21. You are fly fishing in a mountain stream during the early morning; would you expect the wind to be blowing upstream or downstream? Explain.

22. Which wind will most likely produce clouds: a valley breeze or a mountain breeze? Why?

23. Explain why chinook winds are warm and dry.

24. Name some of the benefits of a chinook wind.

25. What atmospheric conditions contribute to the development of a strong Santa Ana condition? Why is a Santa Ana wind warm?

26. How do strong katabatic winds form?

27. Why are haboobs more prevalent in Arizona than in Oklahoma?

28. Describe how dust devils usually form.

29. In what part of the world would you expect to encounter each of the following winds, and what type of weather would each wind bring?

(a) foehn  (e) chinook
(b) California norther (f) Columbia Gorge wind
(c) Santa Ana (g) sirocco
(d) zonda (h) mistral

QUESTIONS FOR THOUGHT

1. A pilot enters the weather service office and wants to know what time of the day she can expect to encounter the least turbulent winds at 760 m (2500 ft) above central Kansas. If you were the weather forecaster, what would you tell her?

2. Why is it dangerous during hang gliding to enter the downwind side of the hill when the wind speed is strong?

3. After a winter snowstorm, Cheyenne, Wyoming, reports a total snow accumulation of 48 cm (19 in.), while the maximum depth in the surrounding countryside is only 28 cm (11 in.). If the storm's intensity and duration were practically the same for a radius of 50 km around Cheyenne, explain why Cheyenne received so much more snow.

4. Why is the difference in surface wind speed between morning and afternoon typically greater on a clear, sunny day than on a cloudy, overcast day?

5. Might it be possible to have a city/suburb breeze? If so, would you expect it to be more prominent during the day or night? Describe how it would form. Use a diagram to help you.

6. Average annual wind speed information in knots is given here for two cities located on the Great Plains. Which city would probably be the best site for a wind turbine? Why?

<table>
<thead>
<tr>
<th>Time</th>
<th>MID-NIGHT</th>
<th>3</th>
<th>6</th>
<th>9</th>
<th>NOON</th>
<th>3</th>
<th>6</th>
<th>9</th>
<th>AVERAGE ANNUAL WIND SPEED (KNOTS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>City A</td>
<td>12</td>
<td>7</td>
<td>8</td>
<td>13</td>
<td>15</td>
<td>18</td>
<td>14</td>
<td>13</td>
<td>12.5</td>
</tr>
<tr>
<td>City B</td>
<td>8</td>
<td>6</td>
<td>6</td>
<td>13</td>
<td>20</td>
<td>22</td>
<td>15</td>
<td>10</td>
<td>12.5</td>
</tr>
</tbody>
</table>

7. Which of the sites in Fig. 9.48 would probably be the best place to construct a wind turbine? A, B, or C? Which would be the worst? Explain.

8. Explain why cities near large bodies of cold water in summer experience well-developed sea breezes, but only poorly developed land breezes.

9. Why do clouds tend to form over land with a sea breeze and over water with a land breeze?

10. The convergence of two sea breezes in Florida frequently produces rain showers; the convergence of two sea breezes in California does not. Explain.

11. If campfire smoke is blowing uphill along the east-facing side of the hill and downhill along the west-facing side of the same hill, are the fires cooking breakfast or dinner? From the drift of the smoke, how were you able to tell?

12. Why don't chinook winds form on the east side of the Appalachians?

13. Show, with the aid of a diagram, what atmospheric and topographic conditions are necessary for an area in the Northern Hemisphere to experience hot summer breezes from the north.