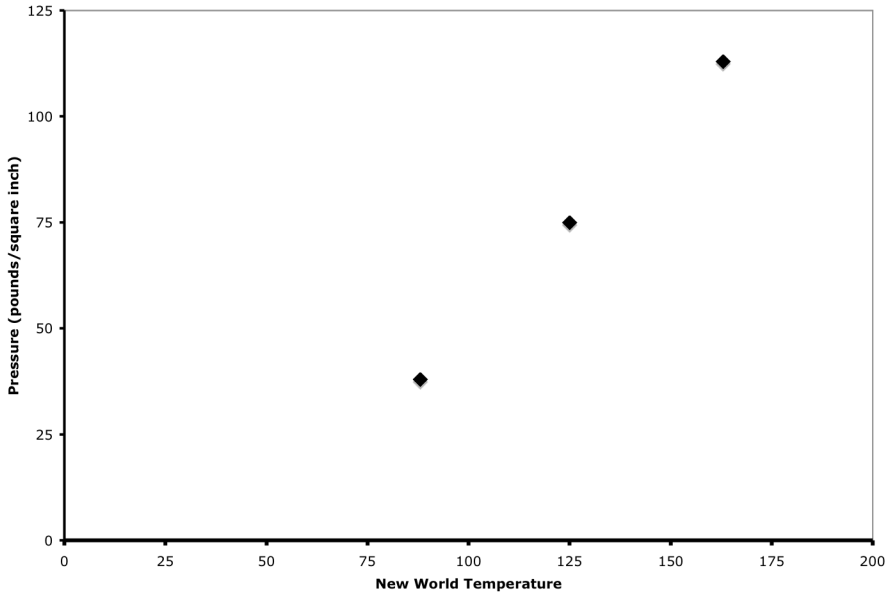
Answer Coming to A Boil Questions

COMING TO A BOIL
1) You are bringing a big pot of cold water to a boil to cook some potatoes. To do it using the least amount of energy you should:
a) turn the heat on full force, less chance for wasted heat.
b) put the heat on very low ***it possibly could never boil if the heat escaping is too much!***
c) put the heat at some medium value

BOILING
2) The water is now boiling. To cook the potatoes using the least amount of energy you should
a) keep the heat on full force ***extra energy just goes out as steam, doesn't make it faster.(but putting a cover on would)***
b) turn the heat way down so the water just barely keeps boiling. (This is all that is needed to keep the water at boiling temp)

DEFLATION
3) If the volume occupied by some air is decreasing, then the temperature of the air must be
a) increasing
b) decreasing
c) you can't tell. The answer also depends on how the pressure is changing. A balloon shrinking volume goes with decreasing temperature, but air being compressed in an engine increases temperature.

NEW WORLD, NEW ZERO
4) Suppose you wake up in a "new world". In the new world, you make some measurements of the pressure in a tank of gas at various temperatures. A graph of your data looks like this:



Approximately what temperature is Absolute Zero in the "new world"
A) Zero New World Degrees
B) 25 New World Degrees

C) 50 New World Degrees
D) 75 New World Degrees
E) 100 New World Degrees

OUCH
5) The physics teacher puts his hand in the hot steam escaping from the pressure cooker and cries ouch. But if he lifts his hand a few inches, he finds the steam is cool. This is because the steam cools as it expands.
a) True ***B) False This is NOT a case of adiabatic cooling.. steam doesn't expand, it got to atmospheric pressure when it escaped the cooker. It mixes with the cold air above and gets colder.***

EXPANSION OF NOTHING
6) A metal disc with a hole in it is heated until the iron expands one percent. The diameter of the hole will
a) increase (just like a jar lid, nothing expands too!! Or like a copier!)
b) decrease C) Not change

