Core Science 221, Section 1 **NAME:**

Homework 4: Thermodynamics: Homeworks are due as posted on the course web site. Enter the answer to the multiple-choice questions on the answer table beside the number corresponding to the question. There may be gaps in the table when full-answer questions appear in the homework. You only need to hand in the table for the multiple-choice questions. Solutions will be posted eventually after the due date.

Answer Table

Name:

	a	b	c	d	e		a	b	c	d	e
1.	O	O	O	O	O	31.	O	O	O	O	O
2.	O	O	O	O	O	32.	O	O	O	O	O
3.	O	O	O	O	O	33.	O	O	O	O	O
4.	O	O	O	O	O	34.	O	O	O	O	O
5.	O	O	O	O	O	35.	O	O	O	O	O
6.	O	O	O	O	O	36.	O	O	O	O	O
7.	O	O	O	O	O	37.	O	O	O	O	O
8.	O	O	O	O	O	38.	O	O	O	O	O
9.	O	O	O	O	O	39.	O	O	O	O	O
10.	O	O	O	O	O	40.	O	O	O	O	O
11.	O	O	O	O	O	41.	O	O	O	O	O
12.	O	O	O	O	O	42.	O	O	O	O	O
13.	O	O	O	O	O	43.	O	O	O	O	O
14.	O	O	O	O	O	44.	O	O	O	O	O
15.	O	O	O	O	O	45.	O	O	O	O	O
16.	O	O	O	O	O	46.	O	O	O	O	O
17.	O	O	O	O	O	47.	O	O	O	O	O
18.	O	O	O	O	O	48.	O	O	O	O	O
19.	O	O	O	O	O	49.	O	O	O	O	O
20.	O	O	O	O	O	50.	O	O	O	O	O
21.	O	O	O	O	O	51.	O	O	O	O	O
22.	O	O	O	O	O	52.	O	O	O	O	O
23.	O	O	O	O	O	53.	O	O	O	O	O
24.	O	O	O	O	O	54.	O	O	O	O	O
25.	O	O	O	O	O	55.	O	O	O	O	O
26.	O	O	O	O	O	56.	O	O	O	O	O
27.	O	O	O	O	O	57.	O	O	O	O	O
28.	O	O	O	O	O	58.	O	O	O	O	O
29.	O	O	O	O	O	59.	O	O	O	O	O
30.	O	O	O	O	O	60.	O	O	O	O	O

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004 qmult 00100 1 4 5 easy deducto-memory: thermodynamics defined 1

Extra keywords: EPS

1. "Let's play *Jeopardy*! For $100, the answer is: It is the science of the thermodynamic state of systems. This state is characterized or defined or determined by thermodynamic variables which include heat energy (properly internal energy), temperature, pressure, volume, density, mass, entropy, phase, and many others too. These variables are functions of the thermodynamic state and are called state functions: they are independent of the history that resulted in the thermodynamics state. Energy transformation most importantly heat flow and macroscopic work done are part of the science. The science encompasses both thermodynamic equilibrium and non-equilibrium states. In modern version of the science, the average microscopic state of the system and how it determines the macroscopic variables mentioned above is included."

   What is _____, Alex?

   a) kinematics b) cinematics c) dynamics d) dynastics e) thermodynamics

SUGGESTED ANSWER: (e)

Wrong answers:

d) A neologism meaning member of a dynasty: e.g., Charles, Prince of Wales is a dynastic or member of the Windsor dynasty.

Redaction: Jeffery, 2008jan01

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004 qmult 00120 1 4 2 easy deducto-memory: internal energy

Extra keywords: EPS

2. "Let's play *Jeopardy*! For $100, the answer is: It is the sum of all microscopic forms of energy: these include kinetic energy, potential energy, electromagnetic radiation energy, and magnetic field energy. Microscopic means that these energies do not manifest themselves in macroscopic ordered structures."

   What is _____, Alex?

   a) kinetic energy b) internal or heat energy c) potential energy d) elastic energy
   e) cinematic energy

SUGGESTED ANSWER: (b)

Wrong answers:

e) As Lurch would say AAAARGH.

