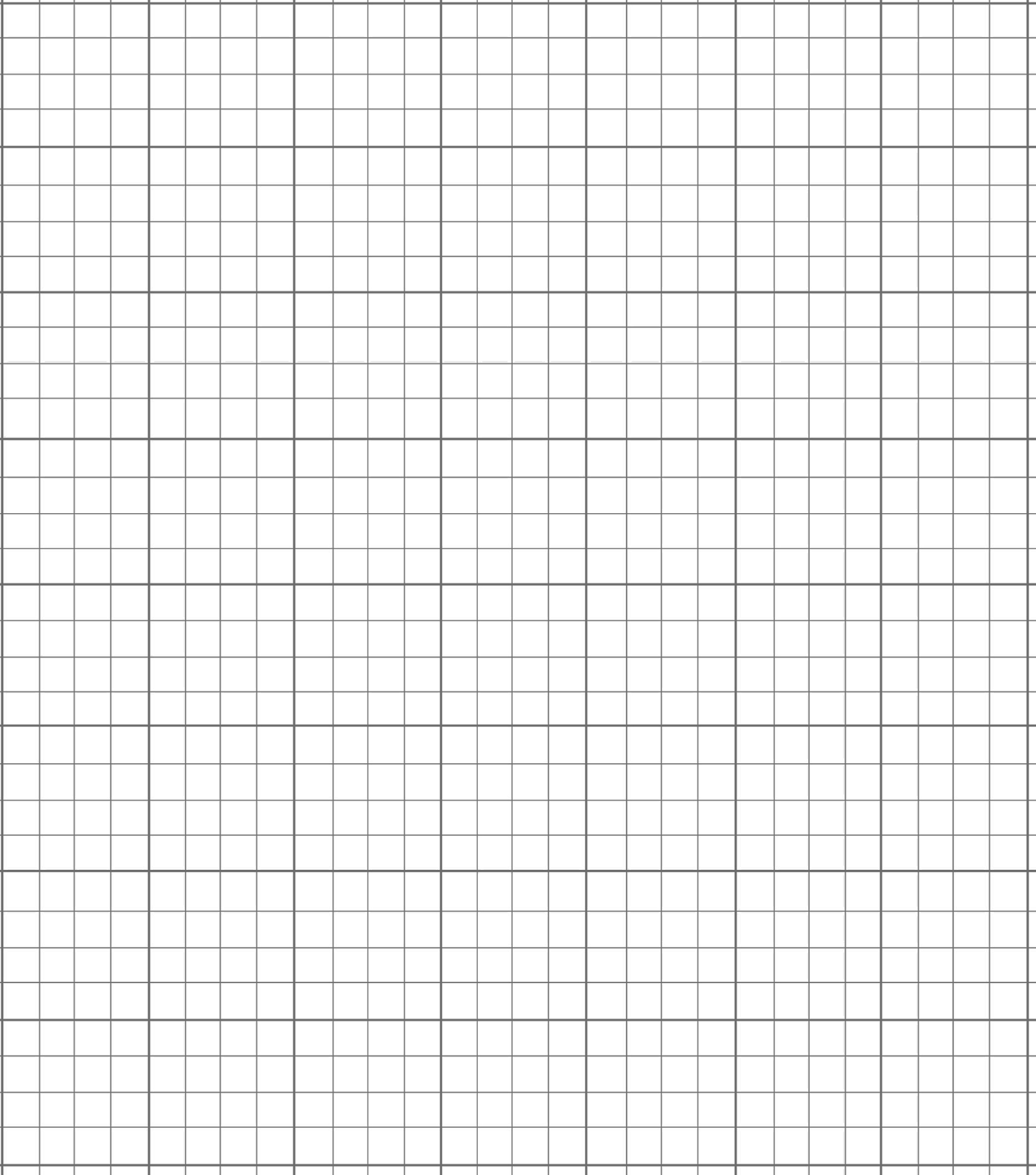
**Is Greenland Really THAT big**

Plan: As an introduction watch the video “Is Greenland Really THAT big?”

http://www.youtube.com/watch?v=2hAWUfdT330

Part 1: Use the figure below to estimate the area of Greenland. Each square represents 8,600 square kilometers. First discuss with a partner how you are going to do this.