WHISTLING TEA KETTLE
7) One tea kettle is heated directly over a stove flame and another is set upon a heavy piece of metal, which is directly over a flame. After they begin to whistle you turn off the stove.
a) The kettle heated directly over the flame continues to whistle, but the kettle resting on the metal stops promptly.
b) The kettle on the metal continues to whistle for some time, but the one heated directly over the flame stops promptly. The metal has less heat capacity than water and thus has less energy, BUT the metal is hotter than the water in the kettle, since heat flows from the flame to metal to kettle, so heat still flows in for a while. But the one over the flame stops right away.
c) Both stop whistling in about the same amount of time

MICROPRESSURE
8) Smoke is made up of numerous tiny ashes. If you could measure the air pressure in a space as small as a smoke ash you would likely find
a) It varies from place to place at any instant of time- different parts of a room have different pressures.
b) It varies from instant to instant at any place in a room – the pressure fluctuates with time.
c) both a AND b there will be gang-ups form time to time AND place to place. It hardly counts in a large space, but shows a big difference in a small space.. air molecules bunch up and push the smoke ash around.
d) except for varying weather conditions and drafts, the air pressure in a room is constant and does not fluctuate from instant to instant or from place to place – even in a very small volume of space.

SOMETHING FOR NOTHING
9) If you put ten joules of electric energy into an electric heater, out will come ten joules of heat. IS there any way in actual practice that you can get *more* than tem joules of heat from a device if your electrical input is only ten joules?
a) Yes, if you are clever enough you can get more than ten joules of heat output from only ten joules of electric energy. (example: backwards air conditioner, 10 J of electricity, takes in 9 joules of heat, output of 19 Joules)

CELSIUS*

10) Water boils at 100 °C and freezes at 0°C at sea level atmospheric pressure. At higher pressure, water will boil at a

a) lower temperature and ice melt at a lower temperature.

b) lower temperature and ice melt at a higher temperature.

c) higher temperature and ice melt at a higher temperature.

d) higher temperature and ice melt at a lower temperature.

FREE LOADER
11) Consider the following idea: A ship heats its boilers and propels itself without the use of coal or oil in the following way. It pumps in warm sea water; extracts heat from that sea water; concentrates the extracted heat in its boilers; and discharges the cooled seawater back into the ocean. The discharged water may be ice if enough heat has been taken from it. Now ask yourself two questions:

First Question: Does this idea violate conservation of energy?
a) yes ***b) no doesn't violate first law!***

Second Question: Could this idea be made to work?
a) yes ***b) no violates second law of thermodynamics! Heat cannot freely go from cooler to hotter.***

HOUSE PAINT
12) The best color to paint your house is a
a) dark color like brown
b) light color like white reflects best (cool during day) , radiates least (warm at night), lasts longer because absorbs less UV, reflects more light into and around house
c) The color you paint your house is purely a question of artistic taste.

HEAT TELESCOPE
13) Make a heat telescope by putting the bulb of a thermometer in a paper coffee cup lined with aluminum foil. On a cool, dry, clear night point the telescope at the sky and after a few minutes read the thermometer. Then point it at the earth for a few minutes and read the thermometer again. Your results indicate
a) the sky is hotter than the earth
b) the earth is hotter than the sky earth is radiating back to space heat it picked up in day, but you are pointing away from this
c) both the sky and the earth have the same temperature.

SMEARED-OUT SUN
14) Turn ON your imagination and suppose somehow the glowing disc we call the sun was smeared out into a larger and larger disc. As it gets larger, suppose the intensity of each little part gets less so that the total energy we get from the whole disc stays the same as its size grows. Now suppose the disc were smeared out all over the sky so there would be no distinction between night and day. We would still receive the same total amount of energy that we received before the smear out, even thought it would be received uniformly over all 24 hours at any given location rather than just during the daylight hours. If this were to happen, then the earth's average temperature would

a) increase b) decrease ***c) remain the same (but the sun's temp would go down)***

IF THE SUN WERE SMEARED OUT
15) If the sun were smeared out all over the sky, the earth's atmosphere would
a) circulate faster than it does now so there would be more wind, rain, and thunder.
b) circulate slower than now.
c) not circulate at all no uneven heat, no weather, an even no life. Must be a temp difference for heat to do work

INVERSION

16) You are camped by a mountain lake. The smoke from your breakfast campfire goes up a ways and then spreads in a flat layer over the lake. After breakfast you are hiking to higher elevations. At those elevations the temperature will probably be
a) cooler
b) warmer temperature has been inverted, cold air sinks, so the smoke is colder than the air above it.

