Exam History of Science

Date: Wednesday March 27, 2019	Lecturer: dr. D.J. Beckers
Time: 15:15 – 17:15u	Course code: FEW X 400652

In general:

1. Make sure your name and student number are on ALL your work.
2. Answer in English sentences. Spelling and grammar should be correct, either to the English or to the US standards. Just a few buzzwords never constitute an answer. Always explain yourself. Use appropriate examples to illustrate your answer.
3. This exam consists of 12 A-questions and 8 B-questions. The A-questions are about the lectures and the texts. The B-questions require you to reflect.
4. You pick eight questions: 5 A-questions and 3 B-questions. Each question is worth 1 point (or nothing!). Indicate clearly which questions you're answering by mentioning either the number and / or the title of the question in your answer. If you answer more than five A-questions, only the first five will be considered. Likewise for the B-questions.

A-questions

1. Euclid
Explain how Euclid proved the Pythagorean theorem. Discuss the difference between his ideas and present-day ideas on the theorem.

2. Surveying
One of the ways that mathematics is applied, is in surveying. It is also one of the oldest uses of mathematics, dating back to Roman days or even earlier. Why do historians nevertheless only speak of applied mathematics from the nineteenth century onwards?

3. Mathematics
The centuries after 1200 witness the rise of *multiple* views on what mathematics was about. Explain this statement.

4. Mathematics in 14th century Theology
Give an example of mathematical reasoning in 14th century Theology. How does Mark Thakkar explain this use of mathematics.

5. Simon Stevin
In what sense did Stevin promote the introduction of the metric system in *The Tenth* (1585)?

6. Practical geometry
Describe two ways in which geometry was considered practical in the eighteenth century.

7. Bernal's paradox
What was Bernal's paradox? Explain both the paradox, and how it was resolved.

8. Dedekind
During the lecture, Richard Dedekind (1831-1916) was mentioned as advocating modernity with respect to numbers. Explain this statement.

9. Insurances and governement
Explain how, during the nineteenth century, the common interest of national governments and insurance companies, resulted in a cultural revolution, regarding the ideas about applying probability theory and statistics.

10. Mathematical model
During the twentieth century, the meaning of "mathematical model" changed considerably. Explain this change and in your answer, name at least one of the people involved in this change.

11. Kuhn-Tucker theorem
In what way(s) does Hoff Kjeldsen (in her text) illustrate that a mathematical theorem can be appreciated differently over time.

12. Computers
Why were automatic calculators called computers only in the late 1950s?

B-questions:

1. Descartes
To what extent did René Descartes change geometry?

2. Applied mathematics
A number of times, in history, the notion of "applying mathematics" has changed, or at least, what people thought was the most valuable in applying mathematics, changed. Describe one of these changes and explain the relation with societal changes at the time.

3. Mathematician
Reflect on the desirability of the mathematical profession: how cool is it being a mathematician, or being a business analyst? (pick either the mathematician *or* the business analyst)

4. Statistics
Does statistics require both trust in numbers and trust in mathematical techniques?

5. Multiple discoveries
Does the phenomenon of multiple discoveries in mathematics illustrate that mathematics is the result of human collaboration, instead of the work of a few brilliant minds?

6. Paradoxes
Paradoxes may both clarify and obscure probability theory. Reflect on these opposing views.

7. Mathematics education
Reflect on the usefulness of mathematics education. Why is it considered useful and to whom?

8. Digital culture
What is (or has been) the impact of computers on mathematical culture?