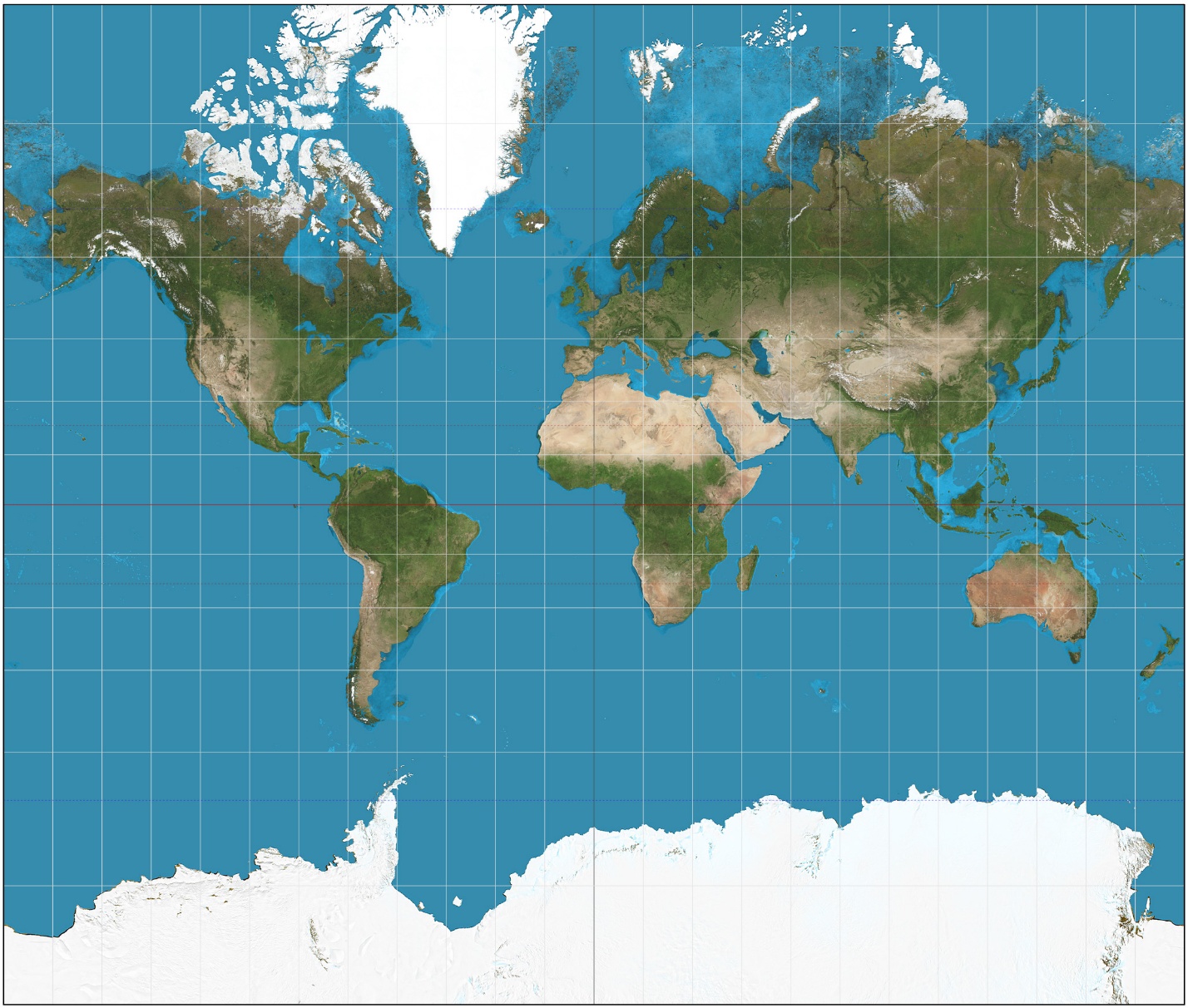
Questions:

1. What did you figure for the area of Greenland?
2. Is your partner’s estimate close to yours? If not, why not? Work together until you agree on an area.
3. Would larger or smaller squares make the estimate more accurate? Explain.
4. How small would you want the squares in order to get the most accurate estimate?
5. Is there a limit as to how small the squares could be? Explain.
6. Give two reasons why it someone would want to know the area of an island.

Go over these answers before moving on:

1. 2,166,000 square kilometers. How many estimates were over this value? How many were under this value? Does the shape of an irregular figure make a difference as to how close an estimate is to the actual value?
2. Answers will vary.
3. Smaller squares would make the estimate more accurate because more squares would be completely filled thereby reducing the area where estimates need to be made.
4. As small as possible or as small as can be seen.
5. Answers will vary, but this may be a good time to talk about the Area Postulate, limits, or numerical integration.
6. Answers will vary. To determine infrastructure needs, to sell land, to develop the land for industrial purposes, to calculate quantities of resources, to determine what fraction is not covered by ice (specific to Greenland)

MERCATOR PROJECTION (lines of latitude and longitude form right angles):



Starting with the Mercator projection trace Greenland onto a piece of paper and cut it out, like in the video.