EQUAL CAVITIES (not teeth, silly!)
17) A block of metal with a white surface and a block of metal with a black surface of the same size are each heated to 500 °C. Which radiates the most energy?
a) The white block
b) The black block
c) Both radiate the same

Now consider a cavity (hole) that is cut in one side of each block of metal. The cavity opening in the side is smaller than the area/volume of the hole, which takes up most of the interior. Again both are heated to 500 ° C. From which block does the most energy come *out of the cavity?* The most energy is radiated from the cavity in the block of:
a) white metal
b) black metal
c) ……. Both are the same

TO TURN IT OFF OR NOT
18) On a cold day, suppose you must leave your house for about one-quarter hour to go shopping. In order to save energy it would be best to:
a) let the heater run so you will not have to use even more energy to reheat the house when you return.***But now the house is so much hotter than the outside, it loses heat faster, thus there is a greater (and constant) heat loss.Newton's Law of Cooling says that ΔT/Δt ~ ΔT***
b) turn your thermostat down about 10°, but not turn it off.
c) turn off the heater when you go. IF your house is at outside temp, it loses no heat, so it loses heat once and gains heat once
d) …. It makes no difference as far as energy consumption is concerned, whether you turn your heater off or let it run.

QUARTZ HEATERS
19) Some types of electric heaters like "Quartz Heaters" are more efficient than old fashioned electric heaters.
a) True ***b) False electricity to heat … it's all wasted energy!***

KEEPING COOL
20) The refrigerator in your house probably uses more energy than all the other electric appliances in your house combined (except electric water heaters, air conditioners and kilns). Suppose you have taken a carton of milk out of your refrigerator and used some. It is most energy efficient to
a) immediately return the milk to the refrigerator
b) leave it out as long as possible. ***(the longer the milk stands out the warmer it gets. The wamer it gets, the longer the refrigerator has to run to get it cool again)***

ALL ELECTRIC HOME
21) If a certain amount of fuel (oil, gas, or coal) is burned in your house stove it would produce X amount of heat. Now, if that same amount of fuel is burned in an electric generating plant, and all the electricity generated is used to heat your house by means of an electric stove, the electric stove would
a) produce more than X amount of heat, because electricity is more efficient than gas;
b) produce exactly X amount of heat, because of conservation of energy;
c) produce much less than X amount of heat, because heat can never be completely converted to electricity.

WANTON WASTE

22) One of the most extravagant wastes of electrical energy you can see is at many supermarkets. Cold food is stocked in the following kinds of refrigeration cases. Which kind of case is most wasteful? Which is most conservative?

a) Horizontal case with sliding cover doors BEST Cold air stays on the bottom

b) Horizontal case without cover

c) Upright case with door

d) Upright case without door WORSE cold air falls out bottom and warm air comes to take its place.

RARE AIR

23) Two tanks of air are connected by a very small hole. Inside the tanks is some rare air- that is, air in which there are so few molecules that the molecules are much more likely to collide with the tank walls than to collide with each other. One tank is maintained at the temperature of crushed ice. The other tank is maintained at the temperature of steam.

a) The air pressure in the tanks must eventually equalize, regardless of the temperature difference.

b) The air pressure in the cold tank will be higher than the pressure in the hot tank.

c) The air pressure in the cold tank will be lower than the pressure in the hot tank

HEAT DEATH

24) The Heat Death of the universe refers to a time in the distant future when the whole universe

a) runs out of energy

b) overheats

c) freezes

d) ……. None of the above heat death is when every place is the same temperature

HOT AIR

24) Warm air rises because:

a) The individual hot air molecules are moving faster than the cool ones and so are able to shoot up higher.

b) The individual hot ail molecules find it more difficult to penetrate the dense air below than the less dense air above.

c) Individual hot molecules do not tend to rise; only large groups of hot molecules tend to rise as a group.