Redaction: Jeffery, 2008jan01

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004 qmult 00200 1 1 4 easy memory: thermodynamic variables

Extra keywords: EPS

3. They are macroscopic observables that are functions of the thermodynamic state of matter. Observable means that the quantity can be measured by means in which we have complete theoretical confidence. After all we do not measure, for example, temperature directly, but rather, for example, the volume of alcohol in an alcohol thermometer. To be deeply philosophical for a moment, we only observe our sense perceptions directly and everything else depends on our theoretical understanding of what we perceive. In the jargon of the philosophy of science, observations are theory laden. Nevertheless, by custom we say we observe things where we have complete confidence in the theory of those things. Where our theoretical confidence is less than complete, we sometimes talk model-dependent results or indirect observations. To end this digression, the observables we were talking about are sometimes called state functions, but the author prefers:

   a) quantum mechanical observables. b) factors. c) global factors.
   d) thermodynamic variables. e) thermodynamic temperatures.

SUGGESTED ANSWER: (d)

In macroscopic classical physics, one uses about dynamic variables, and so using thermodynamical variables gives a more consistent terminology.

Wrong answers:

e) It might be argued that there is more than one kind of temperature depending on the context of the discussion. But there are other thermodynamic variables that are not temperature. In any case, one never (to my knowledge) the redundant locution thermodynamic temperature. The main meaning of temperature is the temperature of thermodynamics. Qualification is only needed for other uses of temperature which do exist in special cases or metaphorically.

Redaction: Jeffery, 2008jan01

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004 qmult 00210 1 1 1 easy memory: thermodynamic variable examples

Extra keywords: EPS

4. Three well known thermodynamic variables (i.e., state functions) are volume, density, and:

a) pressure. b) force. c) work. d) relaxation. e) recreation.

SUGGESTED ANSWER: (a)

Wrong answers:

c) Thermodynamic systems can to work and have work done unto them, but they don't have some fixed work associated with them. A heat engine can do work quasi-endlessly as long as its fueled, but after doing all that work the cycle of states of the states of the engine cycle is just the same as it was before at least an ideal engine. Saying a system has done so much work tells you nothing about the state of the system.

Redaction: Jeffery, 2008jan01

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004 qmult 00300 1 4 3 easy deducto-memory: temperature defined

Extra keywords: EPS

5. "Let's play *Jeopardy*! For $100, the answer is: In one definition, it is a measure of the average internal energy per degree of freedom of a single particle (e.g., an atom, molecule, electron, or photon [though they are a bit of a special case])."

What is _____, Alex?

a) pressure b) volume c) temperature d) entropy e) entity

SUGGESTED ANSWER: (c)

Note that I say a "measure of" and not "is". The situation is a bit more tricky than "is". I think the classical definition allows "is", but in quantum mechanics "measure" may be best.

A photon gas can have a temperature, but I've not made everything consistent in my own mind yet about how it fits in. But the statement is still true. See Wikipedia on temperature and photon gas.

Wrong answers:

e) As Lurch would say AAAARGH.

Redaction: Jeffery, 2008jan01

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004 qmult 00310 1 1 1 easy memory: 3 temperature scales

Extra keywords: physci

6. The three common temperature scales are:

a) Fahrenheit, Celsius, and Kelvin. b) Fahrenheit, Celsius, and Newton.
c) Fahrenheit, Vesuvius, and Kelvin. d) Fahrenheit, Celsius, and Calvin.
e) Gesundheit, Vesuvius, and Calvin.

SUGGESTED ANSWER: (a)

Wrong answers:

e) Everyone one remembers *Calvin and Hobbes*—that great old comic strip.

Redaction: Jeffery, 2001jan01

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004 qmult 00330 1 1 1 easy memory: absolute zero temperature

Extra keywords: EPS

7. When all the removable kinetic energy of a system (e.g., a sample of material) has been removed, the system is at:

   a) absolute zero temperature. b) relative zero temperature. c) $-40°$C. d) $-40°$F. e) 273.15 K.

   SUGGESTED ANSWER: (a)

   Wrong answers:
   d) Oddly enough $-40°\text{C} = -40°\text{F}$. This follows from

   $$1.8°\text{F}/°\text{C} \times (-40°\text{C}) + 32°\text{F} = -40°\text{F} \ .$$

   In any case, it is bloody cold.
   e) This is 0°C.

