

Dressing for Winter

Vocabulary:

Radiation, convection, conduction, respiration, evaporation, insulation, wicking

Method:

The teacher, a volunteer (or an outdoor clothing retailer) models dressing in 3 layers and describes the purpose behind each layer and type of material.

Objectives:

- Students will be able to choose appropriate clothing for winter activities.
- Students will explain what the 3 clothing layers should be for outdoor winter activities and why each layer is needed.

Background

Heat is lost from the body in five ways. It is radiated from the body in the form of infrared radiation. It is lost through convection as the air immediately adjacent to the body is warmed and then disturbed by wind. It is similarly lost through respiration as cool air is taken into the lungs, warmed and then exhaled. Heat loss also occurs by conduction when the body comes in direct contact with some cooler surface, such as the ground, cold pots, snow, rocks, etc... And finally, heat is lost when moisture on the body's surface evaporates - an exothermic chemical reaction. Because an active snowshoer, skier, or hiker can sweat four to six liters of perspiration in a day, evaporative heat loss has special implications for clothing selection.

in order to prevent radiation and conduction, some clothing articles must be capable of providing the wearer with "insulation," a thermal barrier of trapped dead air space that conducts heat away from the body as slowly as possible. Because the body and outdoor elements are continuously exposing insulating clothing to moisture, it is a valuable asset for clothing to insulate even when it is wet.

Procedures

1. For younger students, make a transparency of the winter-dressed student and point out the things they need to remember to bring to be prepared for a day of snowshoeing. Then give them the Gabby stick figure handout and see if they can dress Gabby to be ready for a day at Glacier in the winter.
 2. For older students, the day before, explain to the students that you will be coming in tomorrow with clothing to show them how to dress for winter wilderness activities. Explain to students that knowing how to dress for winter weather is the first step to having a great time outdoors and being safe.
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Materials (clothing can be brought in by teacher or assigned to students to bring in).

- * Wool or synthetic balaklava or ski hat
- * Wool or synthetic gloves or mittens
- * Nylon mitten shells
- * Water and wind resistant nylon parka and pants
- * Down, pile or other insulating parkas and pants
- * Wool shirt and pants
- * Wool, polypropylene, capilene or other synthetic longjohns
- * Wool socks
- * Boots
- * Sun glasses or ski goggles are helpful

2. At the beginning of the activity, come in dressed for a winter day. Take off each item of clothing one at a time and talk about its advantages (and possibly disadvantages). Discuss the fabric it is made from and why. (Another option is to bring in a backpack or bag with the clothing in it and have different students come up and pull out an article and decide if they are appropriate - make sure to include cotton jeans, a baseball cap, a goofy t-shirt, & perhaps some other article that students will chuckle about).
 3. Emphasize that the most basic rule is **layering** as it helps with 3 important outcomes: 1) Keeping moisture away from the skin; 2) Creating insulation to help keep the body core warm; 3) Protecting against the “elements” - wind, snow, rain.
 4. Protective layers of outer clothing should repel precipitation so that it does not soak through to the inner layers. These must also stop the wind to protect the wearer from convection heat loss, and allow ventilation to minimize evaporative heat loss. Explain the basic types of nylon: taffeta, lycra, rip-stop, and cordura. Discuss its tight weave and wind resistance, as well as its inability to absorb water into the fibers of the cloth. Explain Goretex and describe its advantages and disadvantages. Discuss the difference between water resistant and water proof.
 5. For the middle layers, compare the basic types of insulation used in outdoor clothing: down, polarguard, holofil, qualofil, and thinsulate. It's best if you can have at least two different parkas so the students can feel the differences between them for themselves. Middle insulating layers should “breathe” easily.
 6. Inner layers of clothing should be of materials that “wick” moisture away from the skin. (Cover the bottom of a drinking glass with a small amount of water to represent sweat on your skin. Then stand a strip of wool or candle wick in the glass touching the water to show students the idea of moving water from the bottom of the glass to the material=“wicking”). Finally, all layers of clothing should dry rapidly, preferably from body heat alone. Compare wool, polypropylene, capilene, and thermax. Describe advantages and disadvantages of each. Emphasize the structure, the feel, the look, and even the smell of the materials. This is also a good place to discuss cotton and why it is not a prominent component of outdoor clothing (i.e. it actually absorbs water into the individual fibers, causing the fabric to stay wet for a long time).
 7. Certain basic essentials are just as important as a warm jacket and a pair of snowpants. Sixty percent of your body heat escapes through your head if you are not wearing a hat. It is an essential in the winter (not a ball cap but a lightweight wool or fleece will do fine).
 8. Gloves and/or mittens protect your hands from being cold- especially useful when participating in snow sports. A lot of body heat escapes through the hands just as it does through the head. Another area to keep warm is your feet. A pair of wool socks or polypropylene will keep feet warm even if they get wet. Stay away from cotton as stated above.
 9. On a sunny day and even cloudy days, wear sun glasses. They protect your eyes from the sun's UV rays that penetrate even in the winter. The sun also can penetrate the skin, so sunscreen is always an important consideration.
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10. Dressing in layers allows you to add or subtract layers of clothing depending on the weather and temperatures. When you go to the mountains, remember that weather conditions close to home are generally very different from conditions in the mountains. For every 1,000 feet of elevation gain, the temperature drops 3.5 degrees Fahrenheit.

