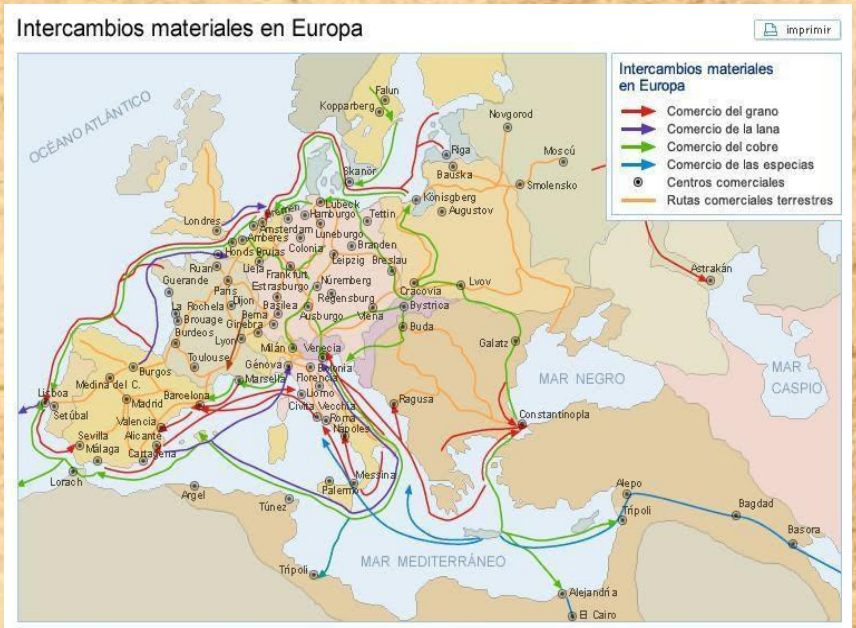
Calatayud was exceptionally placed, in the middle of one of the traditional ways between the Northeast and Southwest of Spain. People from Calatayud had the right to open shops wherever they wanted, and other type of buildings

Nowadays, our key trade routes are no longer contiguous, and they extend right across the globe.

Air freight allows for goods to be transported as directly as possible between countries and shipping

sea lanes allow for larger cargoes to be moved, albeit more slowly.

Highly developed railway systems are a vital part of the multi-modal transportation network that links business and manufacturers with their end consumers.



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POLAND

In medieval times, the most developed network of roads was in the area of Wielkopolska, these were the so-called Wielkopolska roads that led, among others, to Germany, Malbork, Szczecin and Wrocław. Also known at that time were the Baltic roads (from Gdansk), Pomeranian roads (from Toruń), Lesser Poland roads (from Cracow) and Salt roads (from Wieliczka).

THE HANSEATIC LEAGUE (HANSA) was formed around the middle of

the 12th century by
German and

Scandinavian

seafaring merchants

to protect their

mutual trading

interests. Since there

were no navies to

protect their

cargoes, no

international bodies to regulate tariffs and trade, and few ports

had regulatory authorities to manage their use, the merchants

banded together to establish tariff agreements, provide for common

defence and to make sure ports were safely maintained.

The original network linked Lübeck, Westphalia, Saxony and

Gotland, but it quickly spread east with the conquest of Livonia

in the early 13th century. At its peak, the Hanseatic League covered

the entire North Sea and Baltic Sea Regions and it stretched hundreds



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of miles inland along rivers from the Rhine to the Daugava.

CAMINO POLACO is one of the routes within the roads of St. James (Camino de Santiago). The route starts in Ogródniki on the border with Lithuania and leads through Olsztyn, Toruń to Słubice on the German border.



In Middle Ages Poles most often used

land routes, reached the German roads and further to the south - French. Pilgrimages from Poland continued throughout the middle Ages until the end of the 17th century.



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THE AMBER ROAD is one of the most known trade routes in Europe that comes from ancient times.

It was a trade route for the transfer of amber from coastal areas of the North Sea and the Baltic Sea to the Mediterranean Sea. The earliest route went east and then along the Danube River to the Black Sea, where it would be shipped to the ancient Greeks. The ancient Romans then built an overland route that linked the Danube River to the Port of Aquileia in Italy.



Other routes were also taken, such as a sea route along the Baltic and North Seas to Britain, and then the Mediterranean and beyond. Baltic amber is also thought to have traveled as far as Egypt, since amber was found in the breastplate of King Tutankhamun. Amber reached Asia via the Silk Road.

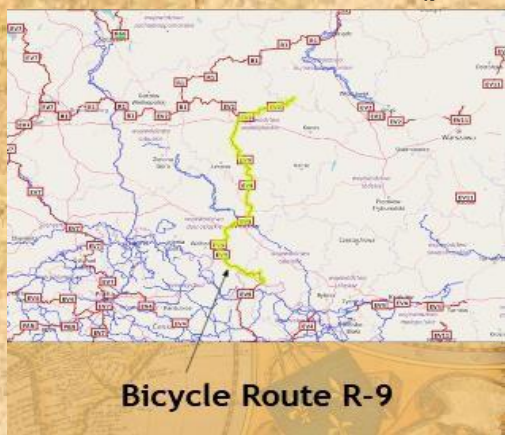
Amber is an organic gemstone that is composed of fossilized tree resin. Ancient forests are the source of amber gemstones. The most important source of amber is under the Baltic Sea, where there was once a forest. The force of the sea drags the amber up from the seabed, and since amber has a very low specific gravity, it floats in saltwater.



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Today on the base of the route there is a European bicycle route EuroVelo 9. In Poland it is marked as the Bicycle Route R-9. The route was in 2007 ready from Poznań to the Czech border. It runs almost 2,000 km from Gdansk on the Baltic Sea through the Czech Republic to Austria, then to Slovenia and ends in Pula on the



Bicycle Route R-9

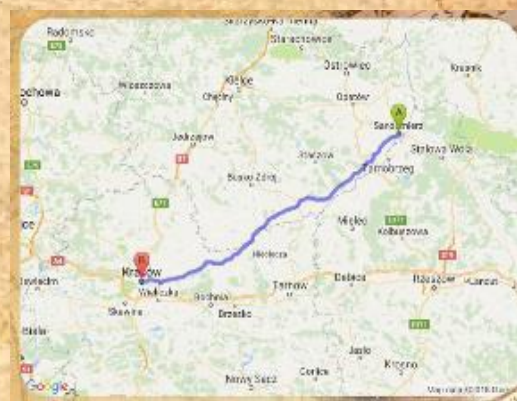
Adriatic in Croatia.

On the route there are monuments inscribed on the list of Historical Monuments or the UNESCO World Heritage List: Gniezno - Arch cathedral of the Holy Spirit Assumption of the Blessed Virgin Mary and St. Wojciech, Poznań - a historical town complex with Ostrow Tumski, Lubiąż - a group of Benedictine abbey together with the Church of the Nativity of the Blessed Virgin Mary and Paczków - an old-town complex with a medieval fortification system.

The longest route from the medieval times is the route connecting Kraków and Sandomierz, currently the national road DK 79.



Near the church of St. Bartłomiej in the old part of Konin stands a valuable monument - a stone pillar from 1151, which is the oldest road sign in Poland.



Current measurements

confirm that the old sign was set exactly halfway between



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Kruszwica and Kalisz. It is 52 km to both towns. As such a precise measurement was made in the twelfth century, it still remains a mystery.

VIA REGIA was a historic road in the middle Ages. It is the oldest and longest road link between the East and the West of Europe.

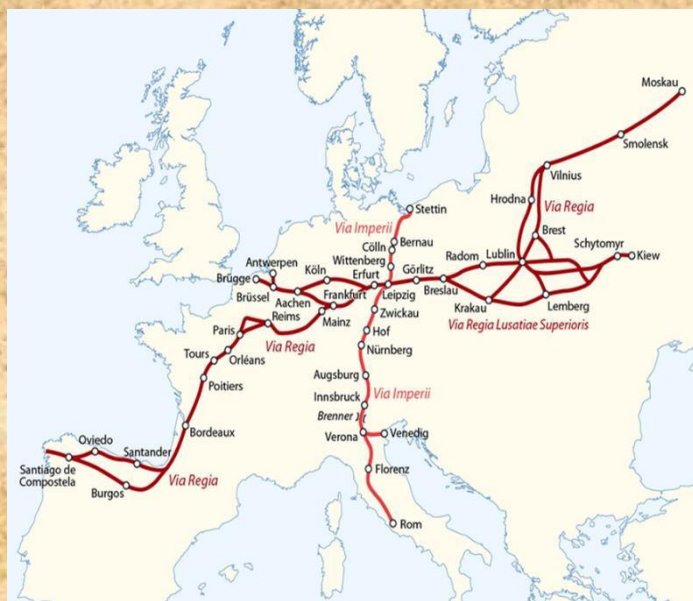
The route exists since more than 2.000 years and connects 8 European countries through a length of 4.500 km.

The term usually refers to a type of road, which was legally associated with the king and remained under his special protection and guarantee of public peace.

It ran west-east through the centre of the Holy Roman Empire. Also known as the route of Saint James (Camino de Santiago)

The road had a large economic significance for interregional trade and bartering. From the west came Flemish blankets, from the east wood, pelts, wax and honey.

An international network uses the potential of the VIA REGIA as symbol for European unification and has been awarded as „Major Cultural Route of the Council of Europe“ in 2005.



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Current roads



Via Regia- today is the equivalent of the European road E40, while in Poland on the same route operates the longest in Poland A4 motorway that runs from the border with Germany in Jędrzychowice near Zgorzelec through Legnica, Wrocław, Opole, Gliwice, Katowice, Krakow, Tarnów, Debica, Rzeszów, Jarosław, Przemyśl to the border crossing to Ukraine Korczowa - Krakowiec.



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All the materials elaborated by the six countries can be found in the following links:



<https://goo.gl/r6hqiE>



<https://goo.gl/7NoAU4>



<https://goo.gl/4ZWSf9>

Especially important is the interactive map that can be seen in the link:



<https://goo.gl/m/cB7d>



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Measuring Distances

In this chapter students learned about the way the people measured the distances in middle ages.

