Extended or long form of periodic table

31. (c) *d*-Block because the last electron enters *d*-subshell.

32. **(c) Shows diagonal relationship** Li (Group 1, Period 2) and Mg (Group 2, Period 3) → show **diagonal relationship** due to similar charge/radius ratio.

33. **(c) Atomic numbers** Old (Mendeleev's) law → atomic mass.
Modern periodic law (long form table) → properties are periodic functions of **atomic number**.

34. (a) Kr has atomic no. 36 which is a noble gas and all noble gases are included in the *p*-block.

35. **(c) IA**
Group IA (alkali metals) → Li, Na, K, Rb, Cs, Fr → all are metals.

Group IIA has Be (amphoteric, borderline) but still metallic.
Group IB has Cu, Ag, Au (transition metals, not "only metals" group strictly in modern sense).

36. **(a) Common elements**
Elements filling **s- and p-orbitals** are called **representative (main group) elements** → includes halogens, noble gases, alkali, alkaline earth, etc.

Among given options, the closest is **(a) Common elements** (representative elements).

37. **(d) Be**
Li ↔ Mg (diagonal relation).

Be ↔ Al (diagonal relation).

38. (c) *d*-block. As the last e^- enters in *d*-subshell.

39. **(a) B and Si**

Diagonal relationship occurs in the **second and third periods** due to similarity in size, charge density, and electronegativity.

Li ↔ Mg
Be ↔ Al
B ↔ Si
Now check the options:
(a) **B and Si** (Correct pair, they show diagonal relationship)
(b) B and Al (same group, not diagonal)
(c) B and Ga (same group, not diagonal)
(d) B and C (adjacent in same period, not diagonal)

40. (d) Due to its vacant *p*-orbital.

41. (a) By obserbing principal quantum number (n), Orbital (s, p, d, f) and equating no. of e^-'s we are able to find the period, block and group of element in periodic table.

42. (c) $33: 1s^2, 2s^2, 2p^6, 3s^2, 3p^6, 4s^2, 3d^{10}, 4p^3$
In its valence shell $5e^-$ are present so it is fifth (A) group element.

43. (d) 38 is the atomic no. of strontium (Sr) which is *s*-block element and all the elements of *s*-block are metals.

44. (d) Hydrogen resembles alkali metals in some properties so it can be placed in the first group of periodic table.

45. **(c) Similar size, same electronegativity and similar high polarizing power**

Lithium (Group 1) and Magnesium (Group 2) show **diagonal relationship**.

Reason: they have **similar atomic/ionic sizes**, **similar electronegativities**, and **high polarizing power** (Li^+ and Mg^{2+} are small, highly charged ions).

46. **(a) Decrease**

In transition metals, from left to right:

Atomic radius decreases slightly at first, then becomes almost constant due to **d-electron shielding**.
Hence, **atomic volume decreases slightly, then remains nearly constant**.

47. (b) Chalcons are oxygen family.

48. **(b) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6$** (Argon, a noble gas)

(a) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^{10}\ 4s^2$

This ends with **$4s^2$**, not a completely filled shell.
This is **Calcium (Z = 20)**, an alkaline earth metal.
(b) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6$
Total = 18 electrons → **Argon (Z = 18)**.
Argon is a **noble gas**.
(c) $1s^2\ 2s^2\ 2p^6\ 3p^6$
Missing $3s^2$.
Total = 16 electrons → **Sulfur (Z = 16)**, a chalcogen.
(d) $1s^2\ 2s^2\ 2p^6\ 3s^2$
Total = 12 electrons → **Magnesium (Z = 12)**, an alkaline earth metal.

49. (c) Both belongs to VA group.

50. (c) According to Dobernier law of triads the atomic mass of the central element was nearly the arithmetic mean of atomic masses of other two elements.

Cl	Br	I	Arithmetic mean

31 75 120

$$\frac{120+31}{2} = 75.5$$

51. ***(b) Electronic configuration****,*

"The physical and chemical properties of elements are periodic functions of their **atomic numbers**."

(a) Atomic volume (old law reference, but not correct now)

(b) Electronic configuration (configuration results from atomic number, but law is based directly on atomic number)

(c) Atomic weight (Mendeleev's basis, now replaced)

(d) Atomic size (a property, not the cause of periodicity)

Atomic number

(but since "atomic number" is missing, the closest reflection of the law's meaning is → ***(b) Electronic configuration****, because periodicity arises due to repetition of outer electronic configuration with increasing Z).*

52. **(a) [Rn] $5f^{14}$ $6d^4$ $7s^2$**

(a) [Rn] $5f^{14}$ $6d^4$ $7s^2$ → Correct (matches group 6 pattern, like tungsten).

(b) [Rn] $5f^{14}$ $6d^5$ $7s^1$ → would mimic Cr/Mo, but **not predicted** for Sg.

(c) [Rn] $5f^{14}$ $6d^6$ $7s^0$ → would place it in wrong group (Group 8).

(d) [Rn] $5f^{14}$ $6d^1$ $7s^2$ $7p^3$ → nonsense (mix of blocks).

53. (c) Z = 2,8,8,1. ∵it would donate e^- more easily.

54. (d) Last electron goes to *s*-subshell.

55. (b) Because they belong to same group.

56. **(c) Atomic number**

(a) **Positron** → discovered by **Carl Anderson (1932)**

(b) **Deuteron (^2H nucleus)** → discovered by **Harold Urey (1931)**
(c) **Atomic number** → **Henry Moseley (1913)** showed that atomic number (nuclear charge, Z) determines element's identity, not atomic weight
(d) **Atomic weight** → used by **Mendeleev** for his periodic table

57. (c) Ionic radius will increase as number of shells increases

58. (b) *Al*. Due to diagonal relationship.

59. **(a) An inert gas element**

Each period in the periodic table ends with a **completely filled outer shell**.

Such elements are the **noble gases (inert gases)**.
Examples:
Period 1 → Helium (He)
Period 2 → Neon (Ne)
Period 3 → Argon (Ar)
Period 4 → Krypton (Kr) … etc.

60. (d) 2,8,2. ∵it would donate e^- more easily.