When it comes to Kinetics, I can do all 45 of these things…

1. An increase in temperature will increase the reaction rate. (they are directly proportional. more collisions)

2. An increase in surface area will increase the reaction rate. (they are directly proportional. more collisions)

3. Rate = 1 / time in seconds

4. An increase in concentration of reactants will increase the reaction rate.
   (they are directly proportional. more collisions)

5. Concentration is molarity of solutions. An increase in concentration will increase the rate of reaction.
   (they are directly proportional. more collisions)

6. Rate and time of reaction are INVERSELY PROPORTIONAL. As one increases, the other decreases.

7. Effective collisions mean the collisions are properly oriented to actually combine or react when the particles bump into each other. Ineffective collisions might be ineffective because of weak collisions, or if the polarity of the particles is not oriented correctly.

8. Catalysts lower activation energy and/or offer an alternate pathway for the reaction to take. (a shortcut)

9. Potential energy diagram show the flow of energy in chemical reactions, start to finish.

10. There are exothermic and also endothermic PE diagrams.

11. Potential energy is the energy stored in chemical bonds.

12. Reactants have inherent potential energy based upon what they actually are. Reactants are not starting from "zero". Some reactants have more potential than others (more likely to react) compare to others.

13. Skip this one.

14. The energy that the products end up with stored in their bonds.

15. Heat of reaction is also known as ΔH, it's the energy difference between the reactants and products.

16. Activation energy is the minimum energy required to start a particular chemical reaction, in kJ/mole.

17. The activated complex is temporary state of being "not reactants" and not yet products. The reactants have gotten enough energy (AE) to come apart here.

18. The ΔH can never change, because the potential energy of the reactants and products are set.

19. Entropy is the measure of disorder in a chemical system.

20. Solids have the LOWEST entropy. Gases have the highest entropy.

21. If all 3 solids are at the same conditions, the larger molecules/or FU's, the more stable or lower entropy they have. Smaller particle sizes gives higher entropy.

22. The hottest solutions have highest entropy, coldest solutions have lowest entropy.

23. I can tell which of these reactions results in lower entropy (or higher entropy). (it's a PHASE thing)
    A. $CO_{2(G)} \rightarrow CO_{2(S)}$ (LOWER ENTROPY)
    B. $H_2O_{(L)} \rightarrow H_2O_{(S)}$ (LOWER ENTROPY)
    C. $Ca_{(S)} + 2H_2O_{(L)} \rightarrow Ca(OH)_{2(AQ)} + H_{2(G)}$ (GREATER ENTROPY)
    D. $NaCl_{(AQ)} + AgNO_{3(AQ)} \rightarrow AgCl_{(S)} + NaNO_{3(AQ)}$ (LOWER ENTROPY)

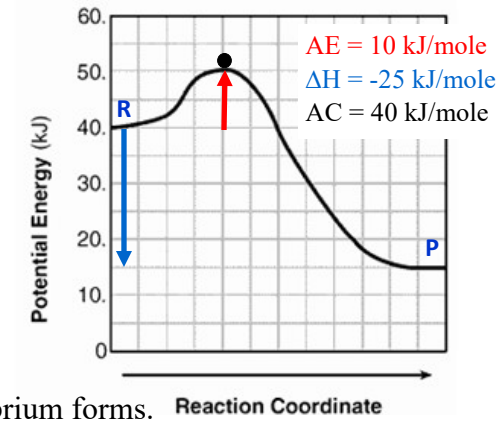
24. I can always explain melting ice results in <u>more</u> entropy.
    I can always explain the vaporization of water results in <u>more</u> entropy
    I can always explain the freezing of a liquid into solid results in <u>less</u> entropy
    I can always explain the condensation of a gas into liquid results in <u>less</u> entropy

25. I can explain that melting is an <u>endothermic</u> process.
    I can explain that freezing is an <u>exothermic</u> thermic process.
    I can explain that vaporization is an <u>endothermic</u> process.
    I can explain that condensation is an <u>exothermic</u> thermic process

26. I can explain which of these equations shows an increase in entropy (or a decrease).
    A. $CO_{2(G)} \rightarrow CO_{2(S)}$ (LOWER ENTROPY)
    B. $CO_{2(L)} \rightarrow CO_{2(G)}$ (GREATER ENTROPY)
    C. $CH_3OH_{(L)} \rightarrow CH_3OH_{(S)}$ (LOWER ENTROPY)
    D. $CH_3OH_{(S)} \rightarrow CH_3OH_{(L)}$ (GREATER ENTROPY)

27. "When bonds form, energy is released", means that bonded compounds release energy exothermically when they form. Nearly all bonds form by releasing energy, hydrogen bonds, ionic bonds, and covalent bonds.

28. I could label the AE, AC, the ΔH, reactants, products, show a catalyst affect, and write in axis labels for a graph that looks like this, and write a good title for a graph like this one.



29. The rate of the forward reaction is equal to the rate of the reverse in a dynamic equilibrium

30. $N_2 + 3H_2 \rightleftharpoons 2NH_3 + E!$
sugar water solution with excess sugar solid is in DE also.

31. A chemical system at dynamic equilibrium stays in equilibrium until a stress is applied, then the system adjusts to that stress and a new equilibrium forms.

If my example reaction is this: $2SO_{2(G)} + O_{2(G)} \rightleftharpoons 2SO_{3(G)} + 392kJ$

32. I can state that the forward reaction is <u>exothermic</u>.

33. I can state that the reverser reaction is <u>endothermic</u>.

I can determine the LeChatelier's Shift (forward or reverse) when these stresses are applied to this reaction…

$$2SO_{2(G)} + O_{2(G)} \rightleftharpoons 2SO_{3(G)} + 392kJ$$

34. add oxygen →
35. ← add sulfur trioxide
36. ← add heat
37. add pressure →
38. ← decrease heat
39. ← add heat
40. ← decrease pressure
41. XX add a catalyst XX
42. add sulfur dioxide →

43. I can use this example from an old regents exam to state the obvious… $I + I \rightarrow I_2 + 146.3$ kJ
When bonds form, energy is released (exo).

44. I can use this other example to do the same… $Cl_2 + 242$ kJ $\rightarrow Cl + Cl$
To break bonds, energy must be absorbed (endo).

45. I can state that the Universe is tending towards <u>LOWER</u> energy and <u>HIGHER</u> entropy.
(use higher or lower in each dash)