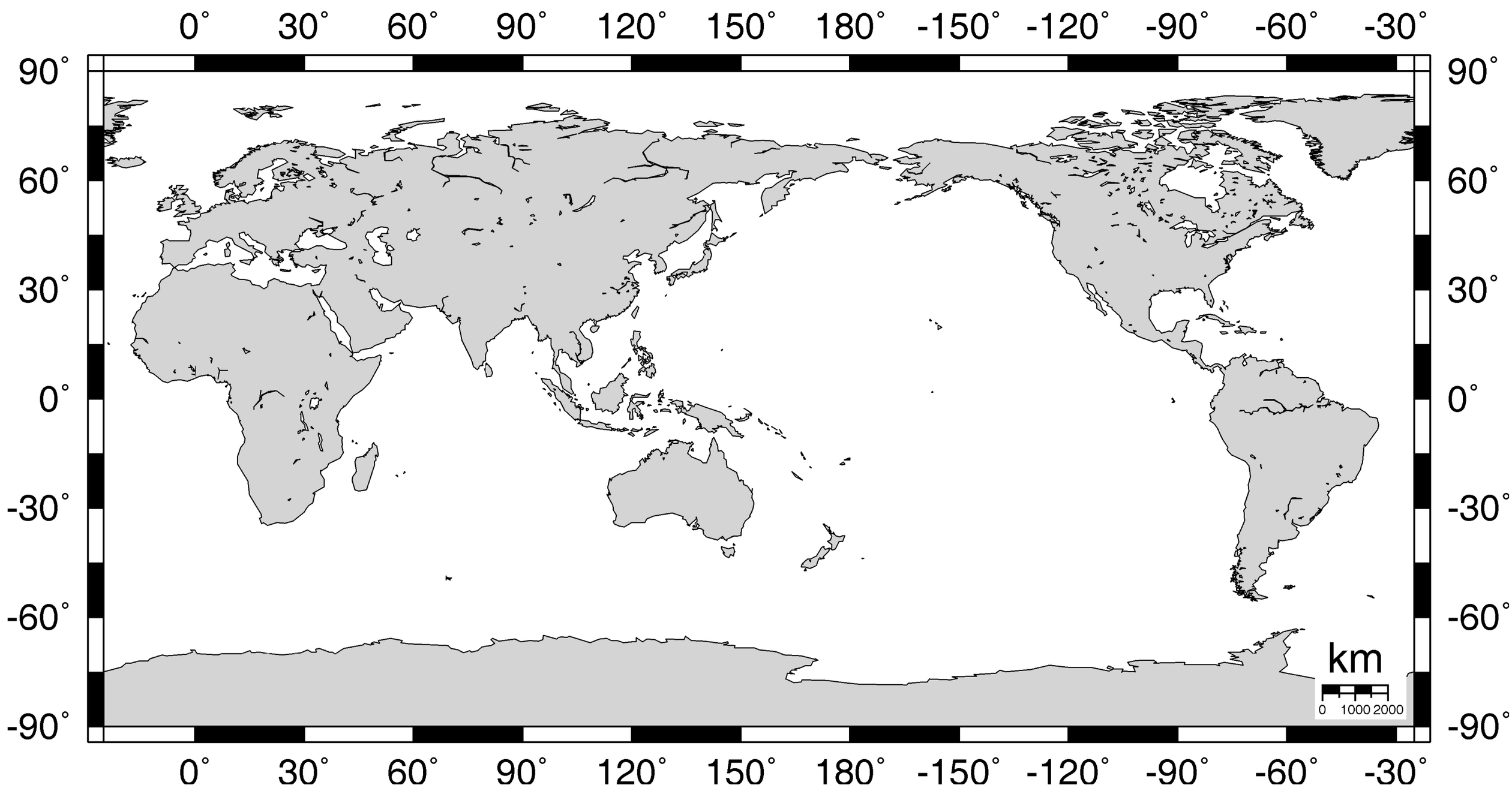
Basic Ocean Navigation

For Aspiring Pirates, Privateers and other such Adventurers



A few things to ponder upon. . .

- The Earth looks flat. How can you prove that it is not?
- The Earth seems to be huge. How will you estimate its size?
- How will you draw map of the Earth (or easier, of NUS)?
- There is so much space around us;
  - how do we know where we are?
  - how do we get from one point to another?
- Is a compass enough for you to find your way?

