Aim: What is temperature \& how is it measured? (continued)

## 5. Thermometers

To build a thermometer you need two fixed points of reference.


Note: Since the number of divisions between the FP and BP of water on both scales is the same, the change in temperature $(\Delta \mathrm{T})$ for ${ }^{\circ} \mathrm{C}$ and K is the same.

So, if the temperature changes by 10 in ${ }^{\circ} \mathrm{C}$, it will change by about 20 in ${ }^{\circ} \mathrm{F}$, and exactly 10 in K.

We don't use a degree symbol with K because it's an absolute unit - where zero really means zero $\mathrm{KE} ;^{\circ} \mathrm{C}$ and ${ }^{\circ} \mathrm{F}$ are relative units - where zero means something else.
6. Converting between temperature scales

ex) $25^{\circ} \mathrm{C}=\ldots \ldots \mathrm{K}$
ex) $25 \mathrm{~K}=$ $\qquad$ ${ }^{\circ} \mathrm{C}$

1. Which is not a form of energy?
(1) light
(2) temperature
(3) electricity
(4) heat
2. What are the two fixed reference points on the Celsius thermometer?
(1) 32 and 100
(2) 0 and 212
(3) 32 and 212
(4) 0 and 100
3. What is the freezing point of water on the Kelvin scale?
(1) 0 K
(2) 32 K
(3) 100 K
(4) 273 K
4. When the temperature of an object changes by $100^{\circ} \mathrm{C}$ the same temperature change in Kelvins would be (1) 100 K
(2) 173 K
(3) 273 K
(4) 373 K
5. Different masses of copper and iron have the same temperature. Compared to the average kinetic energy of the copper atoms, the average kinetic energy of the iron atoms is (1) less (2) more (3) equal
6. At absolute zero (1) matter disappears (2) kinetic energy is maximized
(3) all motion stops (4) everything implodes
7. The average kinetic energy of water molecules increases when
(1) ice changes to water at $0^{\circ} \mathrm{C}$
(2) water changes to ice at $0^{\circ} \mathrm{C}$
(3) water is heated from $10^{\circ} \mathrm{C}$ to $20^{\circ} \mathrm{C}$
(4) water is cooled from $20^{\circ} \mathrm{C}$ to $10^{\circ} \mathrm{C}$
8) Temperature is a measure of $\qquad$ .
9) Convert:
a) $37{ }^{\circ} \mathrm{C}$ to K
b) 100 K to ${ }^{\circ} \mathrm{C}$
c) 0 K to ${ }^{\circ} \mathrm{C}$
10) A gas has a temperature of $100^{\circ} \mathrm{C}$. At what temperature would its average kinetic energy be doubled? (Hint: $1^{\text {st }}$ convert it to Kelvin)
a) $200^{\circ} \mathrm{C}$
b) $373{ }^{\circ} \mathrm{C}$
c) $473{ }^{\circ} \mathrm{C}$
d) $746{ }^{\circ} \mathrm{C}$
