

# **Keep the Heat**

## **Intro to Insulating Fabrics**

# Layering keeps you warm

## DRESSING FOR COLD WEATHER



adding layers will help keep you warm as the temperature drops

### CHILLY



[weather.gov/safety](https://www.weather.gov/safety)

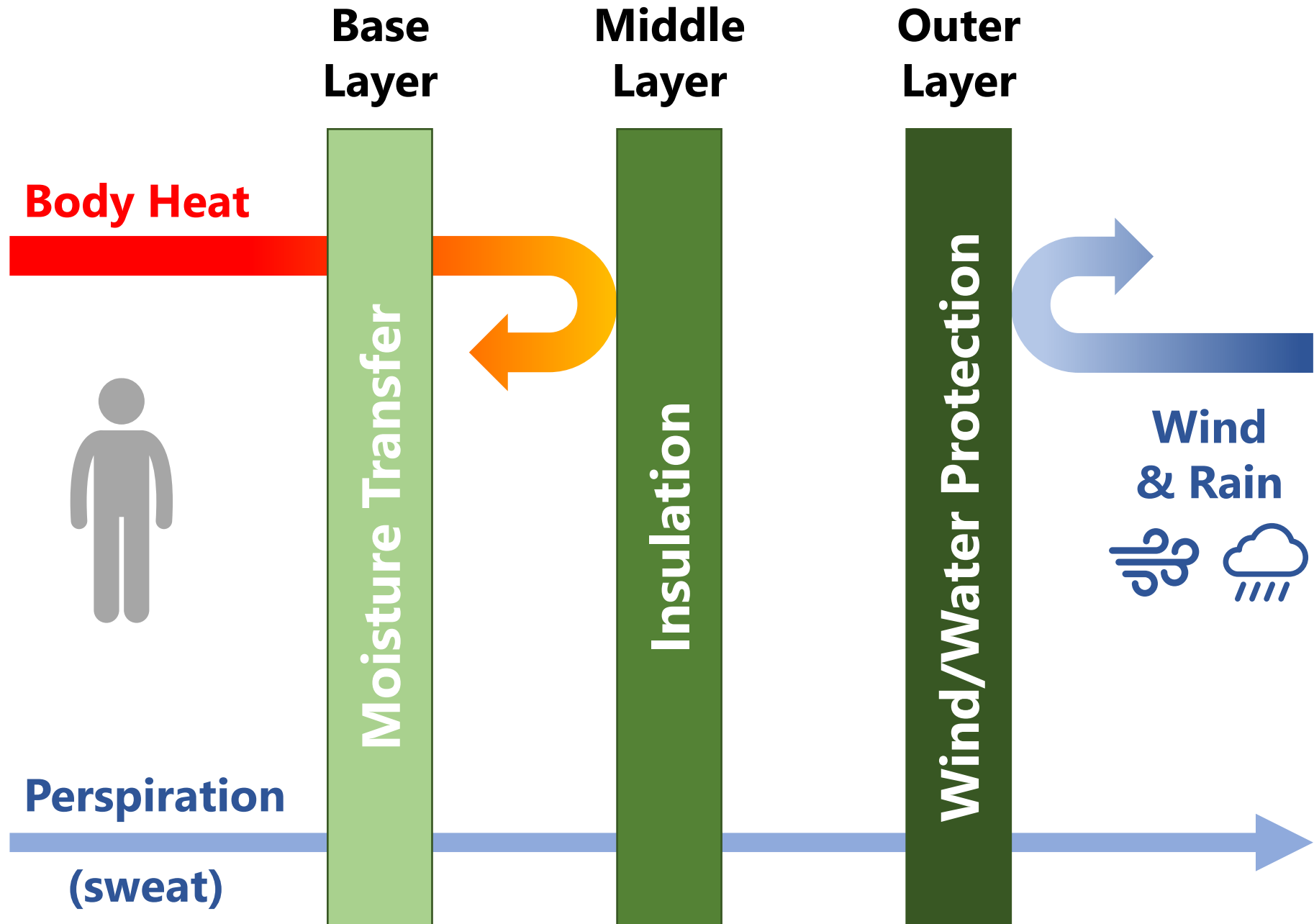
### COLD



### EXTREME COLD



# Why layering works

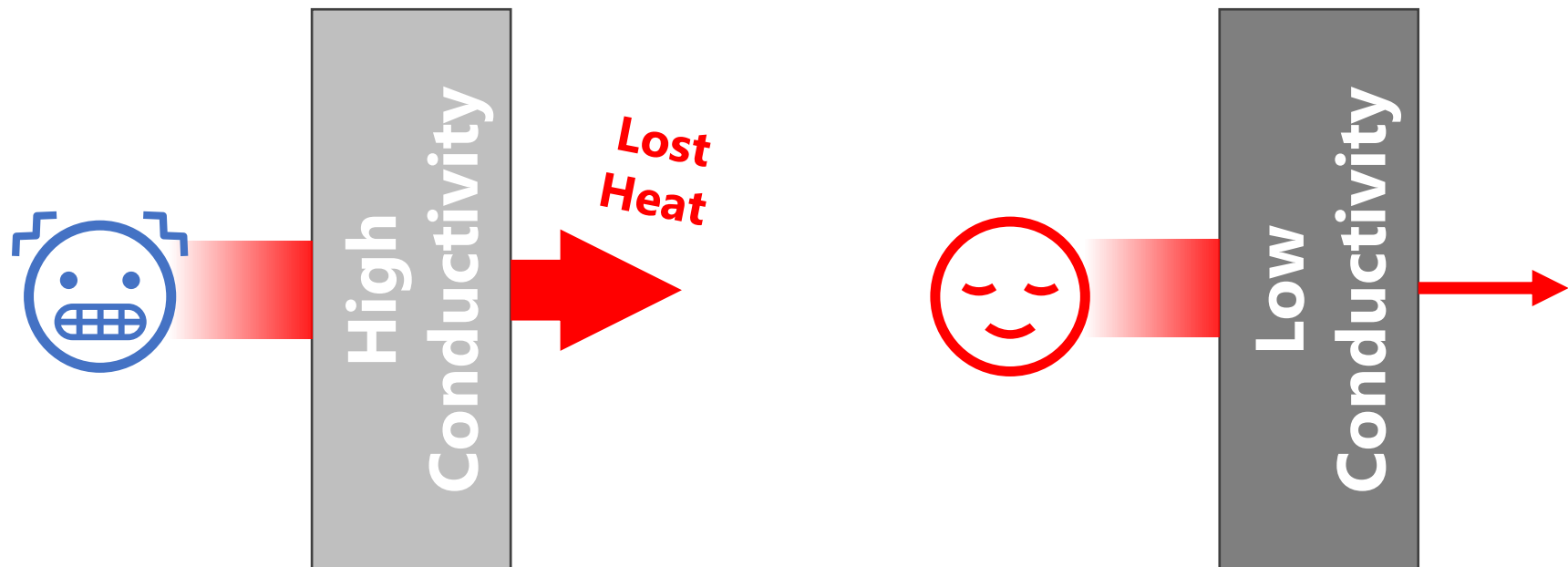


# Thermal Conductivity

**Thermal conductivity** is the rate at which heat transfers through the material, or in other words: how poorly the material insulates.

The **higher** the number, the **more** heat passes through (and the colder you'll feel).

The **lower** the number, the **less** of your body heat you'll lose.



# Thermal conductivity of common materials



**Aluminum**  
**237 W/mK**



**Water**  
**0.59 W/mK**



**Most textile fibers**  
**0.1-0.3 W/mK**



**Styrofoam**  
**0.040 W/mK**



**Air**  
**0.027 W/mK**

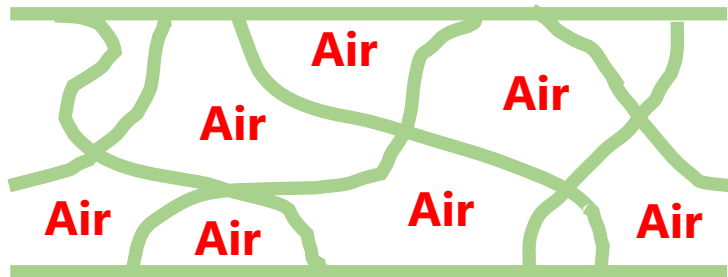


W/mK = Watts (power) per meter  