The needs of life have forced people to measure different sizes. In order to serve these metrics, it was necessary to use fixed models, which everyone had at any time needed them.

Initially in the measurement were used the members of the human body but also the walking, the opening of the hands and the height. These units, although very useful, were not accurate, since all people did not have the same height, the same palm, the same thickness of fingers and the same opening in their step.

For measuring long distances, units of measurement were also, the distance a pedestrian was traveling in a day, the period of sun, moon, the sundials etc.

When people and nation communication, traveling and commerce developed, there was a need to establish common units of



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measurement.

The students calculated, for each drawing route:

- The length as it was calculated in Middle Ages (using also parts of human body) and found the correction due to the Earth being round.
- Hypothetical time (solar watch) for travellers to follow different routes by different ways of travelling and established the cost of any of these trips.
- Compared with nowadays calculations.
- Prepared with this information „Medieval Touristic Brochures“



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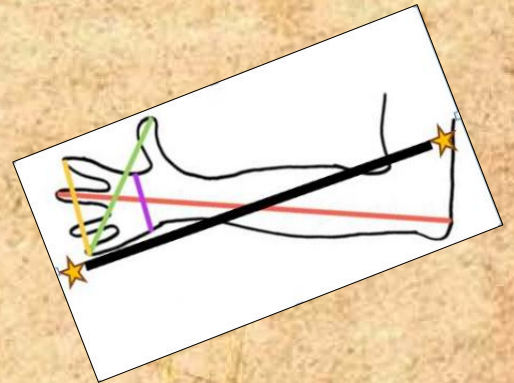


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FRANCE

The coudée („Yard or Cubit“ in English) is the distance between the extremity of the fingers and the tip of the elbow.

The coudée royale was used to measure for the construction industry.



The Canne des Bâtitseurs, also known as a Pige



((Measuring) „Rod“ or Cubit“ in English) equates to 555 lines ($555 \times 0.225\text{cm}$) or a stride of approximately 1.25m. This measurement varied according to the region you were in.

La Corde a 13 Noeuds, („Knotted Rope“ in English) was used to measure the dimensions of a right-angle by builders. The origin goes back to the Egyptians who built the pyramids with this method. The rope has 13 knots which are equally spaced, and when aligned in a triangle form a perfect right angle.



La Ligne („Line“ in English) is the smallest unit used by medieval artisans and builders. It equates to $1/12^{\text{th}}$

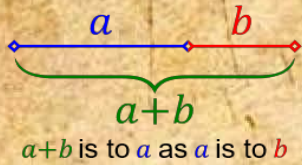


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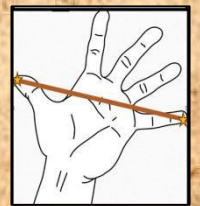
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of an Inch (225mm), and is roughly the diameter of a standard grain of barley



By multiplying the Ligne by 555, constructors obtained a unit called an „Enjambée“ (Stride in English) which equated to 125cm. It is divided into five measures, each corresponding to the sum of the two which precede it —linked by the Golden Ratio (1.618)

L'Empan („Span“ in English) is a dimension of the hand which was used for many years by artisans to measure short distances. It corresponded to the distance between the extremity of the thumb and that of the little finger when the hand is opened, and the fingers spread to the maximum. It equates to about 20cm...but depended on the size of the person's hand



La Palme („Palm“ in English and Paume („Hand“ in English) are other dimensions of the hand which were used for many years by artisans to measure short distances.

The Palme corresponded to the distance between the extremities of the little finger and the index finger (12.4cm approx.), whilst the Paume corresponded to the distance between the base of the little finger and the base of the index finger (7.6cm approx.)



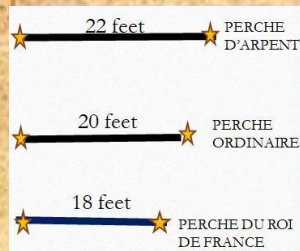
La Perche („Perch“ in English) was a very different measurement depending on where you were



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(Length)



(Surface Area)



La Lieue („League“ in English) was the measure of long distances over land in the middle Ages. A land Lieue was the equivalent of 10,000 feet. (3,248km) It represented the distance a man could walk in 1 hour

L' Acre („Acre“ in English) was used in agriculture and was used as a measurement of surface area. As the acre depended on the size of the feet of the person who measured, an acre could vary between 4,221m² and 5,107m² according to the country, but in France it was 52 ares (15,200m²)

52 ares

La Pied („Foot“ in English) was the basis of measures of length for many years.

It's the equivalent of the length of the Empan (20cm) which is the distance between the tip of the thumb and the tip of the little finger with the fingers spread out, multiplied by the Golden Ratio (1.618) = 32.36cm. More simply, it was often the length of the foot (but not everyone has the



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same size feet!)

La Toise or Brasse („Fathom“ in English) is the length which corresponds to the distance between the two tips of the index fingers of both hands with both arms outstretched. It equates to 6 feet, or 1.949m



L' Arpent „Arepennis“ (or „Acre“ in English) is a surface area which corresponds to 200 ft² (42 ares.) A Paris Arpent was smaller, 100 perches of 18 feet (34 ares.)

42 ares

It was later replaced by the Are (100m²) and the Hectare (1,000m²) when the Land Registry was created.



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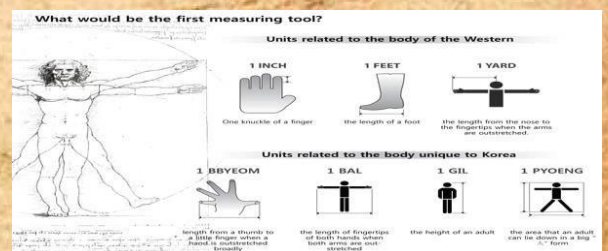
LATVIA

Distances between the Hanseatic cities were large, so the people had to spend a long time on the way, for example, at the middle ages the goods from Riga only after about two months received Brügge, to other cities the goods could travel for a year. Travelling in the middle Ages was a dangerous and complex activity. Without the mundane problems such as ignorance of lodging and food, an important question was safety. Always there were robbers or a pirates' attack possibility so traders had to think about their safety by themselves.

In the middle ages there were used the following distances:

One-day distance is a historical unit of distance. It came to Europe with the first trade routes. And that sign was used until the 19th century till the birth of motorized transport vehicles. It is a distance that can be gone with a horse-drawn carriage within one day if the route is well known. Depending on the surroundings and the roads it was about 40km.

Hour walk / hour journey is the journey, which can be gone by traveller in one hour. Man can usually (walking a certain pace) walk one kilometre in 12-15 minutes; it is about 4-5 km per hour. 3 $\frac{3}{4}$ to 5 km is about half a mile (geographical mile is 7.4



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miles = the ground mile 10km).

1 hour ride - it is between $\frac{2}{3}$ and $\frac{3}{4}$ miles. It depends on the horse's pace.

Carriage's hour drive distance. If the carriage drives along a good path, then it was on average 15 km.

The difference between the distance of hours and one-day trips is historically defined $\frac{2}{3}$. So 10 hours ride corresponds to 14-15 hours walk.

LENGTH UNITS

Cubit - A unit of length equal to 0.443 meters or 18 inches.

1 cubit (fabric unit) - 2 feet - 24 inches
- 53,75cm (Riga cubit). Latvian mayor used this to 1824, when it replaced the Russian length unit - Arsin (71,1cm)

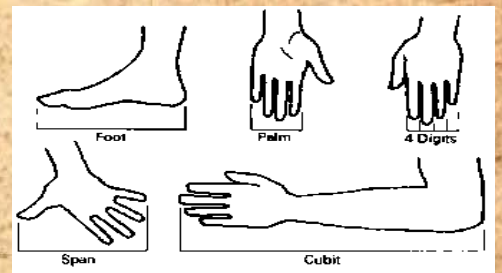
RĪGAS ASS (Rigas axis) = 3

cubit = 6 feet = 161,25 cm

KORTEĻIS = $\frac{1}{4}$ cubit = 6 inches

=13,44 cm

RĪGAS MĒRĪKSTE = 14 feet = 7 cubit = 376,25 cm



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Foot - 12 inches. Length of (large) man's foot.

Inch - 10 lines. 1000 mils. Width of man's thumb, length of 3 barley corns (Anglo-Saxon).

Hand - 4 inches. Width of man's hand; used for height of horse at its withers (shoulders). Formerly, approx. 5 inches.

AREAS UNITS

Riga 7 cubit mērrīkste =
14,156 m²

Cord - ground lines, the land
divided into lines

Foot and step, the most common ones



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GREECE

The ancient information about measurements comes from the inhabitants of Egypt where after the floods of the Nile they were forced to search for the boundaries of their estates, since the mud that flooded the river covered them.



Odometer is a tool for measuring distance travelled. The word derives from the Greek words *hodo's* ("Path" or "gateway") and *metron* ("measure"). A speedometer measures the speed of a moving vehicle. A tachometer indicates the speed of rotation of the engine.

The first evidence for the use of an odometer can be found in the works of the ancient Roman Pliny (NH 6. 61-62) and the ancient Greek Strabo (118.9). Both authors list the distances of routes traveled by Alexander the Great (r. 336-323 BC) as by his bematists Diognetus and Baeton.



An odometer for measuring distance was first described by Vitruvius around 27 and 23 BC, although the actual inventor may have been Archimedes of Syracuse (c. 287 BC – c. 212 BC) during the First Punic

War. Hero of Alexandria (10 AD - 70 AD) describes



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a similar device in chapter 34 of his *Dioptra*.

The odometer was based on chariot wheels of 4 feet (1.2 m) diameter turning 400 times in one Roman mile (about 1400 m). For each revolution a pin on the axle engaged a 400 tooth cogwheel thus turning it one complete revolution per mile. This engaged another gear with holes along the

circumference, where pebbles (*calculus*) were located, that were to drop one by one into a box. The distance traveled would thus be given simply by counting the number of pebbles.