IS THERE A COOL CORNER ANYPLACE?

27) Some people have reason to think that the temperature of the whole universe is about 4° Kelvin (-269 ° C) due to heat released from the cosmic fireball at the creation of the universe (the "Big Bang"). If that is so, is it possible under any circumstances for a small part of the universe to be cooler than 4 K?

a) Yes, some part may be cooler (in fact some HAVE to be, because we know some parts , like us, are hotter)

b) There is no way any part could be made cooler.

HOT AND STICKY

25) The weather in New Orleans and along the whole Gulf Coast is quite hot and humid in the summertime. In such climates the most comfortable time of day is

a) just after sunset when the temperature is dropping slightly.

b) just after sunrise when the temperature is rising.

c) at no particular time on the average

More Questions (WITHOUT EXPLANATIONS)
You're on your own with these questions which parallel those on the preceding pages. Think Physics!!

1) Suppose you have a quart of ice-cold water and wish it to be as cold as practical 15 minutes later, and you have to mix a couple of ounces of boiling water in it right away or in about 14 minutes. It would be best to mix it:
a) right away b) later c) ….. either way it would not make a difference.

2) If glass expanded more than mercury upon being heated, then the mercury in a common mercury thermometer would rise when the temperature
a) increased b) decreased c) either increased or decreased

3) If the temperature of a volume of air is decreased, then its volume must be
a) increasing b) decreasing ***c) …… can't tell***

4) When a metal plate with a hole in it is cooled, the diameter of the hole
a) increases ***b) decreases*** c) can't tell

5) Provided the heat input was the same, water will come to a boil faster
a) in the mountains b) at sea level
And cooking food in the boiling water will be fastest
a) in the mountains ***b) at sea level***

6) A can of air is sealed at atmospheric pressure and room temperature, 20 °C. To double the pressure in the can it must be heated to
a) 40 ° C b) 273 ° C c) 313 °C d)546°C ***e)586°C***

7) If the 20 °C air in the can is to be twice as hot, its temperature must be
a) 40 ° C b) 273 ° C c) 313 °C d)546°C ***e)586°C***

8) A pot of clean snow and a pot of dirty snow are placed in the sunlight. The snow to melt first will be the:
a) clean snow ***b) dirty snow*** c) both the same

9) A pot of clean snow and a pot of dirty snow are placed on a hot stove. The snow to melt first will be the:
a) clean snow b) dirty snow c) both the same

10 When heat is added to a substance its temperature
a) will increase b) will decrease ***c) may stay the same***

11) The fluid inside the cooling coils inside the freezer compartment of your home refrigerator is near its
a) boiling point b) freezing point

12) Inside a warm damp cave completely sealed off from the outside world
a) some life forms could flourish indefinitely
b) no life forms could flourish indefinitely

13) Sunlight energy can be converted at 100 % efficiency to
a) chemical energy in plants
b) heat energy in human made devices
c) both of these
d) none of these

14) A certain amount of fuel burned in your house stove produces X amount of heat. If that same amount of fuel is burned in an electric generating plant and all the electricity so generated is used to heat your house by means of an electric heat pump, the heat pump would produce
a) less than X amount of heat b) X amount of heat ***C) more than X amount of heat***

15) In any gas there are always places where more molecules of one kind or another spontaneously and momentarily gang up, resulting in the development of hot and cold, or high and low pressure spots. So the Heat Death of the universe can never be complete.
a) True ***b) False***