Phases HW #1 **ANSWERS**

1 A gas is at the pressure of 1.25 atm. What is that pressure in kPa?

$\frac{1.25\ atm}{1}$ X	$\frac{101.3\ kPa}{1.0\ atm}$ =	127 kPa

2 How many mm Hg is the pressure of 1.25 atm equal to?

$\frac{1.25\ atm}{1}$ X	$\frac{760.\ mm\ Hg}{1.0\ atm}$ =	950. mm Hg

3 On top of Mt Everest the air pressure is about 0.70 atm. How many kPa is 0.70 atm?

$\frac{0.705\ atm}{1}$ X	$\frac{101.3\ kPa}{1.0\ atm}$ =	71.4 kPa

4 0.70 atm converted to mm Hg is equal to what?

$\frac{0.705\ atm}{1}$ X	$\frac{760.\ mm\ Hg}{1.0\ atm}$ =	536 mm Hg

5 What are the temperature and pressure of STP? 0ºC and 1.0 atm pressure
6 Express the temperature of STP in Kelvin. 273K
7 Express the pressure of STP in mm Hg and in kPa. 760. mm of Hg = 101.3 kPa
8 What is so significant about the temperature 0 Kelvin? Absolute zero is when all molecular motion stops, and this temperature has not been reached by man. It might not even exist in the Universe. There can be no gas pressure at 0 Kelvin either, as the molecules or atoms would stop moving, and therefore have no collisions to cause pressure.
9 Why does spaghetti take longer to cook at my sister in law Donna's house in Boulder, Colorado? Because of the lower air pressure due to the fact that she is living high up in the mountains, water will boil at a lower temperature (see Table H). Since the water is boiling at a lower temperature, in order to cook spaghetti to the expected "softness", it would take a bit longer because the temperature of boiling water there is only about 96°C, while in Vestal it is closer to 100.0°C.

gas pressure	The pressure exerted on a container by a gas enclosed inside the container, due to collisions.
vacuum	A space that contains no atoms or molecules, an empty space. Because the space is completely empty, there would be NO pressure, due to no collisions.
atmospheric pressure	The gas pressure that is caused by the earth's atmosphere, often measured in mm of Mercury, atmosphere's, or kilo-pascals. Sometimes it is still measured in pounds per square inch.
barometer	The device that measures barometric pressure, or air pressure. They originally used mercury in a vacuum tube, and the height of the column of mercury was measured in millimeters, hence the term "mercury is rising" (or falling). Mercury barometers are no longer commonly used in the US.
kilo-Pascal	The metric unit for measuring air pressure or gas pressure. The "normal" or standard pressure is 101.3 kPa, which is equal to 760. mm of Hg, and also to 1.00 atmosphere's of pressure.

Phases HW # 2 ANSWERS

1 What is the name of the force that attracts the molecules of a liquid together?
INTERMOLECULAR FORCES

2 Describe the difference between vaporization and evaporation.
EVAPORATION HAPPENS ONLY AT THE SURFACE OF A LIQUID AS SOME MOLECULES GET ENOUGH KINETIC ENERGY TO ESCAPE AS A GAS. WITH BOILING, ALL THE PARTICLES HAVE SUFFICIENT KINETIC ENERGY TO ESCAPE THE LIQUID PHASE AND BECOME GAS.

3 How can evaporation (or boiling) be described as a "cooling process"?
ONLY THE PARTICLES WITH THE VERY MOST KINETIC ENERGY GET TO ESCAPE AS A GAS. THE REST OF THE PARTICLES STAY AS LIQUID. THE AVERAGE KINETIC ENERGY OF THE PARTICLES THAT GET TO STAY AS A LIQUID ALWAYS GOES DOWN AS THE MOST ENERGETIC LEAVE. THIS IS WHY EVAPORATION COOLS US DOWN WHEN WE SWEAT. IT TRULY LOWERS THE OVERALL TEMPERATURE BECAUSE IT DIRECTLY LOWERS THE REMAINING KINETIC ENERGY LEVEL OF THE MOLECULES THAT ARE LEFT BEHIND.

4 Explain what dynamic equilibrium means in your own words.
DYNAMIC EQUILIBRIUM ONLY CAN HAPPEN IN A CLOSED SYSTEM, LIKE in a sealed bottle.
AT ANY TEMPERATURE, A LIQUID WILL EVAPORATE A CERTAIN AMOUNT OF ITSELF INTO THE GAS PHASE. THE GAS WILL CONDENSE. WHEN THE RATES OF EVAPORATION EQUAL THE RATE OF CONDENSATION, THAT IS DYNAMIC EQUILIBRIUM (CHANGING AND STAYING THE SAME - AT THE SAME TIME).