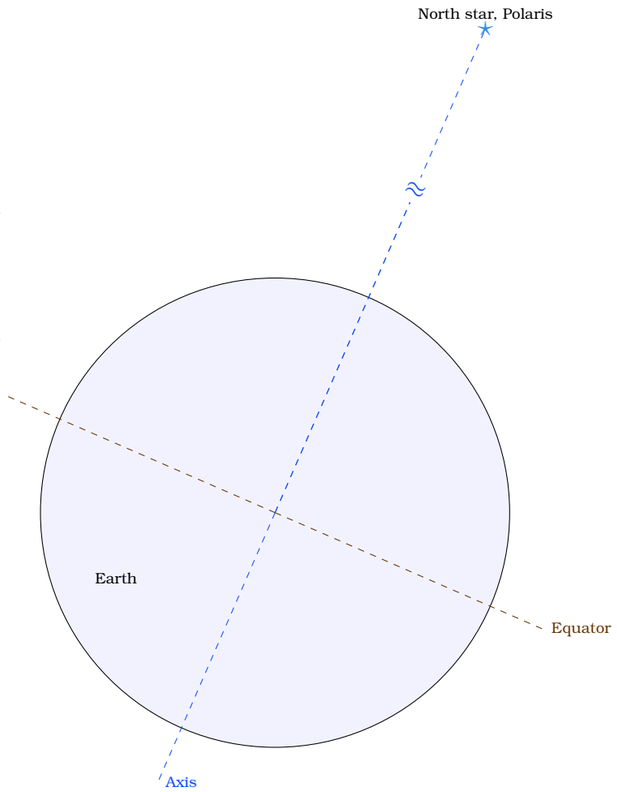
Where am I?

In the Northern Hemisphere

1. What is the significance of the North star (Polaris)?

   _____

2. Use the diagram to determine our latitude using the North Star.



Time & Longitude

3. Indicate longitude of the following locations:

   London _____ San Francisco _____ Singapore _____

4. The length of your shadow at noon is not always zero. What does this tell us?

   _____

5. Indicate the order in which the 'new' Sun is observed at the following locations:

   London _____ San Francisco _____ Singapore _____

6. Approximately how long will it take 'noon' to reach London after Singapore?

   (answer: 6.9 h)

7. Approximately how long will it take 'noon' to reach San Francisco after Singapore?

   (answer: 15.1 h)

8. Mr Bond; Mr James Bond, is in trouble. He just woke up to find himself floating in the middle of the ocean. Lucky for him the fancy tuxedo that Q had given him is keeping him warm and afloat. All he remembers is going out to drinks with his 'friends' in London, and he is now wondering where he is. He notices that the Sun is not casting a shadow and therefore figures out it should be time for lunch. However, when he looks at his watch, it shows 2 pm! What is Mr Bond's present longitude?

Atmospheric & Ocean Circulation

9. Air is made-up of mostly nitrogen (79%, N_2, atomic mass 14.01) and oxygen (21%, O_2, atomic mass 16.00). Water is made up of one oxygen atom and two hydrogen, (H, atomic mass 1.008) atoms.
   Which is 'heavier': dry air (i.e. without any water) or air with water?

10. More _____ material float above _____ dense material.

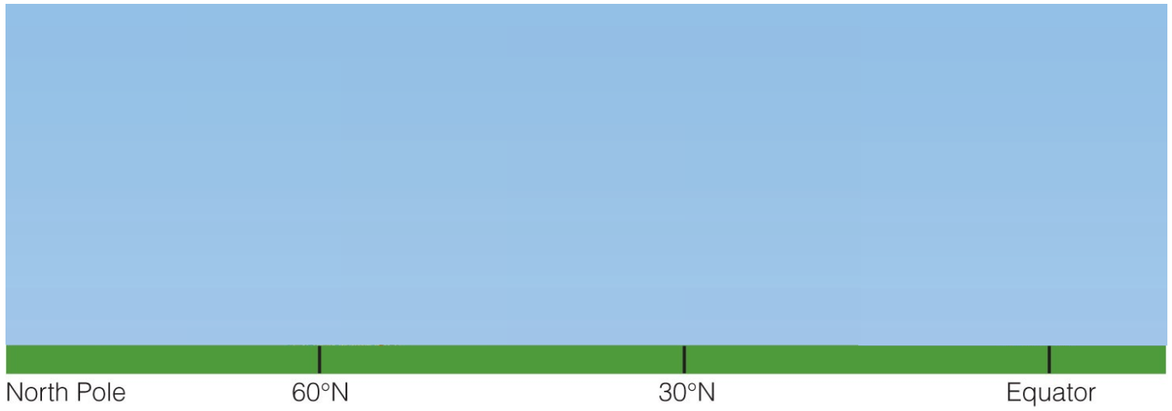
11. An example: _____

12. Convection is the process where _____ material move _____ .

13. When a gas is allowed to expand, it _____ .

14. Atmospheric pressure _____ as you move upwards.

15. Use the digram below to show the workings of the atmospheric convective cells.



16. The Coriolis effect causes objects moving in the Northern hemisphere to be deflected to the _____ and those moving in the Southern hemisphere to be deflected to the _____ .

17. The _____ of the Coriolis effect _____ with latitude.

18. There is _____ Coriolis deflection at the _____ .