Shedding Light on Heat Episode 6: Heat and the Human Body Name: _____

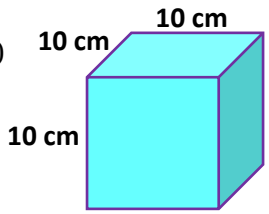
Part A

1. The human body maintains a temperature of _____.
2. Mammals (including humans) and birds are "endothermic". What does this mean? _____
   _____
   _____

Part B

3. How does folding your arms over your chest help keep you warm in cold conditions?
   _____
   _____
   _____
4. Calculate the volume and the surface area of the following shapes.
   Volume = l × w × h Area (in this case, surface area) = l × w (or l × h or w × h)

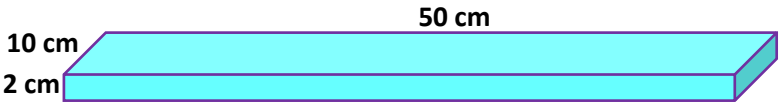
(a)



Volume (in cm^3): _____

Surface area of the top surface (in cm^2): _____
Total surface area (of all six surfaces) (in cm^2): _____

(b)



Volume (in cm^3): _____

Surface Area of top surface: _____; bottom surface: _____
front surface: _____; rear surface: _____
right-side surface: _____; left-side surface: _____
Total surface area (of all six sides): _____

5. If the two shapes above were actually hot pieces of steel that had been removed from an industrial furnace, which one would cool down faster? Explain. _____
   _____
   _____
6. When we are hot at night, we often sleep with our arms and legs stretched out. Why? _____
   _____
   _____
7. There are four major factors that determine how quickly heat transfers from one object to another:
   (a) _____
   (b) _____
   (c) _____
   (d) _____
8. Why do we usually wear thicker clothing in winter? _____
   _____
   _____
9. When the temperature difference between two objects is high, heat energy transfers quickly/slowly, but when the temperature difference is low, heat energy transfers quickly/slowly. (circle the correct word)

Part C

10. Blood vessels have the ability to constrict and to dilate. Using diagrams, describe what this means.

11. Briefly describe how our blood and our blood vessels help us to maintain a constant core temperature.
    _____
    _____
    _____
    _____
12. Skin (especially lighter skin) often becomes redder when someone is feeling hot. Why? _____
    _____
    _____

Part D

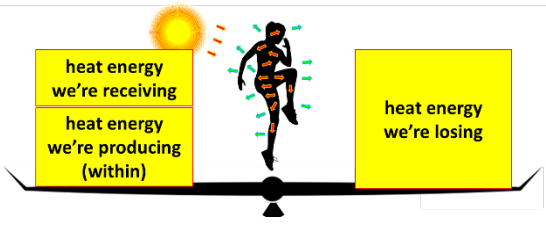
13. If we're feeling cold, we can actually generate more heat inside our bodies by either
    (a) _____, or
    (b) _____
14. Describe how sweating helps us to maintain a constant core temperature. _____
    _____
    _____
    _____
    _____
15. Given that fans don't actually cool the air in a room, why do people use them when it's hot? _____
    _____
    _____
16. Why is it better to leave a door or a window slightly open when using a fan? _____
    _____
    _____

Part E

17. What is hypothermia? _____
    _____
    _____
18. Though everyone is different, most of us (if we had to) could maintain a constant core temperature for hours in 15°C air, but most of us would have hypothermia within about an hour in 15°C water. Why is there such a difference? _____
    _____
    _____
19. Why does swimming become difficult when you a suffering from hypothermia? _____
    _____
    _____
20. Briefly describe some of the things that happen to people when they are suddenly exposed to ice-cold water.
    _____
    _____
    _____
    _____
    _____
21. What is hyperthermia and how does it affect the human body? _____
    _____
    _____

22: SUMMARY: Fill in the gaps using the following words:
increase producing sun shivering heater blood exercising surface area sweating skin cool hot

When we're feeling cold, we can _____ the amount of heat we're receiving by going out into the _____ or turning on a _____.



When we're feeling cold, our bodies can increase the amount of heat we're producing by either _____ or _____.

When we're feeling _____, our bodies increase the amount of heat we're losing by

- _____ (as long as we have water),
- increasing our _____,
- pumping more _____ to the outer surface of our skin.

When we're feeling hot, we can reduce the amount of heat we're receiving by getting out of the sun and moving to a _____ location. We can reduce the amount of heat we're _____ by resting.

When we're feeling cold, our bodies decrease the amount of heat we're losing by

- decreasing our surface area (by, for example, folding our arms over our chest) or
- keeping blood away from the outer surface of our _____.