The odometer was also independently invented in ancient China, possibly by the prolific inventor and early scientist Zhang Heng (78 AD – 139 AD) of the Han Dynasty.

Ancient Greek units of measurement varied according to location and epoch. Systems of ancient measures evolved as needs changed. Some units of measurement were found to be convenient for trade within the Mediterranean region and these units became increasingly common to different city states. The calibration and use of measuring devices became more sophisticated.

Some Greek measures of length were named after parts of the body, such as the *daktylos*, or finger (having the size of a thumb), and the *Pous* or foot (having the size of a shoe). The values of the units varied according to location and epoch but the relative proportions were generally the same.

Some Units of Length



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Pous equal to 0.308m (1.01 foot)

Plethron is a measurement used in Ancient times, equal to 100 Greek feet (pous). It was roughly the width of a typical athletic running-track and was used as the standard width and length of a Wrestling square, since wrestling competitions were held on the racing track in early times

The stadion based on the length of a typical sports stadium of the time. According to Herodotus, one stadion was equal to 600 Greek feet (pous). However, the length of the foot varied in different parts of the Greek world, and the length of the stadion has been the subject of argument and hypothesis for hundreds of years

Diaulos was a double-stadion race, c. 400 metres (1,300 feet), introduced in the 14th Olympiad of the ancient Olympic Games (724 BC).

Bematists (from Greek bema = 'pace'). There were specialists in ancient Greece who were trained to measure distances by counting their steps.



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With the help of Bematists, Eratosthenes managed to estimate the radius of the earth in Egypt

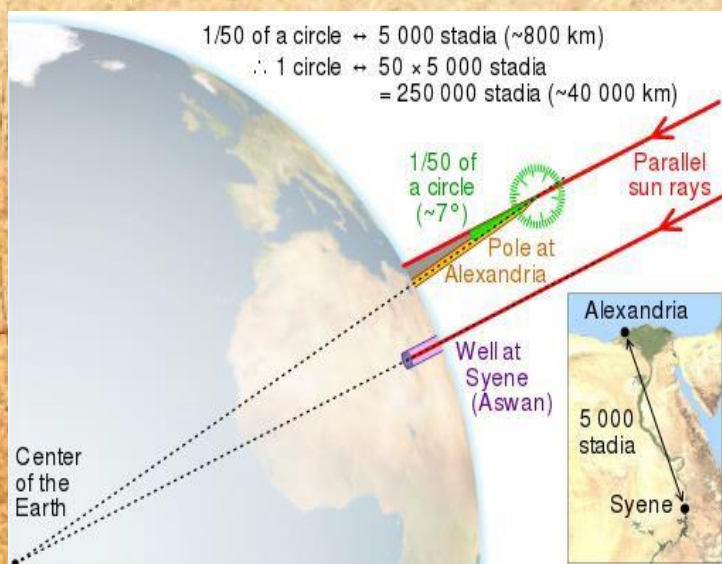


Illustration showing a portion of the globe showing a part of the African continent.

The sunbeams shown as two rays hitting the ground at Syene and Alexandria.

Angle of sunbeam and the gnomons (vertical pole) is shown at Alexandria, which allowed



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Eratosthenes' estimates of radius and circumference of Earth

Following the French Revolution, the debate on the unification of the measures began. The ancient measures were accused of being temporary. The new ones will be universal and eternal.

Today, the International Bureau of Weights and Measures (French: Bureau international des poids et mesures, or BIPM), is an intergovernmental organization created in 1955, to promote the global harmonization of the legal metrology procedures facilitating international trade.



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ITALY



The sundial, also called sun clock, is a measuring instrument of the time based on the detection of the position of the sun. The origin of sundials comes from the natural need to have a reference of "time" for the everyday activities: sowing, harvesting, and making predictions of eclipses, floods...



The first gnomons began to be used by the Sumerians, Egyptians (3000 BC) and Chinese (2400 BC).

The first real sundials began to function at the time of the Greeks. The Romans inherited sundials from other civilisation and they deepened them. After the fall of the Roman Empire and throughout the middle Ages, knowledge of measuring time was handed down through the Islamic and monastic culture.

In the Middle Ages the measure of time was related to natural phenomena: water watches, hourglasses, bells and sundials were used. Weight-operated gears are only used since the 13th century. Time for workers was basically adjusted by the pace of work in the fields: day and night, seasons,



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harvest and sowing.

- Time for upper classes was governed by military or vassal requirements.
- For religious people, prayers dictated the rhythm of the day and the liturgical festivals marked the passing of the months.

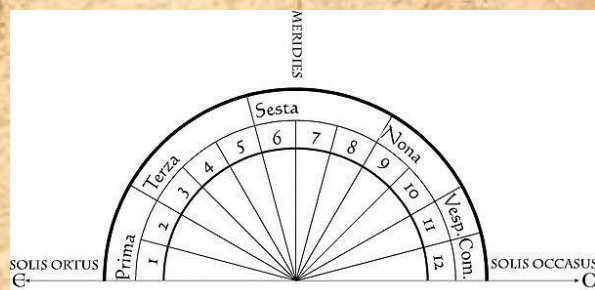
In the early middle Ages, sundials with strange marks began to appear on the facades of small and large abbeys all over Europe. They were used to scan everyday life of generations of monks.

Everyday life was so subdivided:

Morning (mattutino), First (prima), Third (terza), Sixth (sesta), Ninth (nona), Vespers (vespro) and the Last hour (compieta).

Monastic life required the observance of a precise partition of the day. In the

convents a monk was instructed to watch the rhythm of the hours. At two a.m., he played the bell of the prayer according to the rising stars.



Then he sang several psalms until he asked people to stand up; the number of psalms changed every month. The day began in the morning with the rising of the sun with the "hora prima". With the spread of Benedictine monasticism, the ninth hour (about 3 p.m.) was the most important hour because at that time the monk had to stop the work and go to the refectory. It represented the main break of the day.

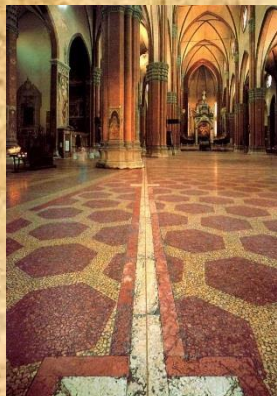
In many Italian churches there are sundials. The most important one is located in Bologna, in the Basilica of San Petronio. It is



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the longest sundial in the world in a closed place, built by the astronomer Giovanni Domenico Cassini (1653).



Every day, entering from the hole at 27 meters high in the archway, a sun ray intersects the line, marking the slow and inexorable flowing of the days and seasons and highlighting the equinoxes and solstices.

Sundials are the simplified sun clocks whose function is to measure noon local time, when the sun is at its zenith on the local meridian, using the projected shadow of a stylus on a plan (vertical, horizontal or inclined).

Horizontal Sundials: They consist of a dial divided into hours represented by rays, the origin of which is a gnomon. The shadow of the gnomon enables the reading of the solar time. These sundials are the easiest to achieve because they require only to know the latitude of the place where they are located. They should be oriented on the north-south.



Analemmatic Sundials: They are a special type of horizontal, quite rare sundials. They are unusual because the gnomon is vertical, and the hours are marked not by lines but by points placed on an ellipse.



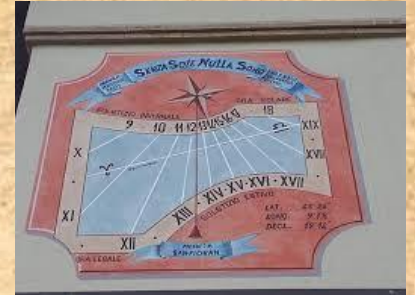
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Analemmatic sundials lend themselves to the creation of sundials on meadows, where a person can act as a gnomon. The point where it should be the person is marked along the north-south axis that cuts in half the line between the ellipse foci.

Vertical sundials: The gnomon can be oblique (parallel to the earth axis) or perpendicular to the sundial plan. This type of sundial is located on the walls of churches, castles and houses. The best situation is that they are oriented to the south (with the wall precisely oriented from east to west). If the wall is not facing south, it will be necessary also to take into account a correction factor, the declination.



Portable sundials: They can be of different types, such as the shepherd sundial.



This sundial is made on a vertical cylinder and the gnomon is rotated to align it with the current date. Then you point the sundial towards the sun. The length of the shadow gives the time, thanks to the graduated curves. Hermannus Contractus, a German monk (eleventh century) invented it.

For other scholars, fatherhood is attributed to the Florentine Paolo dell' Abaco, lived in 1300. However, it was found a copy of it in good conditions

dating from the Roman period in Este (Padova). The shepherds and the peasants of the Pyrenees used it until a half-century ago.



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The Aphorism is an integral part of a sundial; It is the message that its builder writes, addressing to anyone who passes in front of the instrument. The message is sometimes monitory, mocking, poetic, religious and often gloomy.



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SPAIN

Spanish students recorded a video about the way distances between two points can be measured according to their geographical coordinates. As an example, they calculate the distance between two of the projects partners cities, and proposed as an exercise the calculation of the distance between other two cities as following:

This is the Earth.

To place a point over its surface, you have to give the value of two different angles:

- Geographical Latitude: It's the angle from the Ecuador to the Local Parallel. It takes values from 0° to 90° , positive to the North, negative to the South
- Geographical Longitude: It's the angle from Greenwich Meridian to the point. It takes values from 0° to 180° , positive to the East, negative to the West.

To calculate the distance between two different cities, we need the coordinates of both of them: The values of Latitude and Longitude.

Let's A_1 and B_1 be the Latitude and Longitude of the First City and A_2 and B_2 the Latitude and Longitude of the Second City.

The distance between these two cities over the Earth's surface is the length of the minimum arc drawn over the maximum circumference



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containing both of them.

