

MAT4010 Pretest Geometry

Helmer Aslaksen
Dept. of Teacher Education/Dept. of Mathematics
University of Oslo
helmer.aslaksen@gmail.com

The goal of this pretest is to make you think about some questions related to “school mathematics from an advanced viewpoint”. You will discuss these questions in small groups at the beginning of class. This will both force you to reflect about your understanding of these topics, and help me gauge your understanding.

When we finish this part of the course, your homework will be to both write up the answers to the questions, and to answer some questions about the relationship between these questions and school mathematics. All the questions will be discussed in the lectures, but writing up the answers will be a good way for you to review.

You will not be marked on this test, and you can work on it in groups. These pretest-homeworks constitute the “oblig” part of the course, and must be submitted in order to take the exam. Please submit one common file with the answers to the mathematical questions from the whole group to me by e-mail. Include the name of all your group members in the file name. Submit one individual file with the answers to the didactic questions in Canvas. Call the file "Name - Topic".

1 Before the Lectures

- 1.1. Prove the formula for the area of a triangle.
- 1.2. Prove the formula for the area of a trapezoid.
- 1.3. What do we call a quadrilateral with four equal sides?
- 1.4. Is a square also a rectangle?
- 1.5. Prove that the sum of the angles of a triangle is 180° .
- 1.6. What is the sum of the angles of an n -gon?
- 1.7. Explain why $3 < \pi < 4$.
- 1.8. Explain informally why the area of a circle of radius r is $A(r) = \pi r^2$?

- 1.9. Why is the derivative of the area of a circle of radius r , $A(r) = \pi r^2$, equal to the circumference, $C(r) = 2\pi r$?
- 1.10. Can you say something that can make students remember the formulas for the volume of the sphere of radius r , $V(r) = 4/3\pi r^3$, and the surface area of a sphere, $4\pi r^2$?
- 1.11. Why can you say that a triangle is a two-dimensional pyramid?
- 1.12. A student remembers that the formula for the volume of a pyramid is the area of the base times the height divided by a number, but cannot remember what number to divide by. How can you help?

2 Homework after the lectures

- 2.1. Write up answers to the questions above.
- 2.2. Was there anything in this chapter that you had heard about before, but not really understood or not known why it was true?
- 2.3. Was there anything in this chapter that you enjoyed learning about?
- 2.4. Was there anything in this chapter that changed the way you look at this topic?
- 2.5. Was there anything in this chapter that you think you will use in your teaching or that will influence your teaching, either directly or indirectly?
- 2.6. Which of the questions above do you think are likely to come up in your teaching and in which situations? Do you think they will come up often? Do you think they will come from strong students, average students or weak students?
- 2.7. Name three additional situations where the material in this chapter could be useful for your teaching, either directly or indirectly? For instance when planning your teaching, responding to questions, clarifying your own understanding or other situations.
- 2.8. Can you imagine other questions that students might ask? Were there other questions related to these topics that you wondered about when you were in school?