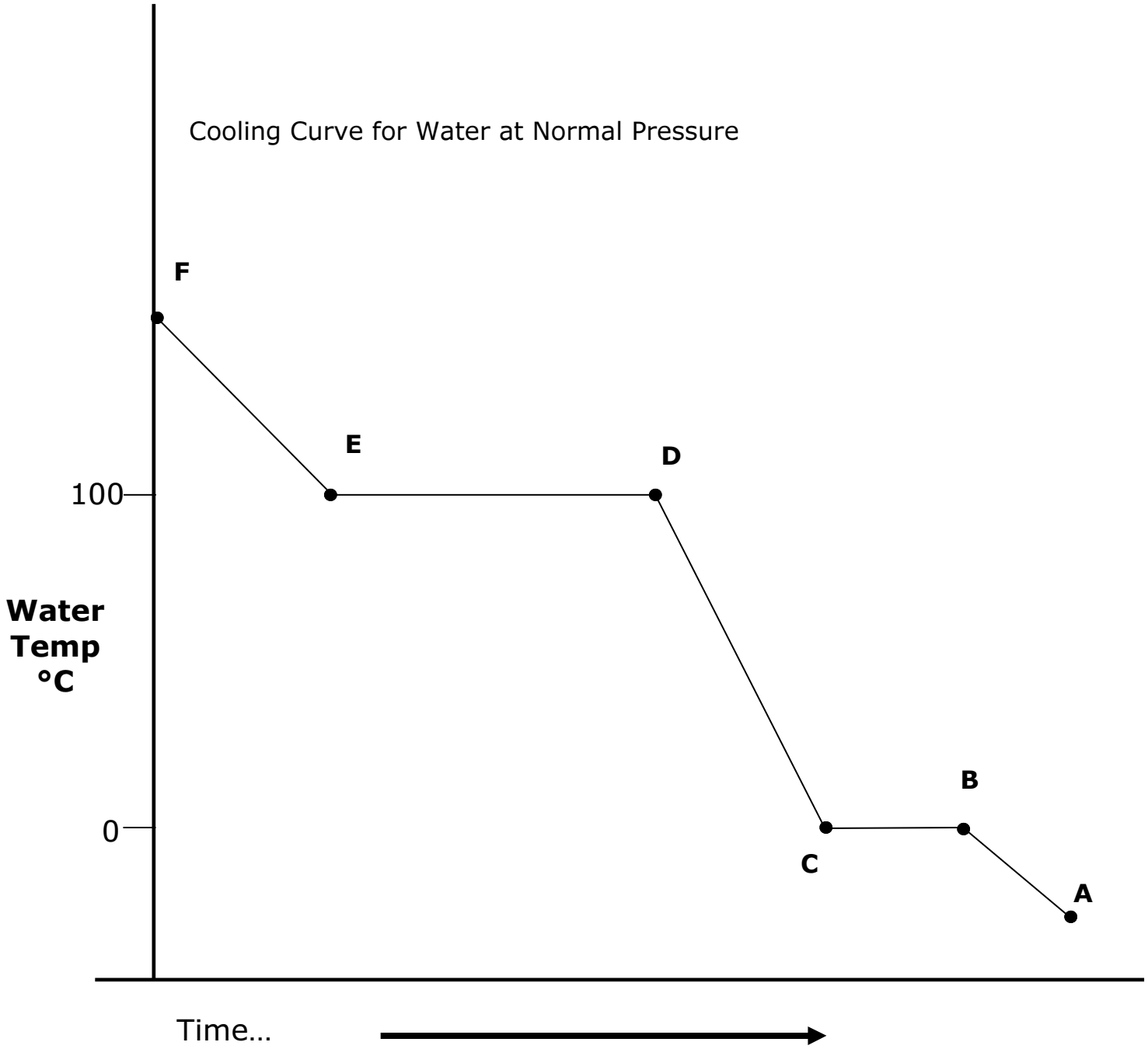
5 Explain this statement in your own words: The temperature of a liquid never goes above its boiling point, even if extra heat is added to it.
ONCE A LIQUID REACHES ITS BOILING POINT, ALL THE MOLECULES HAVE ENOUGH KINETIC ENERGY TO BECOME A GAS. ONCE THIS HAPPENS, IT CAN BOIL FASTER, BUT NOT HOTTER GASES CAN BE HEATED ABOVE THE BOILING POINT, BUT THE TRUE CONCEPT OF BOILING POINT IS THE HIGHEST TEMPERATURE (AT a PRESSURE) THAT A LIQUID CAN REACH.
IF HIGH PRESSURE EXISTS, THE BOILING POINT CAN EXCEED THE NORMAL BOILING POINT, WHICH IS THE TEMPERATURE THAT A LIQUID BOILS AT THE STANDARD (NORMAL) PRESSURE. THIS IS STILL "NOT" EXCEEDING THE BOILING POINT THOUGH, AS BOILING POINT IS A PRODUCT OF TEMPERATURE AND PRESSURE AT THE SAME TIME.

6 Why can't liquids be compressed much?
PARTICLES OF LIQUIDS ARE ALREADY TOO CLOSE TOGETHER. THE PARTICLES CAN MOVE AROUND A LOT, BUT THEY PRESSED TIGHTLY TOGETHER. THERE IS NO ROOM BETWEEN THEM FOR MUCH SQUEEZING.

	air pressure (in kPa)	boiling point of water ºC
below sea level in a deep cave	MORE THAN 101.3 kPa	MORE THAN 100ºC
at sea level	101.3 kPa	100ºC
high atop a mountain	LESS THAN 101.3 kPa	LESS THAN 100ºC

Phases HW #3 ANSWERS

Directions: read phases diary, read chapter 10, draw a NEAT cooling curve for water below. Use dots at the end of each line segment, label from F to A (top to bottom). Each line segment represents certain events happening to the water concerning temperature changes and changes in kinetic energy. Indicate those in the boxes.



line segment	Phase the H_2O is in what's happening to the kinetic energy?	what's happening to the potential energy?
FE	gas only kinetic energy decreasing	potential energy steady
ED	gas to liquid phase change kinetic energy steady	potential energy decreasing
DC	liquid only (disregarding the fact that there is always evaporation from liquid to gas, at any temperature) kinetic energy decreasing	potential energy steady
CB	liquid to solid phase change kinetic energy steady	potential energy decreasing
BA	solid only kinetic energy decreasing	potential energy steady