   Redaction: Jeffery, 2008jan01

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004 qmult 00500 1 1 2 easy memory: heat and internal energy
Extra keywords: EPS

8. Formally, it is a internal energy transfer. But many people use it as a synonym for internal energy at least when speaking loosely. We are speaking of:

   a) work. b) heat. c) force. d) entropy. e) pressure.

   SUGGESTED ANSWER: (b) I think we should just give up on the formal definition and accept that heat is a synonym for thermal energy.

   Wrong answers:
   a) Well no.

   Redaction: Jeffery, 2008jan01

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004 qmult 00510 1 4 3 easy deducto-memory: 3 modes of heat transfer 1
Extra keywords: physci

9. The three common heat transfer processes are:

   a) conduction, invection, and radiative transfer. b) induction, convection, and radiative equilibrium. c) conduction, convection, and radiative transfer. d) conduction, invection, and radiative equilibrium. e) introduction, insurrection, and radiative hibernation.

   SUGGESTED ANSWER: (c)

   Wrong answers:
   e) Oh, c'mon.

   Redaction: Jeffery, 2001jan01

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004 qmult 00550 1 4 4 easy deducto-memory: thermodynamic equilibrium
Extra keywords: EPS

10. "Let's play *Jeopardy*! For $100, the answer is: It is a state of a system of unchanging thermodynamic behavior at the macroscopic level: i.e. pressure, temperature, density, phase, and entropy are unchanging. Entropy is in fact at the maximum allowed by the nature and the available internal energy. At the microscopic level, there is continual change going on. But the atoms and molecules have a distribution of behavior, but the distribution itself is unchanging, and in particular the average behavior is unchanging. The state is a timeless state that could be called at dead state since life (as we know it) cannot exist in this state when it is fully enforced."

    What is _____, Alex?

    a) hydrostatic equilibrium b) mimimum entropy c) heat flow
    d) thermodynamic equilibrium e) ennui

    SUGGESTED ANSWER: (d)

    Wrong answers:

e) Well that too.

Redaction: Jeffery, 2008jan01

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004 qmult 00600 1 5 1 easy thinking: zeroth law of thermodynamics

Extra keywords: EPS

11. If two bodies are in thermodynamic equilibrium with a third body, they are in thermodyamic equilibrium with each other. By being in thermodyamic equilibrium, we mean that if put in thermal contact where heat flows can occur, no macroscopic heat flows will occur and no thermodynamic variables will change. The first statement is the:

    a) zeroth law of thermodynamics. b) first law of thermodynamics.
    c) second law of thermodynamics. d) third law of thermodynamics.
    e) fourth law of thermodynamics.

SUGGESTED ANSWER: (a)

Wrong answers:
e) Historically this was true.

Redaction: Jeffery, 2008jan01

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004 qmult 00610 1 5 3 easy thinking: thermometer in zeroth law

Extra keywords: EPS

12. In the the zeroth law of thermodynamics, the third body acts in part like _____ since it acts as a measurer of thermodynamic equilibrium states.

    a) a rock b) a power station c) a thermometer d) a turbine e) the Third Man

SUGGESTED ANSWER: (c)

Wrong answers:
e) This was Harry Lime.

Redaction: Jeffery, 2008jan01

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004 qmult 00700 1 4 2 easy deducto-memory: 1st law of thermodynamics

Extra keywords: EPS

13. "Let's play *Jeopardy*! For $100, the answer is: It is the 1st law of thermodynamics (in less than most general form), as expressed as formula."

    What is _____, Alex?

    a) $W = Q + \Delta E$ b) $\Delta E = Q - W$ c) $E = \frac{1}{2}mv^2$ d) $E = mv^2$ e) $E = mc^2$

SUGGESTED ANSWER: (b)

Wrong answers:
c) This the kinetic energy formula.
d) This the not the kinetic energy formula though Thomas Young (1773–1829) thought so once.

Redaction: Jeffery, 2008jan01

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004 qmult 00710 1 1 2 easy memory: pressure work

Extra keywords: EPS

14. When one discusses work in thermodynamics, one usually means work done by:

    a) entropy. b) pressure. c) temperature. d) density. e) horses.

SUGGESTED ANSWER: (b)

Wrong answers:
e) A nonsense answer.