This angle, d , associated to the length of the arc can be calculated by the following trigonometric formula:

$$\cos d = \cos a \cdot \cos b + \sin a \cdot \sin b \cdot \cos D$$

Where a is the latitude of the first city measured from the North Pole ($a = 90^\circ - A_1$), b is the latitude of the second city measured from the North Pole ($b = 90^\circ - A_2$) and D is the difference between the geographical longitude of both cities ($D = B_2 - B_1$).

LENGTH UNITS

- Lequa castellana = 5,5 km
- Vara castellana = 84 cm 1 vara castellana = 3 pies = 4 palmos
- Pie = $\frac{1}{3}$ vara = 28 cm 1 pie = 12 inches
- Palmo = $\frac{1}{4}$ vara = 21 cm
- Inch = 2,54 cm 1 inch = 12 líneas
Línea = 2 mm 1 línea = 12 puntos
- Punto = 0,36 mm



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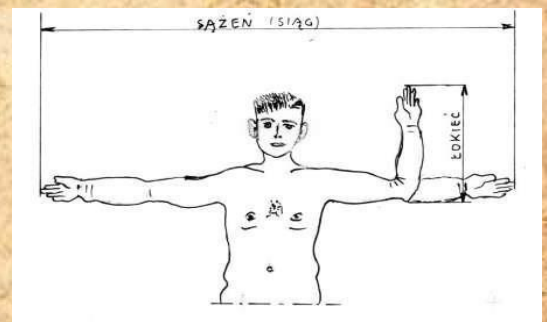
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POLAND

The names of the oldest Polish measurements usually come from objects used by people in their daily work and from parts of the body and its physical capabilities. In the Middle Ages such measures as foot, span (the length of a tight hand from small to big toe), spans (distance between outstretched hands), jump, step were mainly used.

The units were divided into: merchant and agricultural.

The basic units of length were ELBOW, FOOT and „SAŻEŃ”. The elbow equaled $\frac{1}{3}$ of „sażeń” and was divided into 2 feet.



Elbow was mainly used to measure textiles and shorter objects. Foot (0,2868m) for measuring, the distance when planting potatoes and „sażeń” (1,7205m) mainly for measuring wood, nets and longer items.

Distances between particular geographical points were given in „STAJACH” and „MILES”, but both these units were not always clearly defined.

According to the chronicler, J. Długosz, the distance from Poznań to Gniezno in the fifteenth century was 7 miles (currently it is 49 kilometers). It would result from the fact that then mile was



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about 7 kilometers. However, the distance from Krakow to Bochnia was according to J. Długosz 5 miles (currently 43 kilometers). Calculated from this mile would be 86 kilometers.

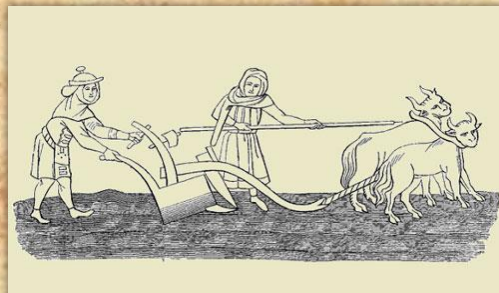
MEASUREMENTS OF SURFACE

Since the areas suitable for development were many in the Middle Ages, no great attention was paid to land surveys and precision in determining their boundaries. The main unit used to measure the land area was „ŁAN”. Since the 13th century, its value has varied from one location to another. A greater łan (also Franconian, King's, Old Polish) consisted of 432 morgs = 23 to 28 hectares. A lesser łan (Chełmno łan) was 30 morg \approx 17,955 hectare.

mil – Danish mile. Towards the end of the 17th century, Ole Rømer connected the mile to the circumference of the Earth, and defined it as 12000 alen. This definition was adopted in 1816 as the Prussian Meile. The coordinated definition from 1835 was 7.532 km. Earlier, there were many variants, the most common was the Sjællandsk mil of 17600 fod or 11.130 km.

How did they travelled and How long did the trips lasted? BY LAND

Land travelling mainly led through the ancient Roman roads, which were severely damaged, but from the 12th century they started to be



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renovated.

Lists of journeys were used, rarely road maps, which begin to spread in the 14th century. Oral information was the most used and was the most valid and current.

It was common to travel in groups and heavily loaded with goods, food, weapons, tools, tents, clothing, money or documents.

The Pilgrims travelling was lighter. Travelling was expensive because carriers, suitable and elegant clothing, tolls, tips, lodging, food, veterinaries were very unique at that time.

In the Middle Ages vehicles with wheels like carts were useful for short distance but they were not used on long trips due to the poor condition of the roads. The saddle was very much used on horses, mules or donkeys, that carried the goods. Those animals were often hired to transport the things.

The journey lasted from sunrise to sunset, even if they had to go and come back on the same day.

On foot, the average distance travelled in one day was about 25 kilometres and could even reach 50 or 60 in the case of professional couriers (real athletes).

On horse, the daily journey could be around 60 and 100 kilometres; this means that to cross France could take 12 to 20 days (in good weather and without any difficulties).



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BY SEA

For long trips between coastal cities, the sea was preferred; it was quicker and more comfortable than the land (for example between Barcelona and Genoa).

Sailing used to take place mainly in the summer (preferably June and July), when the sea was the calmest.

The driving forces of the ships were rowing (on the galley and the „laud“) and sail (on the vessel, „coca“ and caravel) this combined with the use of oars.



The most common methods to maintain the course, were, during the day, the position of the sun and the release of birds carried on board, and at night, the stars.

In the Late Middle Ages there are some scientific advances spread among the European seafarers to facilitate navigation with fewer stopovers. Most of them were introduced by Islamic sailors: the triangular sail (12th century), the compass (around 1200), the stern rudder (13th century) and the first marine charts (13th

To sail from Tunis to Mallorca 2 or 3 days were needed. From Tunis to Genoa or Pisa 7 days, from those Italian cities to Mallorca 3 and from Alexandria to Barcelona 14. These are average times and the actual time could vary greatly depending on the



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weather and the number of stopovers

BY RIVERS

Some of the continental routes that today we do by road, could be done by river (for example along the Rhone and the Elbro, to Zaragoza). River navigation required toll and it was used mainly for merchandise. River navigation complements very well both with sea and land routes.

The construction of dams on large rivers will make impossible today this way of travel.

In river navigation the speed could be different depending on whether they travelled for or against the current. For example, on the Rhone from Lyon to Avignon 24 hours, and from Avignon to Lyon up to a month.

All the created materials can be seen in the following link:



<https://google/234VWi>



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Sailing and Astronomy

This chapter describes the navigation tools used by sailors during the Middle Ages.

Travellers have always been using tools to accomplish their goal of being in touch with new worlds (from organizing the journey and engraving their journey until they are in the new places).

These tools have evolved over time. Some of the traditional orientation instruments, was Astrolabe, Exadas, the magnetic compass, the gyro compass, nautical charts and encyclopedias.

Each naval map and each compass have printed circles with subdivisions in degrees, from 000° to 360° , called windbreaks. The North corresponds to 0° , the East at 90° , the South at 180° and the West at 270° . Based on these subdivisions, sailors refer to the direction of the prevailing weather. The winds are divided into eight primates and eight secondary ones, those prevailing having an address between the primates.



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Orientation instruments (mainly for use in navigation) achieved orientation based on star position. Using the Sun, the Moon, the constellations and the stars, man managed to navigate safely by knowing his exact position (latitude and longitude) as well as succeeding in mapping.

Students:

- Found information about different Navigation tools; Azimuth, Astrolabe, Exadas, Mécanisme d'Anticythère, Rose of the Wind, Constellations
- Learned to use medieval orientation tools and prepared an orientation game with them.
- Studied about the Polish astronomer Nicolaus Copernicus, the founder of the theory of heliocentrism who proved that the Earth and planets revolve around a stationary Sun.



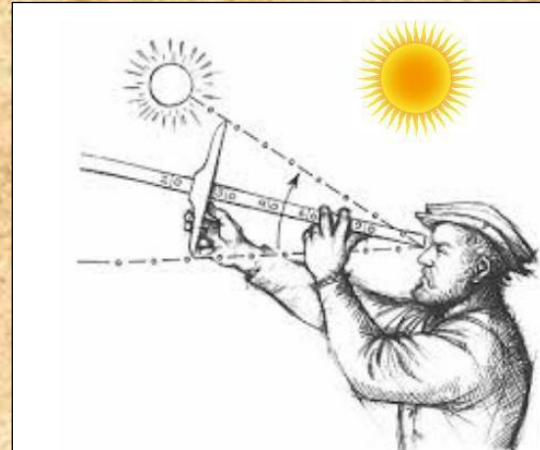
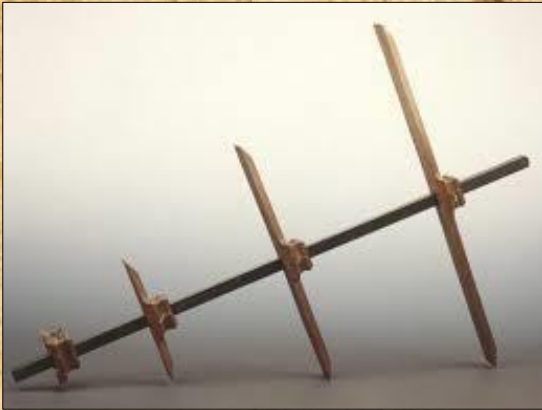
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FRANCE

In the middle Ages, sailors did not have GPS. They had stars and the sun to find their way. To do this, you will have to accurately calculate the height of the sun.



French students made a presentation about how to accurately calculate the height of the Sun.



