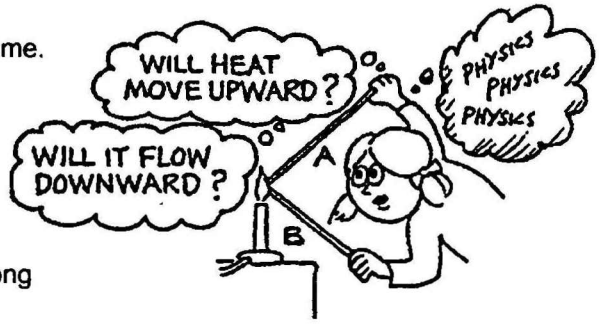
Name A. KEY Date _____

CONCEPTUAL Physics PRACTICE PAGE

Chapter 16 Heat Transfer
Transmission of Heat

1. The tips of both brass rods are held in the gas flame.



a. [True] (False) Heat is conducted only along Rod A.

b. [True] (False) Heat is conducted only along Rod B.

c. (True) [False] Heat is conducted equally along both Rod A and Rod B.

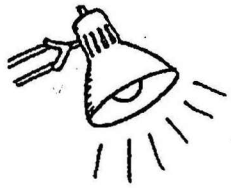
d. (True) [False] The idea that "heat rises" applies to heat transfer by *convection*, not by *conduction*.

2. Why does a bird fluff its feathers to keep warm on a cold day?

Fluffed feathers trap air that acts as an insulator

3. Why does a down-filled sleeping bag keep you warm on a cold night? Why is it useless if the down is wet?

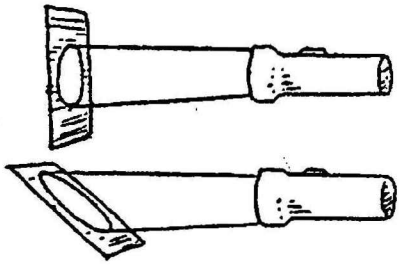
Trapped air in down is an insulator. Wet water takes the place of air and insulation is reduced.

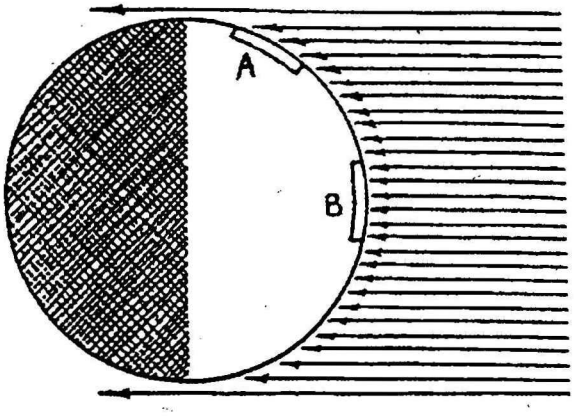


4. What does *convection* have to do with the holes in the shade of the desk lamp?

Warmed air rises through the holes instead of being trapped.

5. The warmth of equatorial regions and coldness of polar regions on Earth can be understood by considering light from a flashlight striking a surface. If it strikes perpendicularly, light energy is more concentrated as it covers a smaller area; if it strikes at an angle, the energy spreads over a larger area. So the energy per unit area is less.





The arrows represent rays of light from the distant Sun incident upon Earth. Two areas of equal size are shown, Area A near the North Pole and Area B near the equator. Count the rays that reach each area, and explain why B is warmer than A.

3 on A; 6 on B; Area B gets twice the solar energy as A, so is warmer

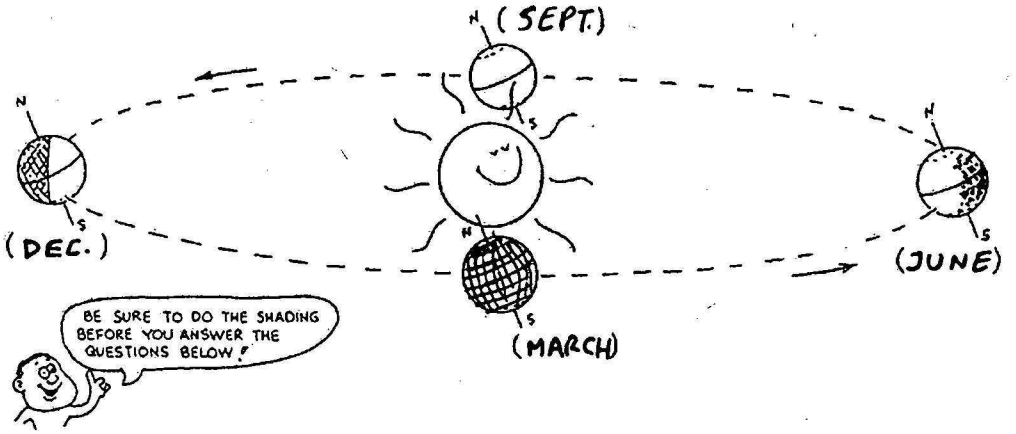
Hewitt Drew it!

Chapter 16 Heat Transfer

***Transmission of Heat*—continued**

6. Earth's seasons result from the 23.5-degree tilt of Earth's daily spin axis as it orbits the Sun. When Earth is at the position shown on the right in the sketch below (not to scale), the Northern Hemisphere tilts toward the Sun, and sunlight striking it is strong (more rays per area). Sunlight striking the Southern Hemisphere is weak (fewer rays per area). Days in the north are warmer, and daylight is longer. You can see this by imagining Earth making its complete daily 24-hour spin.

   Do two things on the sketch:
   i. Shade the part of Earth in nighttime darkness for all positions, as is already done in the left position.
   ii. Label each position with the proper month—March, June, September, and December.



   a. When Earth is in any of the four positions shown, during one 24-hour spin a location at the equator receives sunlight half the time and is in darkness the other half of the time. This means that regions at the equator always receive about 12 hours of sunlight and 12 hours of darkness.

   b. Can you see that in the June position regions farther north have longer daylight hours and shorter nights? Locations north of the Arctic Circle (dotted line in Northern Hemisphere) always face toward the Sun as Earth spins, so they get daylight 24 hours a day.

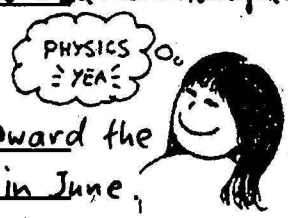
   c. How many hours of light and darkness are there in June at regions south of the Antarctic Circle (dotted line in Southern Hemisphere)?

   Zero hours of light or 24 hours of darkness per day.

   d. Six months later, when Earth is at the December position, is the situation in the Antarctic Circle the same or is it the reverse?

   Reverse; more Sun per area in December in the Southern Hemisphere

   e. Why do South America and Australia enjoy warm weather in December instead of June?



   In December the Southern Hemisphere is tilted toward the Sun and receives more sunlight per area than in June.

Hewitt Drew it!