Redaction: Jeffery, 2008jan01

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004 qmult 00810 1 1 3 easy memory: gas pressure

Extra keywords: EPS

15. Gas pressure is caused by the _____ of atoms and/or molecules.

a) cohesion b) suction c) collisions d) chemical bonds e) neutrons

SUGGESTED ANSWER: (c)

Wrong answers:

d) Arguable true of solids and liquids.

Redaction: Jeffery, 2008jan01

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004 qmult 00840 2 1 5 moderate memory: aerodynamic lift

Extra keywords: EPS

16. Aerodynamic lift is an non-static-air air pressure effect with two main identifiable components:

a) a wing and a prayer. b) entropy and reaction lift. c) entropy and temperature.
d) reaction lift and Carnot lift. e) reaction lift and Bernoulli lift.

SUGGESTED ANSWER: (e)

Wrong answers:

a) Well no. Well maybe.

Redaction: Jeffery, 2008jan01

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004 qmult 00842 1 5 5 easy easy thinking: paper and lift

Extra keywords: Not fair so some students with disabilities.

17. Take this quiz and . . .—no, no not that. Take this quiz—or some single sheet of paper if you arn't in a quiz *mise en scène*—in your fingers with your fingers on either side of one of narrow ends. Hold this end just **BELOW** your lips and blow a strong gust.

a) Nothing happens, because you've blown too hard.
b) Nothing happens, because you've blown too softly and you've never succeeded in blowing up a balloon in your life.
c) You spit.
d) The instructions are unintelligible.
e) The paper rises because you've created a high-speed, low-pressure zone above the paper. Below the paper is normal pressure. The pressure force inequality will push the paper upward against the force of gravity. The overall effect is the Bernoulli lift which is part of aerodynamic lift by which airplanes fly. Of course, if you put the paper above your lips and blow the paper rises too. This time it is the reaction lift which is the other part of aerodynamic lift. The blown air is deflected down by the paper, but for every force there is an equal and opposite force and so the air pushes up on the paper too.

SUGGESTED ANSWER: (e)

The experiment should work and the answer obeys the longest-answer-is-right rule. How can anyone miss. Well actually everyone already knows this trick as actual experience shows: oh well, chagrined agained.

The trick is an example of Bernoulli lift. Moving air above the paper is at lower pressure than stationary air below the paper as the Bernoulli equation suggests. (We derived the Bernoulli equation for incompressible fluids, but Bernoulli-like behavior for compressible fluids is to be expected.) The situation is actually pretty complex: the low pressure zone above the paper causes the high pressure below the paper to push the paper up. But the low pressure zone also causes air above the low pressure zone to lose pressure support and fall down, but I guess the downfalling air gets entrained by the blowing air. Oh, well someone probably knows exactly what everything is doing.

Wrong answers:

a) This seems to be distinctly wrong.
b) This could well be true.

c) It's been known to happen. Best not to aim at anyone.
d) Well I tried my best, but, as we say in science, one picture is worth 10^3 words.

Redaction: Jeffery, 2001jan01

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004 qmult 00870 1 5 5 easy thinking: 2001: A Space Odyssey

Extra keywords: physci

18. In *2001: A Space Odyssey*, astronaut David Bowman finds himself trapped without his helmet in a space pod. The computer Hal has locked the direct pod-to-space-ship airlock. Bowman decides to "breathe vacuum"—to go sans helmet through space to an outside airlock—and then deal with Hal. Why doesn't Bowman explode due to his internal body pressure in the nearly zero pressure of space?

a) He is too quick to explode.
b) He holds his breath.
c) Hal has not anticipated Bowman's maneuver or at least has no contingency plan.
d) Sheer plot requirement.
e) Most of the body's internal pressure is supplied by nearly incompressible (and therefore nearly non-expandable) fluid and solid: these parts won't explode under decompression. The solid and liquid parts are strong enough it seems to keep the air in the body cavities contained. One **HOLDS** one's breath and one hopes one's eardrums don't rupture.

SUGGESTED ANSWER: (e)

I used to just hope Arthur C. Clarke (1917–2008) and Stanley Kubrick (1928–1999) were right about this. Clarke was a diver as well as a space guru: so supposedly he knows all about it. But Bowman can't stay out too long because some nasty bubbles must form in his blood, or so I seem to recall. Apparently, the situation is more dangerous if you try to return to ordinary air pressure with your lungs full of high pressure air: see Halliday & Resnick, p. 526. Even about a 1 psi difference between between lungs and body is dangerous then—say when a diver surfaces without exhaling.

