18. Element X has two isotopes. If 72.0% of the element has an isotopic mass of 84.9 atomic mass units, and 28.0% of the element has an isotopic mass of 87.0 atomic mass units, the average atomic mass of element X is numerically equal to

    (1) $(72.0 + 84.9) \times (28.0 + 87.0)$

    (2) $(72.0 - 84.9) \times (28.0 + 87.0)$

    (3) $\dfrac{(72.0 \times 84.9)}{100} + \dfrac{(28.0 \times 87.0)}{100}$

    (4) $(72.0 \times 84.9) + (28.0 \times 87.0)$

19. Which statement best explains why most atomic masses on the Periodic Table are decimal numbers?
    (1) Atomic masses are determined relative to an H–1 standard.
    (2) Atomic masses are determined relative to an O–16 standard.
    (3) Atomic masses are a weighted average of the naturally occurring isotopes.
    (4) Atomic masses are an estimated average of the artificially produced isotopes.

20. What is the maximum number of electrons that may be present in the second principal energy level of an atom?
    (1) 8   (3) 18
    (2) 2   (4) 32

21. In an aluminum atom in the ground state, which energy level contains the most electrons?
    (1) 1   (3) 3
    (2) 2   (4) 4

22. The maximum number of electrons that can occupy a principal energy level (n) of an atom is equal to
    (1) n^2 (3) $n + 2$
    (2) $2n^2$ (4) $n^2 + 2$

23. An atom of bromine is in the ground state. The outermost electrons are in principal energy level
    (1) 1   (3) 3
    (2) 2   (4) 4

24. Which electron configuration represents an atom of an element having a completed third principal energy level?
    (1) 2-8-2   (3) 2-8-10-2
    (2) 2-8-6-2   (4) 2-8-18-2

25. As an electron in a hydrogen atom moves from the second principal energy level to the first principal energy level, the energy of the atom
    (1) decreases   (3) remains the same
    (2) increases

26. Electron X can change to a higher energy level or a lower energy level. Which statement is true of electron X?
    (1) Electron X emits energy when it changes to a higher energy level.
    (2) Electron X absorbs energy when it changes to a higher energy level.
    (3) Electron X absorbs energy when it changes to a lower energy level.
    (4) Electron X neither emits nor absorbs energy when it changes energy level.

27. Which electron configuration represents an atom in an excited state?
    (1) 2-6   (3) 2-7-1
    (2) 2-7   (4) 2-8-1

28. Which electron configuration represents an atom of lithium in an excited state?
    (1) 1-1   (3) 2-1
    (2) 1-2   (4) 2-2

29. Which electron configuration is possible for a nitrogen atom in the excited state?
    (1) 2-5   (3) 2-6
    (2) 2-4-1   (4) 2-4

30. Which is the configuration of an atom in the ground state?
    (1) 2-8-2   (3) 2-7-2
    (2) 2-8-3   (4) 2-7-3

31. An electron in an atom will emit energy when it moves from energy level
    (1) $2s$ to $3p$ (3) $2p$ to $3s$
    (2) $2s$ to $2p$ (4) $2p$ to $1s$

32. 40% of the isotopes of an element have a mass of 16 amu. 60% of the isotopes have a mass of 18 amu. Calculate the average atomic mass. Show all work.

18. Element X has two isotopes. If 72.0% of the element has an isotopic mass of 84.9 atomic mass units, and 28.0% of the element has an isotopic mass of 87.0 atomic mass units, the average atomic mass of element X is numerically equal to

    (1) $(72.0 + 84.9) \times (28.0 + 87.0)$

    (2) $(72.0 - 84.9) \times (28.0 + 87.0)$

    (3) $\dfrac{(72.0 \times 84.9)}{100} + \dfrac{(28.0 \times 87.0)}{100}$

    (4) $(72.0 \times 84.9) + (28.0 \times 87.0)$

19. Which statement best explains why most atomic masses on the Periodic Table are decimal numbers?
    (1) Atomic masses are determined relative to an H–1 standard.
    (2) Atomic masses are determined relative to an O–16 standard.
    (3) Atomic masses are a weighted average of the naturally occurring isotopes.
    (4) Atomic masses are an estimated average of the artificially produced isotopes.

20. What is the maximum number of electrons that may be present in the second principal energy level of an atom?
    (1) 8 (3) 18
    (2) 2 (4) 32

21. In an aluminum atom in the ground state, which energy level contains the most electrons?
    (1) 1 (3) 3
    (2) 2 (4) 4

22. The maximum number of electrons that can occupy a principal energy level (n) of an atom is equal to
    (1) n^2 (3) $n + 2$
    (2) $2n^2$ (4) $n^2 + 2$

23. An atom of bromine is in the ground state. The outermost electrons are in principal energy level
    (1) 1 (3) 3
    (2) 2 (4) 4

24. Which electron configuration represents an atom of an element having a completed third principal energy level?
    (1) 2-8-2 (3) 2-8-10-2
    (2) 2-8-6-2 (4) 2-8-18-2

25. As an electron in a hydrogen atom moves from the second principal energy level to the first principal energy level, the energy of the atom
    (1) decreases (3) remains the same
    (2) increases

26. Electron X can change to a higher energy level or a lower energy level. Which statement is true of electron X?
    (1) Electron X emits energy when it changes to a higher energy level.
    (2) Electron X absorbs energy when it changes to a higher energy level.
    (3) Electron X absorbs energy when it changes to a lower energy level.
    (4) Electron X neither emits nor absorbs energy when it changes energy level.

27. Which electron configuration represents an atom in an excited state?
    (1) 2-6 (3) 2-7-1
    (2) 2-7 (4) 2-8-1

28. Which electron configuration represents an atom of lithium in an excited state?
    (1) 1-1 (3) 2-1
    (2) 1-2 (4) 2-2

29. Which electron configuration is possible for a nitrogen atom in the excited state?
    (1) 2-5 (3) 2-6
    (2) 2-4-1 (4) 2-4

30. Which is the configuration of an atom in the ground state?
    (1) 2-8-2 (3) 2-7-2
    (2) 2-8-3 (4) 2-7-3

31. An electron in an atom will emit energy when it moves from energy level
    (1) $2s$ to $3p$ (3) $2p$ to $3s$
    (2) $2s$ to $2p$ (4) $2p$ to $1s$

32. 40% of the isotopes of an element have a mass of 16 amu. 60% of the isotopes have a mass of 18 amu. Calculate the average atomic mass. Show all work.