Extended or long form of periodic table

1. **(c) It is a non-metal**

Reason: An electronic configuration ending with **ns^1** (e.g., 2,8,1 for Na) indicates an **alkali metal**. Alkali metals are **monovalent and electropositive** (a), their oxides are **basic** (b), and they have **low electron affinity** (d). Hence calling it a **non-metal** is incorrect.

2. (d) n/p ratio is a cause of radioactivity.

3. Electronic configuration:

$1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^3\ 4s^2$
Step 1: Count total electrons

$1s^2=2$
$2s^22p^6=8$
$3s^23p^6=8$
$3d^3=3$
$4s^2=2$
Total = 23 electrons → Atomic number = 23 (Vanadium, V).

Step 2: Determine group

Vanadium is a **transition element** (d-block).
General rule for d-block group number (for main groups):

Group number$=(n-1)d^x+ns^y$

Here: $(3d^3)(4s^2) \rightarrow 3+2=5$
So, **Group 5**.
(c) Fifth group

4. **s–block elements** are those in which the **last electron enters an s–orbital ($ns^{1–2}$).**

This corresponds only to:

Group 1 (IA, alkali metals, ns^1)

Group 2 (IIA, alkaline earth metals, ns^2)

They are **not** in IIIA/IVA, not in B sub-groups (transition elements), and not in VA–VIIA (p-block).

(a) IA and IIA

5. (c) Halogens has 7 electrons in his valance shell (ns^2np^5).

6. (c) As alkali metals have tendency to loose e^-.

7. (b) Each period consists of a series of elements whose atom have the same principal quantum no. (n) of the outer most shell i.e. In second period $n = 2$, this shell has four orbitals (one 2s and three $2p$) which can have eight electrons, hence second period contains 8 elements from atomic no. 3 to 10.

8. n=2, l=1, m=+1, s=−1 /2

Step 1: Identify the orbital

n=2 → 2nd shell.

l=1 → **p orbital**.

So it's a **2p orbital**.

m=+1 → one of the three orientations of p orbital (px,py,pz).

s=−1/2 → electron with spin down.

So this describes an electron in the **2p subshell**.

Step 2: Which element?

In 2p subshell, the filling goes from **B (Z=5, $2p^1$)** up to **Ne (Z=10, $2p^6$)**.

The last possible filling ($2p^6$) corresponds to **Neon (Z = 10)**.

Thus, the element is **Neon**.

Step 3: Position in the periodic table

Neon (Z=10) → **Group 0 (noble gases)**, **Period 2**.

(b) Group 0, period II

9. (b) Neils Bohr developed the long form of periodic table on the basis of Mosley's principle.

10. (a) $33 - 1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2 4p^3$

11. (d) 16-$1s^2 2s^2 2p^6 3s^2 3p^4$ there are $6e^-$ in outer most shell therefore its group is VIthA.

12. The **rare–earth metals** are the **lanthanides (atomic numbers 57–71)**.

The series starts from **Lanthanum (Z = 57)**, though sometimes Ce (58) is considered the first *lanthanide proper*.
But in standard classification, the **first element of rare–earth metals = Lanthanum (La, Z=57).**
(d) Lanthanum

13. (d) Many metals with catalytic properties because
(i) They provide surface area for reaction to occur
(ii) They decreases the ionisation energy.
(iii) They have vacant d -orbitals.

14. "The properties of the elements are periodic function of their atomic numbers."

This is the **Modern Periodic Law**, given by **H.G.J. Moseley** after his X-ray studies (1913).
(d) H.G.J. Moseley

15. The long form of the periodic table has:

7 horizontal rows (periods)
18 vertical columns (groups)
(b) Seven horizontal rows and eighteen vertical columns

16. The **telluric helix** (a screw-like arrangement of elements according to atomic weights) was proposed by **De Chancourtois** (sometimes written De Chan Courtois).
(a) De Chan Courtois

17. (d) Aluminium. As it belongs to p -block element.

18. (c) $Cu_{29} - [Ar]\ 3d^{10}4s^{1}$.

19. Californium (Z = 98) → belongs to the **actinide series** (5f-block).
(a) Actinide series

20. Across a period (left → right):

Nuclear charge increases.
Valence electrons are added to the same shell, so effective nuclear attraction increases.
Tendency to lose electrons (metallic character) decreases.
Answer: **(b) Decreases**

21. (a) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2$ principal quantum no. is 4 so it belongs to 4^{th} period.

22. The given general electronic structure is:

$(n-1)d^{1-10}\ ns^{0-2}$
This corresponds to elements where the **d-orbitals of the penultimate shell are being filled**.
Such elements are called **transition elements (d-block elements)**.
: **(a) Transition elements**

23. (b) Inert gases, these have ns^2np^6 configuration.

24. (a) $1s^2 2s^2 2p^2$ – there are $4e^-$ in valence shell therefore it goes to IV- group.

25. **(a) Cadmium (Cd, Z=48):** d-block element (transition metal), not lanthanide.

(b) Californium (Cf, Z=98): an **actinide**, not a lanthanide.
(c) Cerium (Ce, Z=58): first true lanthanide (rare-earth element).
(d) Cesium (Cs, Z=55): an alkali metal (Group 1), not lanthanide.
(c) Cerium

26. Mendeleev arranged the elements in his periodic table according to their **atomic weights** (not atomic number — that came later with Moseley).

(a) Atomic weight

27. (a) $U > Ra > Pb > Hg$

28. (a) *Mg – Ba*. Both belongs to II-A group.

29. (b) $Na - Cl$. Both belongs to III period.

30. (d) Elements of second and third period
Diagonal relationship

II	Li	Be	B	C	N	O	F
III	Na	Mg	Al	Si	P	S	Cl