I think the resolution of the two cases is this. In the space case, the whole membrane (skin) of the body resists decompression from normal air pressure (about 15 psi) to nearly zero pressure, and thus the lung-body pressure difference stays tolerable. In the diver case, the body, blood and tissue, can relax from a slightly higher-than-air-pressure state to an air-pressure state quickly: the body is designed to hold itself at air pressure. But if the diver doesn't exhale an intolerable pressure difference between lungs and body develops. Maybe I'm talking through my hat.

Wikipedia (Wikipedia: 2007nov23: human adaptation to space) confirm that a human may be able to survive about 30 seconds in vacuum, but perhaps be conscious for only 15 seconds. So Bowman had to be quick, but 15 seconds can be a long time if all you need to is pass through an airlock.

Wrong answers:
a) Oh, c'mon.
b) True, but not an answer.
c) True, but not an answer.
d) The screenwriters could have got him out of that pod some other way.

Redaction: Jeffery, 2001jan01

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004 qmult 00900 1 4 4 easy deducto-memory: Clausius and entropy 1

Extra keywords: discoverer of the entropy concept

19. "Let's play *Jeopardy*! For $100, the answer is: He introduced the concept of entropy."

Who is _____, Alex?

a) Ptolemy (circa 100–175 CE)
b) Nicolaus Copernicus (1473–1543)
c) Isaac Newton (1642/3–1727)
d) Rudolf Clausius (1822–1888)
e) Stephen Hawking (1942–)

SUGGESTED ANSWER: (d)

Wrong answers:

e) Actually, Hawking did introduce the idea that black holes had temperature and entropy and radiated Hawking radiation—a form of radiation that coincidently has the same name as Hawking himself.

Redaction: Jeffery, 2001jan01

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004 qmult 00910 1 1 3 easy memory: entropy defined

Extra keywords: EPS

20. The thermodynamic variable entropy is a quantitative measure of:

a) order. b) microscopic order. c) microscopic disorder. d) macroscopic disorder.
e) temperature.

SUGGESTED ANSWER: (c)

Wrong answers:

d) I think macroscopic disorder can be qualitatively described by a qualitative generalized entropy. Others may not think this a useful idea.

Redaction: Jeffery, 2008jan01

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004 qmult 00920 1 4 5 easy deducto-memory: cause of entropy

Extra keywords: EPS

21. "Let's play *Jeopardy*! For $100, the answer is: They are the cause of increasing disorder."

What are _____, Alex?

a) Rambo or Rambolizing processes b) rambling or rambilizing processes
c) rotational or rotationalizing processes d) rational or rationalizing processes
e) random or randomizing processes

SUGGESTED ANSWER: (e)

Wrong answers:

a) Just a nod to Sylvester Stallone (1946–).

Redaction: Jeffery, 2008jan01

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004 qmult 01000 1 4 3 easy deducto-memory: 2nd law of thermodynamics stated

Extra keywords: EPS

22. "Let's play *Jeopardy*! For $100, the answer is: The entropy of a thermodynamically closed (or isolated) system never decreases. Random processes if present will in fact drive a closed system to the state of maximum entropy allowed by the system's nature and available internal energy."

What is _____, Alex?

a) zeroth law of thermodynamics b) first law of thermodynamics
c) second law of thermodynamics d) third law of thermodynamics
e) fourth law of thermodynamics

SUGGESTED ANSWER: (c)

Wrong answers:

a) As Lurch would say AAAARGH.

Redaction: Jeffery, 2008jan01

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004 qmult 01010 2 5 2 mod. deducto-memory: 2nd law of thermo consequence hot to cold

Extra keywords: EPS consequences and/or connections

23. The second law of thermodynamics **FORBIDS**:

a) heat to flow spontaneously from hot to cold.
b) heat to flow spontaneously from cold to hot.
c) entropy to increase in a closed system.
d) entropy to increase in an open system.
e) entropy to decrease in **ALL** cases.