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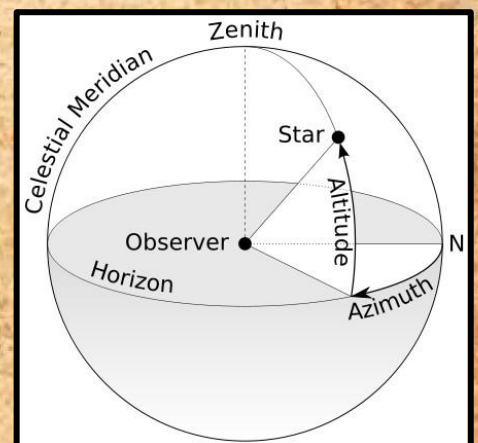
Solar declination – 2018

	January	February	March	April	May	June	July	August	September	October	November	December
1	-23,02	-17,56	-8,36	3,94	14,84	22,01	23,14	17,98	7,83	-4,10	-15,27	-22,07
2	-22,94	-17,29	-7,98	4,34	15,15	22,14	23,07	17,72	7,45	-4,50	-15,58	-22,20
3	-22,86	-17,01	-7,60	4,73	15,45	22,27	22,99	17,45	7,06	-4,90	-15,88	-22,33
4	-22,76	-16,73	-7,22	5,13	15,75	22,40	22,91	17,18	6,68	-5,29	-16,17	-22,45
5	-22,66	-16,45	-6,83	5,52	16,05	22,51	22,82	16,90	6,29	-5,68	-16,46	-22,56
6	-22,55	-16,16	-6,45	5,91	16,34	22,62	22,72	16,62	5,90	-6,07	-16,74	-22,67
7	-22,44	-15,86	-6,06	6,30	16,63	22,73	22,62	16,33	5,51	-6,46	-17,02	-22,77
8	-22,32	-15,56	-5,67	6,69	16,91	22,82	22,51	16,04	5,11	-6,85	-17,30	-22,86
9	-22,19	-15,26	-5,27	7,08	17,19	22,91	22,39	15,74	4,72	-7,23	-17,57	-22,95
10	-22,06	-14,95	-4,88	7,46	17,46	22,99	22,27	15,44	4,32	-7,61	-17,83	-23,03
11	-21,92	-14,64	-4,49	7,84	17,73	23,07	22,14	15,14	3,93	-8,00	-18,09	-23,10
12	-21,77	-14,32	-4,09	8,22	17,99	23,14	22,00	14,83	3,53	-8,37	-18,35	-23,16
13	-21,62	-14,00	-3,69	8,60	18,24	23,20	21,86	14,51	3,13	-8,75	-18,60	-23,22
14	-21,46	-13,67	-3,29	8,97	18,50	23,26	21,71	14,19	2,73	-9,12	-18,84	-23,28
15	-21,30	-13,34	-2,89	9,34	18,74	23,30	21,56	13,87	2,33	-9,49	-19,08	-23,32
16	-21,12	-13,01	-2,49	9,71	18,98	23,35	21,39	13,54	1,93	-9,86	-19,31	-23,36
17	-20,94	-12,67	-2,09	10,08	19,21	23,38	21,23	13,21	1,52	-10,22	-19,53	-23,39
18	-20,76	-12,33	-1,69	10,44	19,44	23,41	21,05	12,87	1,12	-10,59	-19,75	-23,42
19	-20,57	-11,99	-1,28	10,80	19,67	23,43	20,87	12,53	0,72	-10,94	-19,97	-23,44
20	-20,37	-11,64	-0,88	11,16	19,88	23,44	20,68	12,19	0,31	-11,30	-20,18	-23,45
21	-20,17	-11,29	-0,48	11,51	20,09	23,45	20,49	11,85	-0,09	-11,65	-20,38	-23,45
22	-19,96	-10,93	-0,07	11,86	20,30	23,45	20,29	11,50	-0,49	-12,00	-20,58	-23,45
23	-19,75	-10,57	0,33	12,20	20,50	23,44	20,09	11,14	-0,90	-12,34	-20,77	-23,44
24	-19,53	-10,21	0,73	12,55	20,69	23,43	19,87	10,79	-1,30	-12,69	-20,95	-23,42
25	-19,30	-9,85	1,14	12,89	20,88	23,41	19,66	10,43	-1,70	-13,02	-21,13	-23,40
26	-19,07	-9,48	1,54	13,22	21,06	23,38	19,43	10,06	-2,10	-13,36	-21,30	-23,37
27	-18,83	-9,11	1,94	13,55	21,23	23,34	19,21	9,70	-2,51	-13,69	-21,47	-23,33
28	-18,59	-8,74	2,34	13,88	21,40	23,30	18,97	9,33	-2,91	-14,01	-21,63	-23,28
29	-18,34		2,74	14,20	21,56	23,25	18,73	8,96	-3,31	-14,33	-21,78	-23,23
30	-18,08		3,14	14,52	21,72	23,20	18,49	8,58	-3,71	-14,65	-21,93	-23,17
31	-17,82		3,54		21,87		18,24	8,21		-14,96		-23,11

LATVIA

AZIMUTH is an angular measurement in a spherical coordinate system.

The vector from an observer (origin) to a point of interest is projected perpendicularly onto a reference plane; the angle between the projected vector and a reference vector on the reference plane is called the azimuth.

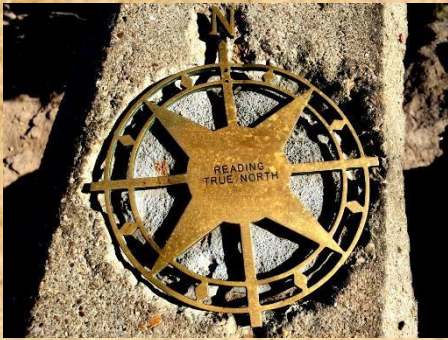


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An example of azimuth is the angular direction of a star in the sky.



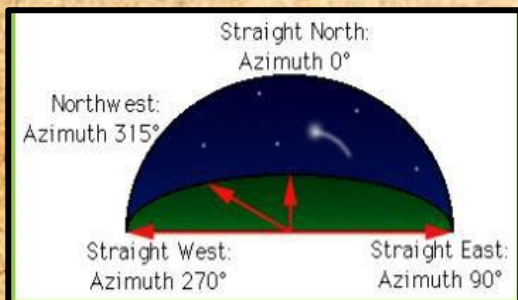
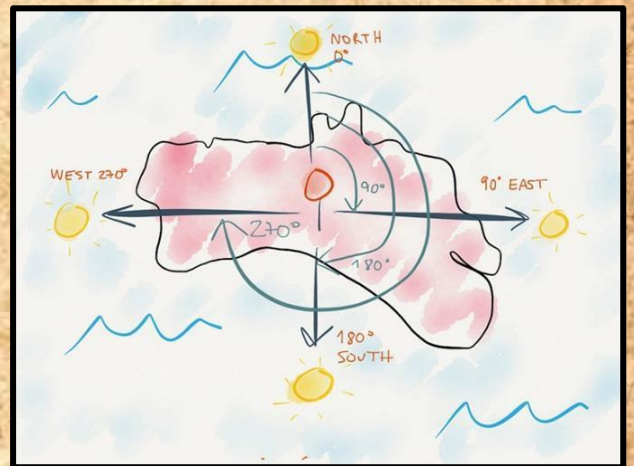
The star is the point of interest, the reference plane is the local horizontal area (e.g. a circular area 5 km in radius around an observer

at sea level), and the reference vector points north. The azimuth is the angle between the north vector and the star's vector on the

horizontal plane.

Azimuth is usually measured in degrees ($^{\circ}$). The concept is used in navigation, astronomy, engineering, mapping, mining, and ballistics.

Today, the reference plane for an azimuth is typically true north, measured as a 0° azimuth, though other angular units (grad, mil) can be used. Moving clockwise on a 360 degree circle, east has azimuth 90° ,



south 180° , and west 270° .

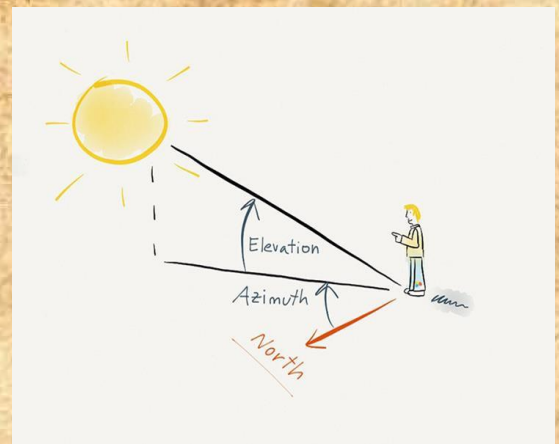
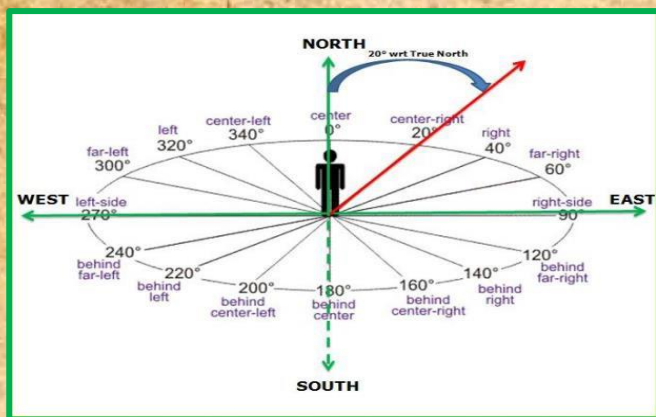
There are exceptions: some navigation systems use south as the reference vector. Any direction can be the reference vector, as long as it is clearly defined.



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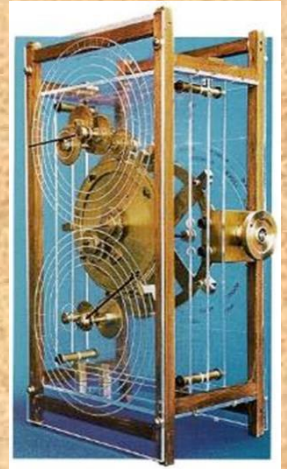
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GREECE

THE ANTIKYTHERA MECHANISM or Astrolabos of Antikythera
it was an Astronomical and geodetic instrument.
A complex brass gear system showing constellations
of the zodiac,
months of the year, sunrise and sunset planets, moon
phases, sunrises, and sunsets.



an ancient analogue computer
and it was used to predict
astronomical positions and
eclipses. It is said to be
constructed around 150 BC.



