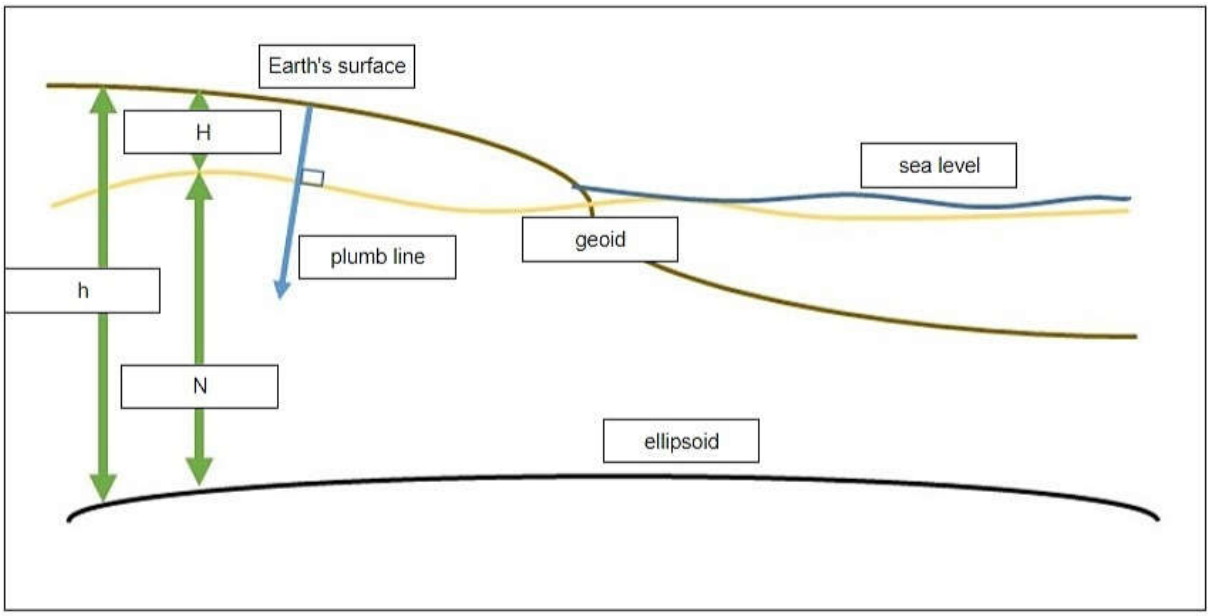
Question **1**

EUREF-FIN is the Finnish 3D realisation ✓ of the ETRS89. The European Terrestrial Reference System is a geocentric ✓ system that has been fixed to the Eurasian plate ✓ , meaning that coordinates don't change with plate movement ✓ . EUREF-FIN was first defined ✓ based on permanent GNSS stations ✓ and 100 campaign measurement points ✓ , but later points have been added and now there are over 2000 points. EUREF-FIN is not fixed to any specific map projection ✓ for plane coordinates, but there are some recommendations for the public administration. ETRS-TM35FIN ✓ uses Universal Transverse Mercator ✓ projection and is used for small-scale maps, ETRS-GKn (n being the middle meridian) ✓ which uses Gauss-Krüger ✓ projection and is used for large-scale maps.

Question **1**

Here are different surfaces and variables relevant for height definition and computation. Drag and drop correct labels to correct places. The variables H, h and N go on top of the correct thing. (2 points)