SUGGESTED ANSWER: (b)

Wrong answers:
a) Exactly wrong.
c) The second law allows this to happen.
d) The second law does not forbid this.
e) The second law only forbids the decrease of entropy in closed systems. In open systems entropy can decrease and this is commonplace and necessary for the whole biosphere.

Redaction: Jeffery, 2008jan01

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004 qmult 01100 1 1 4 easy memory: 3rd law of thermodynamics
Extra keywords: EPS

24. As a system's temperature approaches absolute zero, its entropy (and thus its maximum possible entropy) approaches zero or at least a minimum value possible for the system. This rule is called the _____. The _____ implies somehow that absolute zero temperature cannot be reached for a macroscopic system.

a) zeroth law of thermodynamics. b) 1st law of thermodynamics.
c) 2nd law of thermodynamics. d) 3rd law of thermodynamics.
e) 4th law of thermodynamics

SUGGESTED ANSWER: (c)

Wrong answers:
a) A nonsense answer.

Redaction: Jeffery, 2008jan01

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004 qmult 01210 1 4 4 easy deducto-memory: 3 main phases
Extra keywords: EPS

25. "Let's play *Jeopardy*! For $100, the answer is: Solid, liquid, gas."

What are _____, Alex?

a) the three laws of thermodynamics b) the last three real substances c) the chemical categories d) the three main phases of matter e) the three least important phases of matter

SUGGESTED ANSWER: (d)

Wrong answers:
e) As Lurch would say AAAARRRGHHH!

Redaction: Jeffery, 2008jan01

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004 qmult 01220 1 1 1 easy memory: least dense phase
Extra keywords: EPS

26. The least dense phase of matter at a given temperature and pressure is usually:

a) gas. b) liquid. c) solid. d) none of the above. e) all of the above.

SUGGESTED ANSWER: (a)

Wrong answers:
e) Now how could this be logically speaking?

Redaction: Jeffery, 2008jan01

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004 qmult 01310 1 1 5 easy memory: phase change, temperature
Extra keywords: EPS pressure

27. Bulk phase changes (i.e., not just changes at the surfaces of samples) for pure substances happen at definite temperatures which are:

a) all above 273.15 K. b) all below 273.15 K. c) all below 273.15 K and independent of pressure. d) independent of pressure. e) dependent on pressure in general.

SUGGESTED ANSWER: (e)

Wrong answers:
d) Exactly wrong.

Redaction: Jeffery, 2008jan01

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004 qmult 01340 2 1 3 moderate memory: dry ice
Extra keywords: EPS

28. A common substance that has no liquid phase at ordinary air pressure is carbon dioxide (CO_2). The solid phase is commonly called:

a) impossible green. b) sublimium. c) dry ice. d) marsh gas. e) Irish dirt.

SUGGESTED ANSWER: (c)

Wrong answers:
d) A gaseous decomposition product of organic matter which is mostly methane.

Redaction: Jeffery, 2008jan01

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004 qmult 01360 1 4 5 easy deducto-memory: water cycle
Extra keywords: EPS

29. "Let's play *Jeopardy*! For \$100, the answer is: It is the movement of water through the Earth's atmosphere and on its land and water surfaces and subsurfaces. An outline of the process is as follows. Solar energy evaporates liquid water from the water surfaces and causes convection and vertical and horizontal movement in the atmosphere of water vapor. The vapor precipitates out as rain or snow or hail. Usuually as a liquid water flows downhill then and at least some of it reaches the oceans. There are also large amounts of water in the form of ice some of which is also flowing slowly downhill. The whole process is also called the hydrological cycle."

What is the _____, Alex?

a) heat engine cycle b) bicycle c) ice cycle d) last real cycle e) water cycle

SUGGESTED ANSWER: (e)

Wrong answers:
a) Well the water cycle is in some respects like heat engine. In fact, one could call it a natural heat engine.

Redaction: Jeffery, 2008jan01

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004 qmult 01380 2 1 2 moderate memory: triple point
Extra keywords: EPS

30. The three main phases of matter for a single substance can exist together **IN THERMODYNAMIC EQUILIBRIUM** only:

a) at absolute zero. b) at a triple point. c) below 273.15 K. d) above 273.15 K.
e) with Macaques.

SUGGESTED ANSWER: (b)

Wrong answers:
e) I hardly think so.