It was discovered in 1900 by sponge divers
men that collected sponges near a shipwreck in Antikythera (An island
in South Greece).

The mechanism is the most ancient saved machine with gears. It is
made out of brass and
has a frame made out of wood. Many are those who tried to rebuild
the mechanism. The first to achieve it was Alan George Bromley.
Next was John Gleave. Another rebuilt was made in 2002 by
Michael Wright.



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ASTROLABE is an instrument used to observe the stars and determine their height on the horizon, to calculate the time, the sunset, the sunrise and the orientation. It was useful for Muslims to find the holy town Mecca. In the Middle Ages, the astrologer was the main navigational organ, but was later replaced by the Exadas.

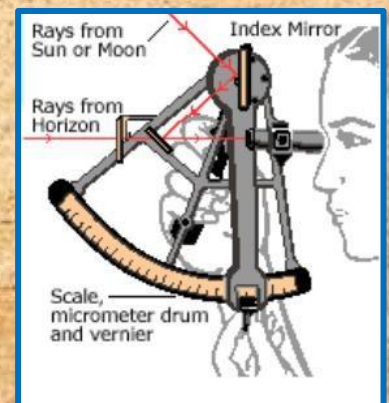


It was invented by Apollonius Pergaios about 200 B.C.

At 180 B.C. Ipparchus the Rhodian with his studies based on astrolabe helped the development of trigonometry.

Ypatia was blamed from Christians for satanic rituals with astrolabes. Astrolabes were constructed of copper and their diameter was 15cm. In the front the astrolabe had a painting of the sky based on the 20 brightest stars.

EXADAS is an angle calculator. It is used in sailing by sailors in order to count the height of objects that are in the sky and also vertical or horizontal angles. Sailors use it in order to count angles of objects located in the sky like



the sun, the moon, planets and stars. It was invented by John Cabel 10 1757. It wasn't the first device of its kind. Sailors used astrolabe to navigate, but because the results were not always valid, they had to find

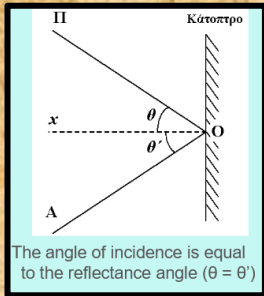


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something better.



The Principle of Operation of the Exadas is mainly based on the reflection phenomenon and the laws governing it.

Its function is based on the use of a pair of objects that reflect the image of a star and must come in the same line as the horizon.

The person who manages the instrument in an upright position observes through a small telescope the horizon and the image at the same time because one lamp is half-calculied while the other rotates by the help of a bar.



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ITALY

THE ROSE OF THE WINDS is a diagram, apparently very simple, which represents the origin of the winds. Its name derives from the arrangement of the rhombuses, superimposed like the petals of a rose.

It is a geometric figure in the shape of a star with many points. The simplest form of the rose is the 4-pointed one, each of which corresponds to one of the cardinal points.

The wind that blows from the North takes the name of Tramontana,

The one coming from the South is called Ostro or Mezzogiorno,

From the East we have the Levante, From West the Ponente blows.

However, it may also be necessary to know intermediate directions.

The other four points indicate:

- the North-East (Grecale),



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- the South-East (Scirocco),
- the South-West (Libeccio) and
- The North-East (Mistral).

The oldest image of Wind Rose is the star that appears on the Catalan Atlas.

It is said that it was made by Abraham Cresques, today we can admire it at the National Library of France.



According to some experts, the rose became famous at the time of the Maritime Republics.

In the past, when sailing was exclusively done by sails, it was very important to know the wind direction.

This is why the compass rose, in its simplicity, represented a useful tool for sailors.



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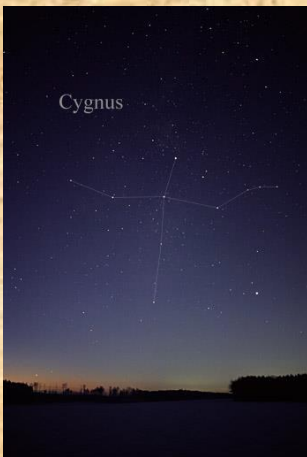


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SPAIN

Spanish students presented the Brochure they created about studying the Milky Way and its relationship with the Way of Saint James. They explained the mythology back some of its Constellations:

CYGNUS This constellation is joined to one of the myths of Zeus



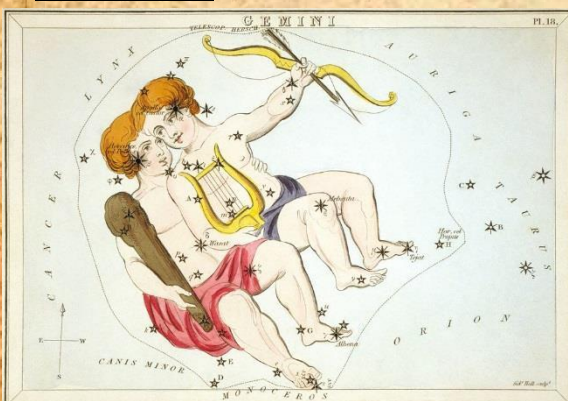
romances. The King of gods, in love with Leda, arrived flying to her bed, pretending to run away from an Eagle. That night, she laid with her husband Tindareo.



As the fruit of this

romances, Leda layed two eggs, from where two couples were born: Polux and Clitemestra, and Helena and Castor. Polux and Helena were Zeus' sons; Castor and Clitemestra, Tindareo's.

GEMINI The constellation of the twins, refers to the brothers Castor



and Polux. Castor and Polux kidnapped Idas and Linceo linacées, to marry them. Idas killed Castor,



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and Polux, as a revenge, killed Linceo, Idas' brother.

Polux for the first time was separated from his brother, so loved for him that he asked Zeus to take his immortality away from him or give his live back to Castor. Zeus decided Polux could live in Hades as long as Castor was back on Earth, making t hem alternately death and alive, so that Polux received both the options of his request.

MILKY WAY has been always linked to



Saint James Way and its pilgrims. Even in the Codex Calixtinus it is

mentioned the vision Charlemagne had about a way of stars, and the

apparition of the Apostle to explain the sense of that.



As it is well known, Greek Mythology explains the origin of Milky Way as part of the Legend of Heracles, who, while he was a kid, was approached by Hermes to Hera's breast, while she was sleeping, for reaching immortality through her milk.

When she woke up, she threw the kid far away, and the flowing milk left a wake in the sky, Milky Way.

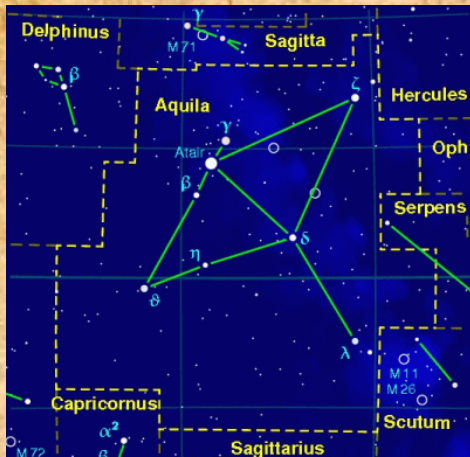


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AQUILA After stealing the fire to give it to the mortal people,



Prometeo was punished by Zeus. Chained with steel cables in the Caucasus, Zeus sent an Eagle to eat his liver, who constantly regenerated.

Zeus swore over Estige he would never untie Prometeo from the rock. But, when Heracles



crosses the Caucasus, he pierced Prometeo's Eagle with an arrow and he was free. Zeus, proud of his son's feat, didn't protest, but to keep the promise, he ordered Prometeo to wear a ring made with the steel of his chains and a piece of rock to which he had been tied.

AURIGA

Mirtilo is Enomao's charioteer who betrayed his master.

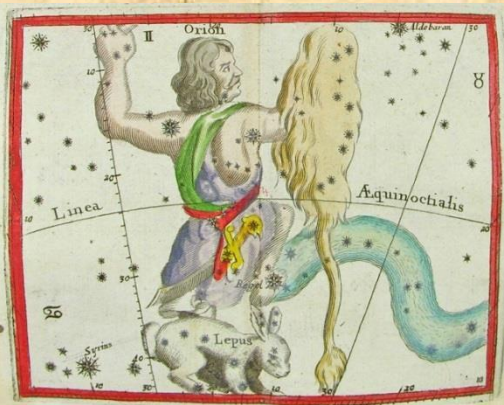




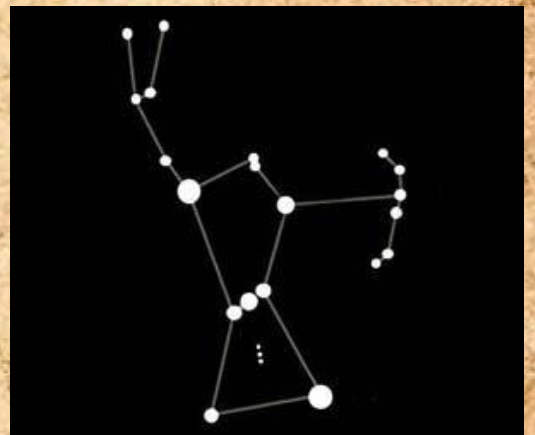
When Pelope arrived, Hipodamia fell in love with him and helped him to bribe Mirtilo. Mirtilo removed the plug of a wheel of Enomano's chariot, and replaced it with one made of wax.

Pelope killed him for not to have to pay him for his betrayal. After his death, Hermes, Mirtilo's father, transformed him in the constellation of the Charioteer.

ORION was a giant, Posidon's son. When he tried to rape Artemis,



the goddess sent him a Scorpion who stung his heel. As a payment for the service given to



Artemis, this animal was converted in constellation, and the same happened for Orion.