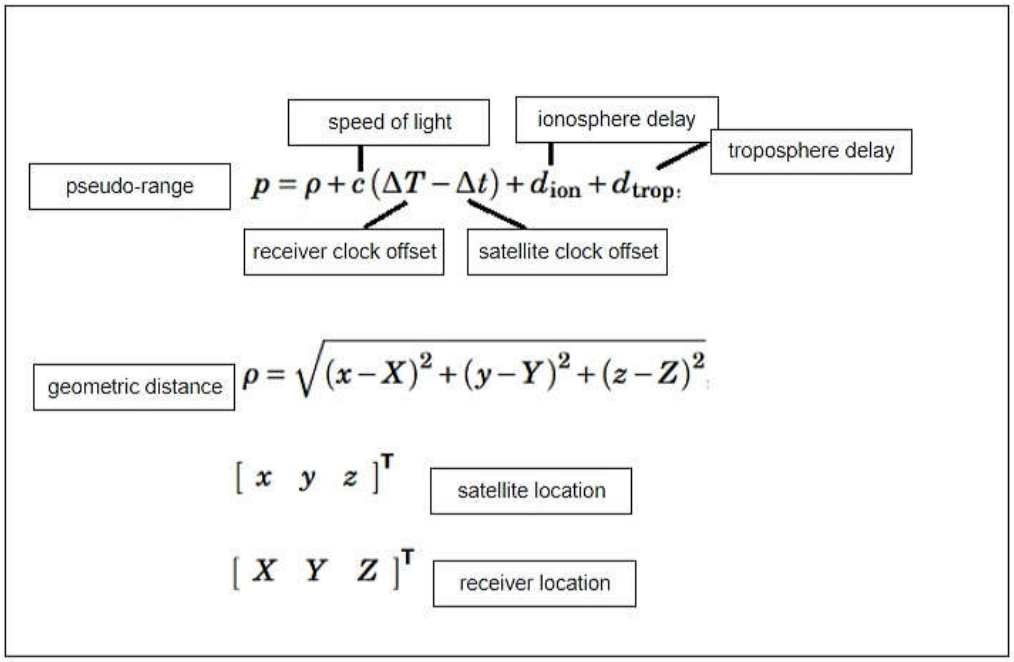


Question **2**

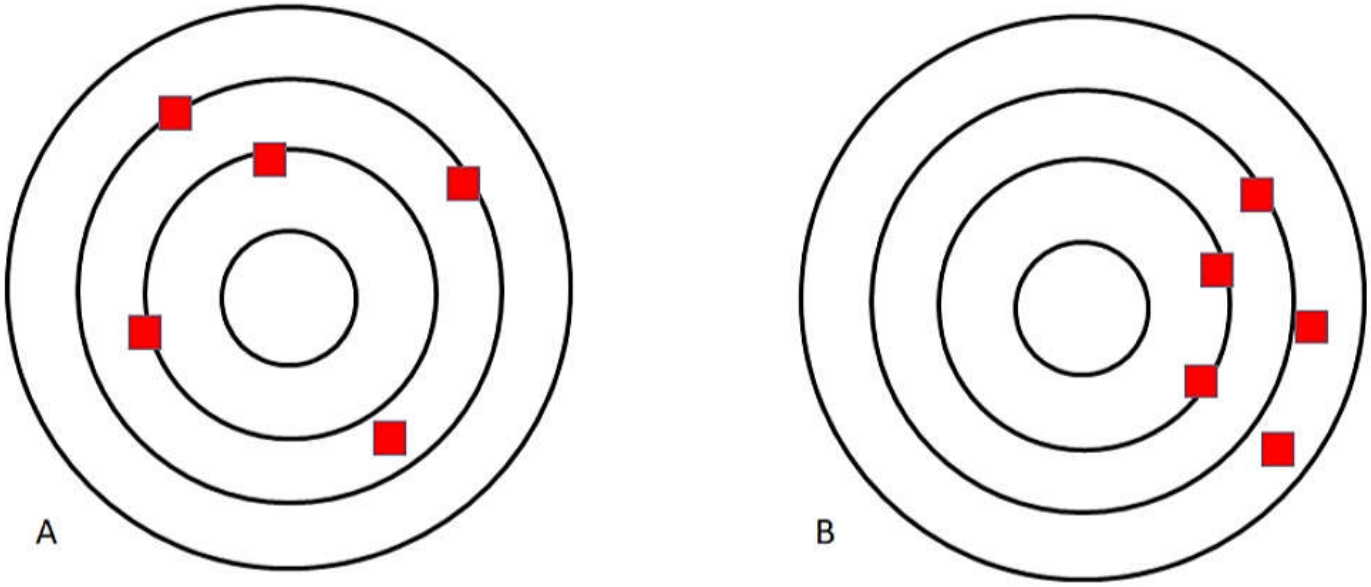
What are the different quantities and surfaces you named in the previous question? Explain the terms shortly and give definitions for the variables. (2 points)

Question **1**

Drag and drop correct explanations to the equations. (1 points)



Question **2**



What is DOP? Which one of the two plots has higher DOP? Why? What does it mean?

Question **3**

You have plane coordinates with height information (x, y, H) in some modern datum (e.g. EUREF-FIN). Which steps do you need to convert to geocentric (X, Y, Z) coordinates?

Question **1**

How would you plan a static GNSS campaign to minimize different error sources during the measurement? What techniques would you use to minimize different error sources to get as accurate coordinates as possible? (2 points)

Question **2**

In the alternative future, Republic of Karelia (Karjalan tasavalta) has claimed independence from Russia. Karelia is situated between Finland and Russia and has been under Russian rule for almost hundered years. You have been appointed as the new head of the geodetic commission of Karelia. What do you need to do to define your country's coordinate system and your borders in it? You can assume this is in the near future and no new techniques have emerged. You can also assume the geodetic measurements done under Russian rule are not available. (3 p)

Question **1**

Match the correct observing method with the EOP, based on the current ITRF status.

Polar motion	GNSS with others contributing ✓
Celestial frame and UT1 variation	VLBI only ✓
Geocenter motion	SLR only ✓
Scale	VLBI, SLR with Doris contributing ✓

Question **2**

Why space geodesy is important for the society? (2p)

Question **3**

What is the most interesting geodynamic phenomenon for you? Why? What is the best way to study it? (2p)

Question **1**

You get a call from a science reporter at a newspaper. She is writing an article about Metsähovi Geodetic Research Station and has got all the facts about the different techniques already, but wants to know more. How do you explain the importance of Metsähovi's geodetic equipment to her? She is a science reporter, thus very broad common knowledge on topics in natural sciences, but not expert in this topic. (3 points)

Question **2**

What was the most useful thing you learned on the course? Why? (2p)