Redaction: Jeffery, 2008jan01

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004 qmult 01390 1 4 5 easy deducto-memory: humans sweat
Extra keywords: EPS

31. "Let's play *Jeopardy*! For \$100, the answer is: Among mammals, not the largest (the blue whale), not the smallest (the Etruscan shrew), not the fastest (the cheetah), nor the slowest (the sloth), not the most magnificent (the lion), not the noblest (the horse), not the most good-natured (the llama), nor the proudest (the camel), not the busiest (the beaver), not the growliest (the grizzly bear), not the tallest (the giraffe), not even the most sexed (the bonobo), nor the least (the giant panda), not the smelliest (the skunk beating out the billygoat), not the most loyal (the dog though this may be an over-rating),

nor the most self-satisfied (the domestic cat [felis silvestris catus smugisimus]), not the lonesome flyer (the bat), nor the most spade-handed (the mole), not the wiliest (the coyote, but maybe they are only faux wily), nor the least (the guinea pig), not the flittiest (the gazelle), not the shyest (the wild deer), nor the most shattering (the proverbial bull in a china shop: AKA Raging Bull), not the most playful (the otter or the dolphin: take your pick), not the most clever (the fox who is also most into chicken coops and sour grapes), not the prickliest (the porcupine), not even the most thieving (the raccoon), and certainly not the most moon-child (the opossum)—

not the most cheese-loving (the mouse),
nor the quiestest (the church mouse),
not the maddest (the March Hare on the authority of Alice),
not the most obstinate (the mule: but maybe hybrids don't count),
not the most alpha-male (the He-Gorilla),
not the cheekiest (the squirrel),
nor the most hypocritical (we've all heard of weasel words)

—not the most striped (the zebra), nor the spottiest (the leopard), and not the most orange (the orangutan—provided artificial means are ruled out), not the most north polar (the muskox), nor the most Himilayan (the yak), not the most burning bright in the forest of the night (the tiger), nor even the most omnivorous (the pig probably), not the loneliest (the Lone Wolf), nor the most wère (the She-Wolf of London), not the most left-over from another age (the platypus), not the most conformist (the sheep), nor the least (the Rogue Male Elephant), perhaps the brainiest (but we'll see at the end of the day), not the most extremely bipedal (the kangaroo), not the closest cousin (the Neanderthal), nor the smallest cousin (Homo Floresiensis)—

not the most mythical (the unicorn),
nor the most binatured (the centaur),
nor yet the most sublime (the gryphon though you'd never know it),
not the most alluring/fatale singer on the rocks (the siren),
not the most selfish elfish (the elf),
and not the most alto soprano in the choir (the angel),
nor yet the most fallen (the devil—though a close second by all accounts),
not the most Irish (the leprechaun),
not the most respectable (the hobbit),
nor yet the most bare-bottomed (the cherub)

—not the most rodent-like non-rodent (the chihuahua), not the most disgustingly hairless (the Mexican hairless), nor the only one without a tail (the Manx cat sometimes), not the most pointed (the stag), not the longest horned (the narwhal—in fact, not horned at all), not the most hunted horn (the rhinoceros), not the best wallower (the water buffalo), not the most extinct (the mammoth), nor the least (the rat), not the most sacrificial (el toro in the arena), nor the most tender (the dams of all species caressing their young)—but the sweatiest."

What is the _____, Alex?

a) hedgehog b) lemur c) monkey d) satyr e) human

SUGGESTED ANSWER: (e)

One should I suppose say the best sweater, but that sounds less affecting. Kate Hodges played title character in *The She-Wolf of London* which was a very short-lived, not-too-serious, none-too-great supernatural series—but what a concept. All but forgotten, but it has a Wikipedia entry.

Wrong answers:

a) The hedgehog misses on prickliness even:

> 'The basic hedgehog condition is sadness,' says Max. 'Charlotte is thinking of how many hedgehogs have tasted the sweetness of the moon, all of them gone in the whisper of the trees and the rustling of the years.'
>
> 'Whoa, boy,' says Max's mind. 'This kind of thinking is not going to get Charlotte all the way to the bank.'
>
> —-*Her Name was Lola*, Russell Hoban

Redaction: Jeffery, 2008jan01