AVIA 123 – Chapter 10 – Local Winds – Study Guide

1. Thermal local winds that occur in the ______________ during the warmer part of the year create Sea, Land, Mountain, Valley and Slope Breezes occur primarily because of ______________ cooling and heating 10-2

2. Thermal local winds that depend on radiational cooling and heating are tied closely to the ______________ 10-2

3. A Sea Breeze refers to a local wind that flows from the ___ to the ___. Sea Breezes occur because the __________ of the land surface increases more rapidly than the temperature of the surface of the ___. 10-2

4. The Sea Breeze is also accompanied by a very slight change in atmospheric __________ which aids wind movement. A well-developed Sea Breeze will have winds of _______ knots and will extend from the _______ up to as high as _________ above the surface. 10-2

5. Above the Sea Breeze the wind will move back toward the sea creating a local circulation of low altitude winds flowing toward __________ with slightly higher altitude winds at about 6,000 feet flowing towards __________ which completes the Sea Breeze Circulation. 10-2

6. A Sea Breeze describes __________ air moving inland from the sea. Air movement occurs because the __________ heats more rapidly than the sea and warm air rising over the land. Heating reduces pressure which creates a __________ pressure gradient (very small gradient) creating enough difference to generate air movement. 10-3

7. A Sea Breeze Front may develop along with the Sea Breeze. The Sea Breeze Front may be marked by a broken line of __________ clouds. If sufficient instability exists, the Sea Breeze Front may be marked by a line of _______. 10-3

8. Thermal winds are normally named for the __________ of the breeze and flow from __________ to warm. 10-3/4

9. Sometimes, due to a Sea Breeze Front (very localized, very narrow), the ________ sea breeze forces warmer land-side air aloft which sometimes creates lower altitude __________ clouds at about 2,000’ – 3,000’ 10-3

10. Sometimes, sea breezes will flow around __________ near the coastlines and create convergence zones. A good local example is the flow around the Olympic Mountains which creates a __________ zone in the vicinity of Seattle. 10-3
11. Land Breezes occur a few hours after ________ due to the more rapid cooling of the surface of the land compared to the surface of the _____, and work very much like the Sea Breeze except the circulation flows at low altitude toward the____ and at higher ________ toward the land  10-4

12. Generally, a Land Breeze will be weaker than a ________ with winds of only about 5 knots and with the overall circulation only extending up to about________  10-4

13. A Valley Breeze is a circulation of air toward higher ________ that creates air that flows upslope, and has a corresponding circulation of air that flows out from the mountains at higher altitudes and then descends over the _______. The term for an upslope wind is ANABATIC.  10-5

14. An Anabatic wind occurs because the air in the vicinity of ________ ________heat ________ than the air at the same altitude over lower elevations and the differential heating creates a very small differential ________ change which creates the wind flow.  10-5

15. Upslope and Valley Breezes usually reach maximum speeds during the middle of the ________ with speeds of _____ to ____knots. Because snow cover tends to reflect rather than absorb solar radiation, snow cover tends to reduce the effects of ________ and ________ breezes. 10-6

16. Mountain Breezes occur primarily at________ as the cooler air at higher altitude near the surfaces of mountain slopes cools more ________ than air at the same altitude over lower elevations. The term for down-slope winds is KATABATIC.  10-6

17. Mountain Breeze ________ wind circulation works in reverse from the Anabatic winds of the ________ Breeze. In a Katabatic circulation warmer air at altitude from over lower elevations flows toward ________slopes. 10-6

18. Cold Downslope or Drainage winds occur when cold dense air sinks and strengthens ________ and ________ breezes 10-8

19. Mountain Lee Waves and Warm Downslope winds are ________ (scale) wave patterns that develop over and ________of mountains. These two winds are forms of Atmospheric ________ Wave air movement 10-9

20. Mountain Lee waves occur in movement of ________ air over mountains with a wind speed of at least ___knots and may persist for several______. The danger of a Mountain Lee wave wind is that on the Lee side, the air can be very_______. 10-9

21. A weak Lee Wave will have vertical movement of a few hundred ______. A strong Lee Wave can have vertical movement of up to ______ feet per minute and can attain vertical changes of up to ______ feet or more. 10-10
22. Two locations where Mountain Lee Waves are strongest are the lee slopes of the _________ ________ in California and the ________ ________ in Colorado 10-11

23. Indications of potential Mountain Lee wave action are _________ Clouds (lens-shaped clouds) that will occur above the peaks of the mountain range and downwind of the Mountain range when wind speeds exceed ______ knots and the direction of wind flow is ___________ to the mountain ridgelines 10-11

24. Examples of Warm Downslope winds and where they occur

   a. ________- ______________________
   b. ________- ______________________
   c. ________- ______________________
   d. ________- ______________________
   e. ________- ______________________