For this reason, the Constellation of Orion run away forever from that of Scorpio.



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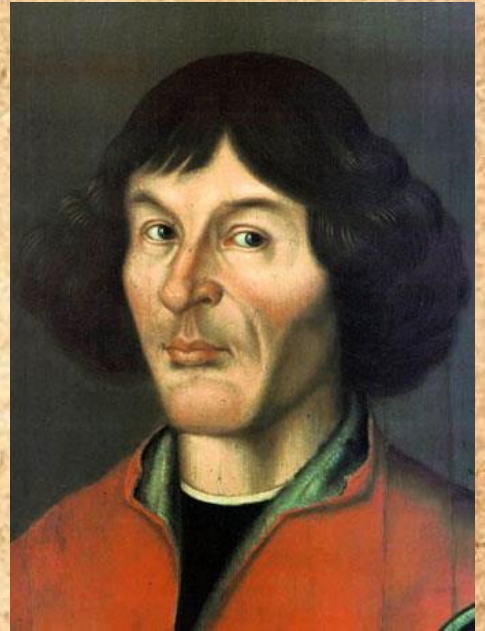


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POLAND

NICOLAUS COPERNICUS AND HIS HELIOCENTRIC THEORY

Nicolaus Copernicus - Polish well known astronomer, the founder of the theory of heliocentrism. He proved that the Earth and planets revolve around a stationary Sun. Born in Torun, February 19, 1473 in the family of merchant Nicholas and Barbara.



He travelled to Italy at the age of 18 to attend college, where he was supposed to study the laws and regulations of the Catholic Church and return home to become a canon. However, he spent most of his time studying mathematics and astronomy. Due to his uncle's influence, Copernicus did become a canon in Warmia, but he asked to return to Italy to study medicine and to complete his law doctorate.

While attending the University of Bologna, he lived and worked with astronomy professor Domenico Maria de Novara, doing research and helping him make observations of the heavens. Copernicus never took orders as a priest, but instead continued to work as a secretary and physician for his uncle in Warmia.

When he returned to Poland to take up his official duties, his room in one of the towers surrounding the town boasted an observatory, giving him ample time and opportunity to study the night sky, which



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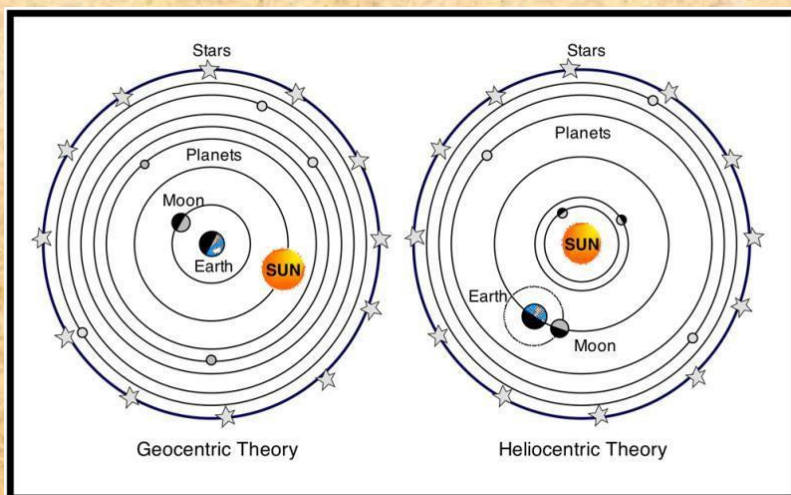
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he did in his spare time.

His most important work is the rotation of the Celestial Spheres in which he described the heliocentric view of the world in sufficient detail that it can be scientifically useful.

On the basis of observing the sky, he said that the Earth revolves around the Sun.

Copernican heliocentrism is the name given to this astronomical model developed by Nicolaus Copernicus and published in 1543.



It positioned the Sun near the centre of the Universe, motionless, with Earth and the other planets orbiting around it in circular paths modified by epicycles and at uniform speeds.

This was a breakthrough discovery for the development of modern science.

The Copernican model departed from the Ptolemaic system that had prevailed for centuries, placing Earth at the centre of the Universe (the other planets revolve around the stationary Earth), and is often regarded as the launching point to modern astronomy and the Scientific Revolution.



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Other astronomers built on Copernicus' work and proved that our planet is just one world orbiting one star in a vast cosmos loaded with both, and that we're far from the centre of anything

All the materials created can be seen in the following link:



<https://goo.gl/33vBv6>



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Trekking Routes

After studying the great medieval routes,

Students:

- chose part of a medieval route, close to their own cities, which they visited, studied the special features and took photos of it.
- designed a trekking or bicycle route using part of a medieval route
- prepared a tourist brochure including all the information, characteristics, difficulties etc.
- presented these brochures to their classmates



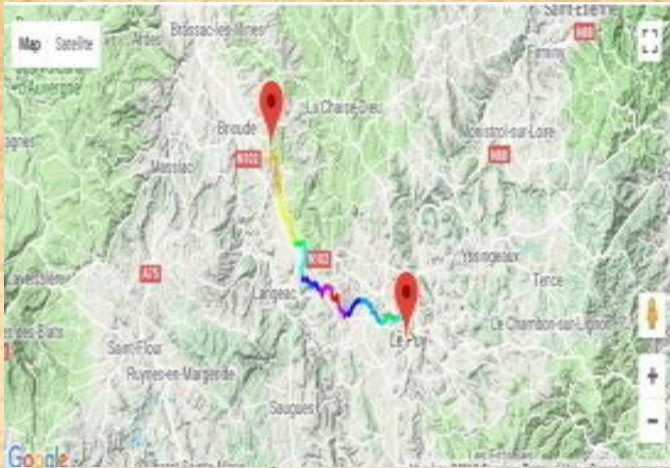
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FRANCE PROPOSED THE ST MICHAEL'S WAY.

It is a part of a pilgrim route that links two sacred places, Mont-Saint-Michel and Saint-Jacques-de-Compostelle, two of the most important pilgrimage sanctuaries of the Christian West.



The path of Saint Michel connects the sanctuary of Aiguilhe (Le Puy en Velay) to Mont-Saint-Michel (Manche). The trek covers 65 km of beautiful countryside and climbing to over 1100 m in

altitude

The journey finish with 268 steps and 85 m climbing to visit the spectacular chapel of Saint-Michel D' Aiguilhe for a breathtaking view.

This European cultural route brings life back to an old pilgrimage way by which pilgrims from the northern part of France and even further afield rallied Le Puy-en-Velay to go to Santiago de Compostela.



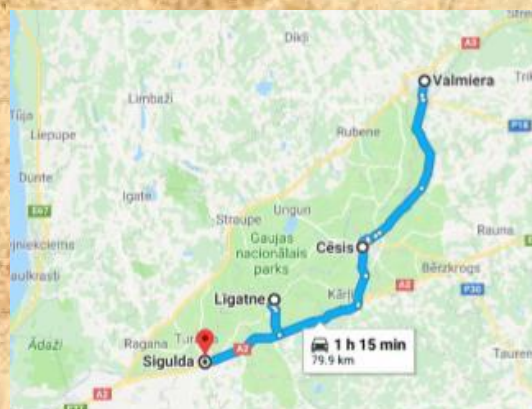
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LATVIA PROPOSED THE GAUJA ROAD.

This way is the most beautiful section of the Gauja Valley along the Gauja River between the towns of Valmiera and Sigulda. Magnificent sandstone outcrops, rocks, cliffs and caves are among the park's major attractions.



Scattered along the Gauja River, there are ancient castle mounds, Medieval castles, churches, manor houses, watermills, windmills, other archaeological, architectural and art monuments and towns with a long history, as Cesis.

On the banks of the Gauja River, among the woodland crossed with ravines, there are more than 5 km of trails, Ligatne Nature Trails, where you can watch wild animals and birds native to Latvia.

It will take you approximately 2-3 h. In Ligatne Nature Trails You can watch roe deers, wild boars, bears, foxes, elks, lynx, owls, eagle-owls and aurochs.

GREECE PROPOSED THE NARROW PASSAGE OF PYLI



Between the mountains of Itamos and Koziakas on the way of the Vlachs nomads of Pindos. The transportations of the Vlachs of Pindos as nomads occurred two times per year: one in April and one in October. The transportation ways were



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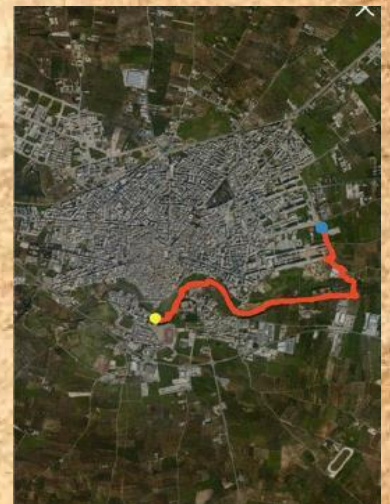
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called „vlachostrates“ (streets of Vlachs). The same paths were used during the whole year for the transportation of a variety of products and commodities.

The passage of Pyli was a point connecting the plain of Thessaly with the mountainous area. The border was the Portaikos River and the stone arched bridge that survives until today. There was an inn where travelers traveled overnight and relaxed. Today is a place of beauty where people come to walk on the old surviving path and enjoy the natural beauty and the medieval monuments of the area.

ITALY PROPOSED LAMA BALICE

Lama Balice is a natural area that crosses the city of Bitonto. It is a Regional Natural Park since 2007, which has an important value both from an environmental and historical point of view. It is a route of 33 Km length suitable for everyone, except for people with limited mobility.



The departure point is Church of Santa Teresa (Piazza Sylos, Bitonto) and the arrival point: ITE "Vitale Giordano" (Piazzale Rodari, Bitonto), It lasts 1:00 - 2:00 hours. One can observe the flora and fauna of this unique natural site and can walk, run, take pictures in a unique landscape.

A very nice walk in the nature, along paths that travelers



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crossed for centuries, in the heart of Bitonto but far from the chaos of the city.