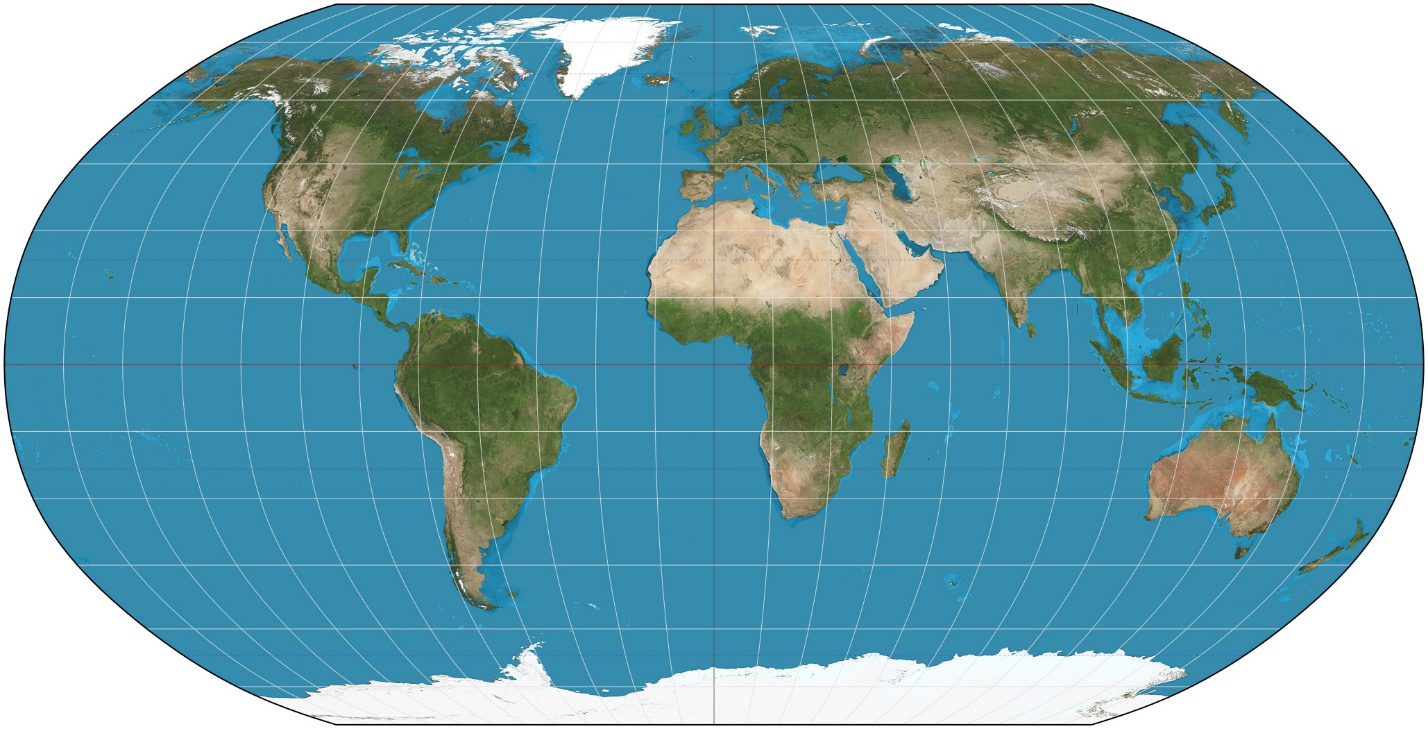
Questions:

1. Compare Greenland to other land areas. List at least two areas that are about the same as Greenland.
2. Google the areas you are comparing and record them.
3. Based on the actual area of Greenland given by your teacher, are you close? By what factor are you in error? (For example, if you thought you had an area of 100 and the actual area was 20, you are in error by a factor of 5.)
4. Does the Mercator projection better represent the true area of polar or equatorial regions? (Hint: look closely at the spacing of the lines of latitude and longitude on the map.)
5. If the Mercator projection is so inaccurate, why is it used?

Answers:

1. South America, Africa, most of North America, Russia, and many others
2. South America = 18 million sq km, Africa = 30 million sq km, North America (minus Alaska) = 23 million sq km, Russia = 17 million sq km
3. 7 – 14
4. Equitorial regions - the lines of longitude are parallel on a Mercator projection (they converge at the poles) and lines of latitude get progrssively further apart (they are evenly spaced on the earth – ignoring the equitorial bulge)
5. It was very useful in navigation as it preserved angles. Straight lines on a Mercator projection are lines of constant heading or direction. In the days of navigating by stars, sun, and compass, this was useful. Today it is rarely used.

ROBINSON PROJECTION (lines of latitude are horizontal and lines of longitude are curved more and more):



Using the Robinson projection, trace Greenland onto a piece of paper and cut it out.

Questions:

1. Compare Greenland to other land areas. List at least two areas that are about the same as Greenland.
2. Google the areas you are comparing and record them.
3. Based on the actual area of Greenland given by your teacher, are you close? By what factor are you in error? (For example, if you thought you had an area of 100 and the actual area was 20, you are in error by a factor of 5.)
4. Does the Robinson projection better represent the true area of polar or equatorial regions? (Hint: look closely at the grid on the map.)
5. If the Robinson projection is inaccurate, why is it used?
6. What is the only “map” that shows the true sizes and spatial relationships of Earth?
7. Answers will vary: US, China, Australia, Europe
8. US = 10 million sq km, China = 10 million sq km, Australia = 7.7 million sq km, Europe = 10 million sq km
9. 3 – 6
10. Equitorial regions
11. The Robinson projection is a compromise projection that tries to create a visually appealing map without heavy distortion. The National Geographic Society replaced the Robinson projection with the Winkel tripel projection in 1998.
12. A globe! Optional: discuss 3D models

Extension: Use Polar, Van der Grinten, or the Winkel tripel projections with similar questions.

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