(distance)\*Kelvin (temperature)

# Why does insulation keep you warm?

**Insulation** preserves the air that has been warmed by your body, holding it close to your skin and reducing heat loss.

Two ways insulating clothes protect you from cold:



Use fibers that **trap air** to create a layer of still air that serves as insulation



**Stop the wind** from entering your clothes and pushing out the warm air.



# How insulating fabrics work



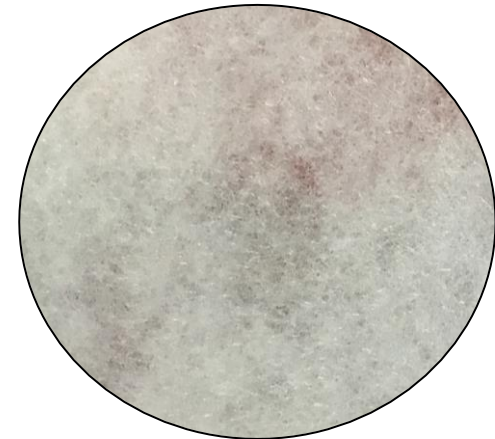
**Quilted fabrics** use a layer of fluffy batting material sewn between two layers of denser fabric to trap air



**Puffy coats** use down or fluffy synthetic fibers to trap air. Down is the tiny, fluffy feathers birds have under their outer feathers to keep warm.



**Down**



**Polyester Batting**

# Image Acknowledgements

## Slide 2

- <https://www.weather.gov/images/safety/Winter-Dress-Infographic.jpg>

## Slide 3

- "Person" by Gan Khoon Lay, courtesy The Noun Project
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