11. For review on the 3 layers, have students go to the interactive website www.winterfeelsgood.com and dress the snowmonsters.

Evaluation

Ask students to list and describe each clothing layer and its function.

Extension

Conduct an experiment where students (and teachers!) wear one wet **cotton** sock all day on one foot, while the other foot has one wet **wool** sock on all day. Which foot stays warmer?



Is this student ready for a winter field trip to Glacier? Circle the words for what they remembered. Draw in pictures for the things they need.

Winter Hat

Drink with lid that
closes

Winter
Coat

Scarf (optional)

Gloves or
Mittens

Snowpants

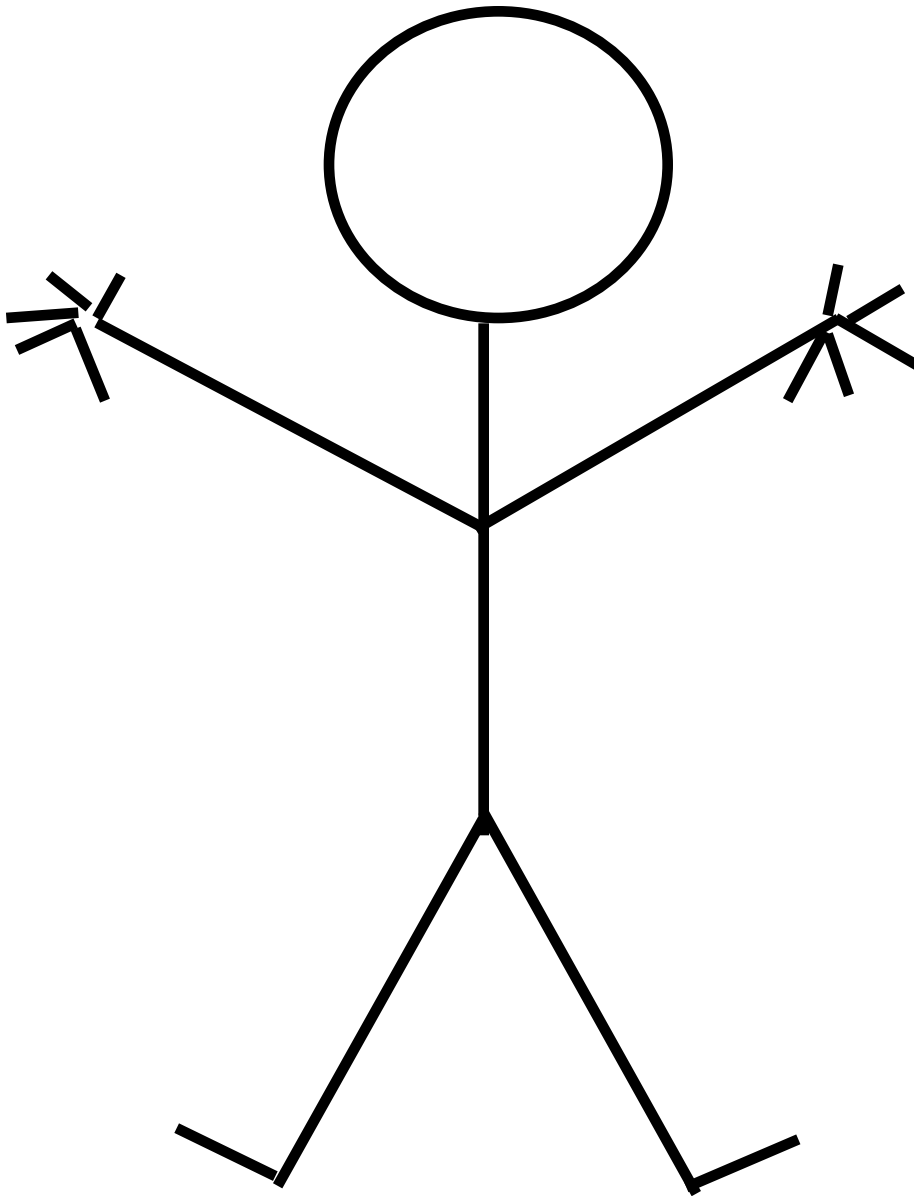
Lunch and
snack

Warm, water-
proof boots
with socks



Dressing for a Winter Field Trip to Glacier

Help Gabby stick figure dress to go snowshoeing in Glacier National Park. Gabby needs: long sleeve shirt, long pants, socks, snow boots, socks, snow pants, a winter coat, gloves or mittens, a warm hat, and a yummy lunch with a resealable drink and snack.



When your teacher says you have Gabby ready, take your drawing home to remind YOU and your family what you need for your Glacier field trip.
