

First Midterm Examination Study Questions

The questions below will help you focus on the most important concepts presented in class as you prepare for the first midterm exam. These questions don't necessarily cover all of the material on which you may be tested (nor will you necessarily be tested on all of the material noted below), but these questions are a good starting point for studying. As you prepare for the exam, I recommend that you **write down the answers** to these questions **in your own words** (not just copied from the textbook, and certainly not from Wikipedia!) to ensure that you understand the material completely.

1. Define the following terms: *latitude, longitude, parallel, equator, meridian, prime meridian*.
2. Latitude ranges from _____° to _____°, while longitude ranges from _____° to _____°.
3. State the latitude (in degrees) for the following "special" parallels: *equator, Tropic of Cancer, Tropic of Capricorn, Arctic Circle, Antarctic Circle, North Pole, South Pole*.
4. Using a world map or globe, estimate the latitude and longitude of Los Angeles (in California) and Sydney (in Australia). Be sure to specify if these locations are north or south latitude, and east or west longitude.
5. Describe and explain the concepts of *graphic map scales, fractional map scales* and *verbal map scales*.
6. What is meant by a map scale of 1:100,000?
7. What is the difference between an *equivalent map* and a *conformal map*?
8. Briefly describe the four major families of *map projections: cylindrical, plane, conic, and pseudocylindrical* ("elliptical").
9. What is an *isoline* on a map?
10. Describe and explain the four factors in Earth-Sun relations associated with the change of seasons: *rotation, revolution* around the Sun, *inclination* of Earth's axis, and *polarity* ("parallelism").
11. Is the noon Sun directly overhead at the equator *every* day of the year? (In other words, do the vertical rays of the noon Sun strike the equator every day of the year?) If not, on which day or days of the year is the Sun directly overhead at the equator?
12. Is the noon Sun ever directly overhead here in San Francisco? If not, on which day of the year is the noon Sun *highest* in the sky here, and on which day is it lowest?
13. Is the noon Sun ever directly overhead at the North Pole? If not, on which day of the year is the noon Sun highest in the sky there.
14. Beginning with the March equinox, describe the changing latitude of the vertical rays of the noon Sun during the year.
15. For the equator, describe the approximate number of daylight hours on the following days of the year: *March equinox, June solstice, September equinox* and *December solstice*.
16. For the midlatitudes of the Northern Hemisphere (such as here in San Francisco), describe the approximate number of daylight hours on the following days of the year: *March equinox, June solstice, September equinox* and *December solstice*. (For example, does San Francisco receive 12 hours of daylight, more than 12 hours of daylight, or less than 12 hours of daylight on those days.)
17. For the North Pole, describe the approximate number of daylight hours on the following days of the year: *March equinox, June solstice, September equinox* and *December solstice*.
18. At the North Pole, for how many months of the year is there *no* sunlight at all?
19. What is the longest day of the year (the day with the greatest number of daylight hours) in the midlatitudes of the Northern Hemisphere? What is the longest day in the Southern Hemisphere?
20. In terms of Earth-Sun relations, explain the significance of the Tropic of Cancer, the Tropic of Capricorn, the Arctic Circle and the Antarctic Circle.
21. Describe the most important "constant" components and "variable" components of the atmosphere.
22. Describe the general size and temperature characteristics of the *troposphere* and the *stratosphere*.
23. What is *ozone* and why is it important in the atmosphere?
24. What is the difference between *weather* and *climate*? What are the four *elements of weather and climate*? What are the seven dominant *controls of weather and climate*?

25. Describe the *Coriolis effect* and its cause.
26. Describe and contrast *shortwave radiation* and *longwave radiation*.
27. What is meant by the term *insolation*?
28. Briefly describe the following warming and cooling processes associated with *electromagnetic energy*: *radiation* (emission), *absorption*, *reflection*, *transmission*, and *scattering*.
29. Why is the sky blue? Why are sunsets orange and red?
30. Briefly describe the following warming and cooling processes: *conduction*, *convection*, *advection*, *expansion* (*adiabatic cooling*) and *compression* (*adiabatic warming*).
31. What happens to the temperature of air when it rises? When it descends? Why?
32. Briefly describe and explain how the troposphere is warmed indirectly by the Sun.
33. Describe and explain the *greenhouse effect* in the atmosphere, noting the two most important natural *greenhouse gases*.
34. How might humans be enhancing (increasing) the natural greenhouse effect?
35. Explain the reasons for the unequal warming (by latitude) of Earth by the Sun.
36. Explain why land warms and cools faster and more than water.
37. Describe the *average lapse rate* (average vertical temperature gradient) in the troposphere.
38. Why does temperature generally decrease with increasing altitude in the troposphere?
39. What are the two dominant *mechanisms of heat transfer* around the world? How would global temperature patterns be different without this heat transfer?
40. Where in the world do we generally find the greatest *average annual temperature ranges* and where do we find the smallest average annual temperature ranges? Why?
41. Describe the basic pattern of ocean currents around the margins of a major ocean basin (including the relative temperature of each current—either “cool” or “warm”). [You should be able to sketch the direction of movement (and note the relative temperature) of major ocean currents on a blank map of an ocean basin.]
42. What is the relative temperature of the ocean current flowing along the west coast of a continent in the midlatitudes? Along the east coast of a continent?
43. What is an *isotherm*?
44. Using the isotherm maps of average January and July sea level temperatures (Figures 4-29 and 4-30 in the textbook) describe the general influence of latitude, season, land-water contrasts and ocean currents on global temperature patterns.
45. What generally happens to atmospheric pressure with increasing altitude?
46. What factors generally cause *low atmospheric pressure* cells and *high atmospheric pressure* cells near the surface?
47. What is an *isobar*? When referring to air pressure, what is a *ridge* and what is a *trough*?
48. Describe the three factors that influence wind direction: *pressure gradient*, *Coriolis effect* & *friction*.
49. How and why are surface (“friction-layer”) winds different from upper-atmosphere *geostrophic* winds?
50. Describe and explain the pattern of wind flow in the Northern Hemisphere around: a surface high; a surface low; an upper atmosphere high; an upper atmosphere low. [You should be able to sketch the wind direction on isobar maps of highs and lows at the surface and the upper atmosphere in both the Northern and Southern Hemispheres.]
51. What is the reason for the difference in wind flow patterns around highs and lows in the Northern Hemisphere and the Southern Hemisphere?
52. What is a *cyclone*? An *anticyclone*?
53. Describe the pattern of vertical air movement within a cyclone and an anticyclone.
54. Describe the general wind speed associated with a gentle (gradual) *pressure gradient* and a steep (abrupt) pressure gradient.
55. What are the *Hadley Cells*, and generally what causes them?
56. Describe the general location and characteristics of the following atmospheric circulation components: *intertropical convergence zone (ITCZ)*, *trade winds*, *subtropical highs*, and the *westerlies*. [You should be able to sketch in the location of these four components on a blank map of an ocean basin.]
57. Describe the characteristic weather associated with the intertropical convergence zone (ITCZ) and the characteristic weather associated with subtropical highs.