

MOUNTAIN SNOWPACK – PREWORK

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NOTE: For an introduction to the material to be covered read the three articles provided (The Mountain Snowpack, The Basic Ideas Behind Snow Metamorphism, and Recycled Power and Other Types of Near-Surface Faceting) and answer the following questions. Excellent additional information can be found in Chapter 5 of Staying Alive in Avalanche Terrain, 2nd edition (Tremper, 2008) and Chapter 3 of the Avalanche Handbook, 3rd edition (McClung and Schaerer, 2006).

1. Why does snow change form (metamorphose) so easily and quickly under the conditions we commonly find in the mountain snowpack?
2. Why is the development of a layered structure in the snow cover important for avalanche formation? What is the role of snow metamorphism in the development of these layers?
3. Different layers within the snowpack may be a result of the different storms that deposited those layers. Once on the ground, snow can further differentiate through metamorphism. Name the three main types of snow metamorphism, provide a brief description of processes involved, and describe the resulting snow crystals.
4. What is the average temperature gradient within a snow cover which is 50 cm thick when the ground temperature is 0 degrees C and the temperature at the snow surface is -10 degrees C? Is this temperature gradient sufficient for faceted crystal growth?
5. In the above example, if the density throughout the snowpack is similar, where in the snowpack would you expect to find the fastest growing faceted crystals? Why?

6. In dry snow without a strong temperature gradient, what would you expect to happen to the strength of the snowpack? Describe the snow crystals you might expect to see.

7. In a typical mid-winter snowpack, where might you expect to find the strongest temperature gradients? What are some of the mechanisms driving those high temperature gradients?

8. Choose the best answer to complete the statement below. Then explain your answer.
Melt-freeze metamorphism can create _____ layers in the snow.
 - a. strong
 - b. weak
 - c. both strong and weak

9. What tends to happen to the grain size after repeated cycles of melt-freeze metamorphism? Why?

10. Define settlement, glide, and creep.