SPAIN PROPOSED THE WAY OF VERA CRUZ

This Way links the towns of Roncesvalles, in the Pyrenees, and Caravaca de la Cruz, in Murcia. For approximately 14 km, one can enjoy the same route people have been travelling through for more than 8 Centuries.

In the 13th Century, it is believed that Templar knights brought a piece of the Lignum Crucis, the cross where Jesus died crucified, and lately discovered by the Empress Saint Helena, mother of Constantine the Great, first roman Emperor to convert to Christianity.

This piece of the cross was deposited in Caravaca de la Cruz, where nowadays continues being venerated. The Way of Vera Cruz shares part of the drawing with the Way of Saint James, the most famous pilgrimage route during the middle Ages.

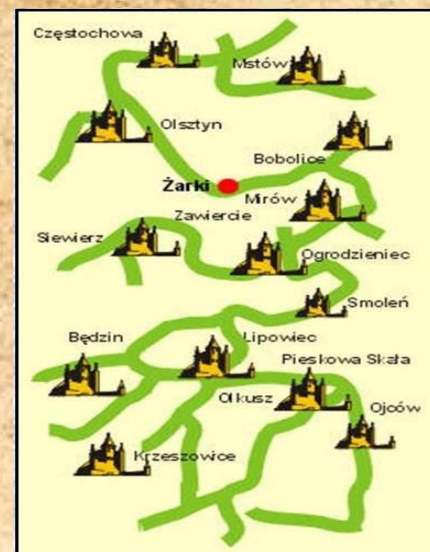


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POLAND PROPOSED THE TRAIL OF THE EAGLE'S NESTS of south-western Poland. It is a marked trail along a chain of 25 medieval castles between Częstochowa and Krakow.



The castles date mostly to the 14th century, and were constructed probably by the order of King of Poland Casimir the Great.

The trail has been named the "Eagle's Nests", as most of the castles are located on large, tall rocks of the Polish Jura Chain featuring many limestone cliffs, monadnocks and valleys below. The most interesting and picturesque Aquiline Sockets on this route are the castles of the Ogrodzieniec, the Olsztyn, the Ojców and Bobolice.

The trail of the Eagle's Nests is one of the most beautiful places in Poland and the cradle of Polish culture. It is located amidst beautiful hills covered with forests, picturesque limestone monadnocks, creates an impression of extraordinary harmony between man and the environment.

All the created materials can be seen in the following link:



<https://goo.gl/RXGeSH>



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Conclusions

In this study we realized that during the Middle Ages people travelled over long distances, despite the difficulties and the time required. The various countries were connected with large commercial but also religious routes. The most important of them are the following.

1. The Hanseatic League was a commercial and defensive confederation of merchant guilds and market towns in Northwestern and Central Europe. It came to dominate Baltic maritime trade for three centuries along the coast of Northern Europe from Russia to France. A net of river water ways linked to the ports of Baltic Sea and then the ships transported the products to the different countries.



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2. The trade route from the Varangians to the Greeks connected



Scandinavia, Kievan Rus' and the Eastern Roman Empire. The majority of the route comprised a long-distance waterway, including the Baltic Sea, several rivers flowing into the Baltic Sea, and rivers of the Dnieper river system, with portages on the drainage divides.

3. The Via Francigena connected Canterbury to Rome and to the harbors of Apulia. The final part of Via Francigena crossed part of Puglia and included the ancient Via Appia and the Via Traiana. Appia way is one of the earliest and strategically most important Roman roads and it connected Rome to Brindisi, in southeast Italy. The Appian Way was the first long road built specifically to transport troops outside the smaller region of greater Rome. Via Traiana was an alternative to the Via Appia.



4. Via Egnatia linked a chain of Roman colonies stretching from the Adriatic Sea to the Bosphorus. The route, gave the colonies of the southern Balkans a direct connection to Rome. It was the „continuation“ of Appia Road in Italy. Egnatia started from Dirrahhio and ended in Constantinople.



5. The Silk Road connected Asia with the Middle East and Southern Europe.



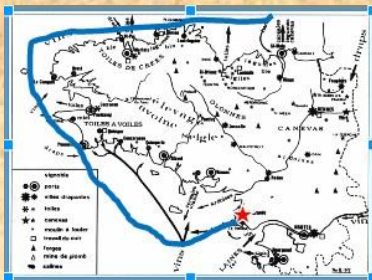
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6. The Spice Road also known as Maritime Silk Roads, is the name given to the network of sea routes that link the East with the West. They stretch from the West coast of Japan, through the island of Indonesia, around India to the lands of the Middle East —



and from there, across the Mediterranean to Europe.



7. Salt route. The transport of salt was via internal rivers and also via the sea to export it to other countries.

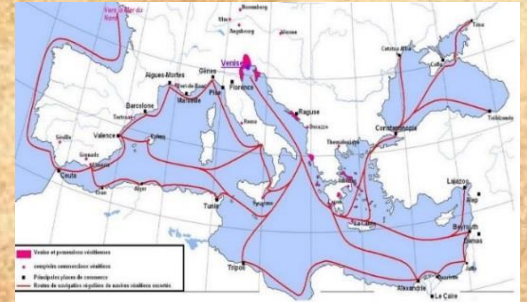
8. The Amber Road was a trade route for the transfer of amber from coastal areas of the North Sea and the Baltic Sea to the Mediterranean Sea. The earliest route went east and then along the Danube River to the Black Sea, where it would be shipped to the ancient Greeks. The ancient Romans then built an overland route that linked the Danube River to the Port of Aquileia in Italy.



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9. The Marine Routes. From Southern European ports to Eastern Turkey. It arrived to the ports of Byzantium, Egypt and Syria, but also to ports in South France, Sardinia and Sicily.



10. The St James' road: pilgrimage route to Santiago de Compostela. There were equally plenty of ways of getting to Santiago de Compostela. The Way of St. James has existed for over a thousand years. It was one of the



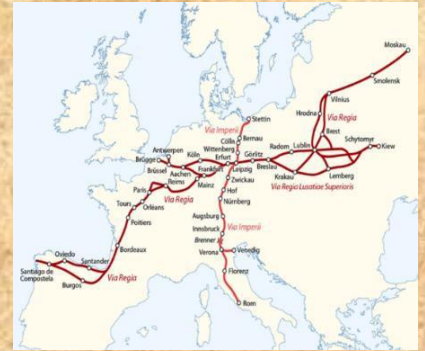
most important Christian pilgrimages during medieval times. Pilgrims travelled to Santiago de Compostela to meet the supposed burial place of the apostle James the Great.



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11. Via Regia is the oldest and longest road link between the East and the West of Europe. The Route exists since more than 2000 years and it ran west-east through the center of the Holy Roman Empire.



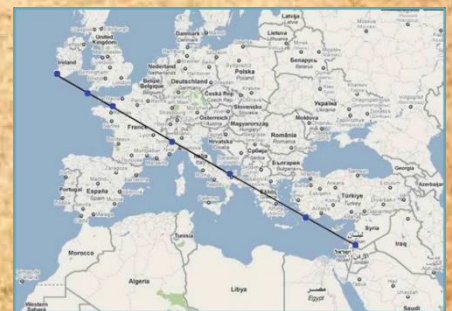
12. The way to the Holy Land.

Religious trips were the most common: many pilgrims were departing for the Holy Land while others visited temples, monasteries and holy places with miraculous saints. Many pilgrims, who arrived it Jerusalem and Bethlehem to see the parts of the Birth, Passion and



Resurrection of Christ, also visited the Sinai because they considered the place also Holy Land due to the presence of the „Blasted and Not Damaged Vatus“ and the tradition of Decalogue to Moses, according to the biblical text.

13. La Via Sacra. The mysterious and evocative St. Michael's Sacred Line joins seven monasteries dedicated to the Archangel Michael for over then 2000 km crossing Europe. This line is one of the so-called „ley lines“, straight lines that touch important points of the world, very exclusive places already considered in prehistoric times. They are high symbolism and spiritual places.



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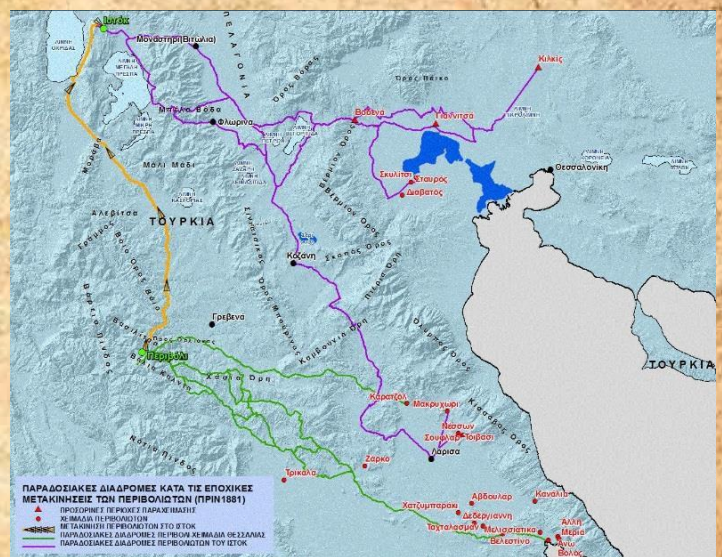


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14. The Way of Vera Cruz
It goes from the Pyrenees to Caravaca de la Cruz, where a fragment of „Lignum Crucis“ is venerated.
15. The Wine Routes



16. „Vlachistrates“ (Local streets of Vlachs-Greece)
In the central areas of Greece, the transportations were organized in caravans. The transportations of the Vlachs of Pindos as nomads occurred two times per year: one in April and one in October.



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17. The Tratturi (Italy) are the mountain grassy paths that shepherds traditionally used two times a year for transhumance (precisely at the end of the summer and the beginning of the spring) to move their herds from the mountains in Abruzzo to the Tavoliera, or Plain, of the Apulias, and back.



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