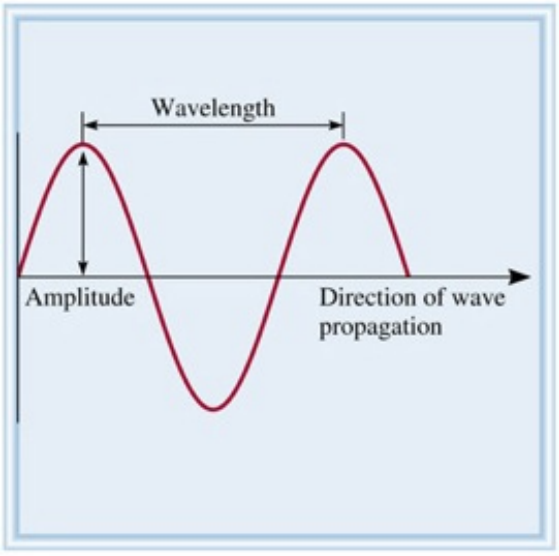
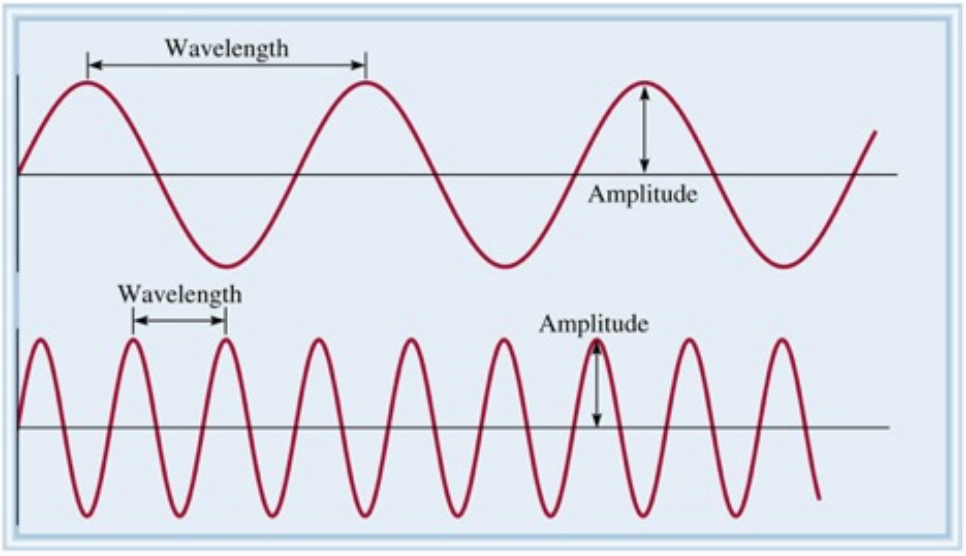



(a)

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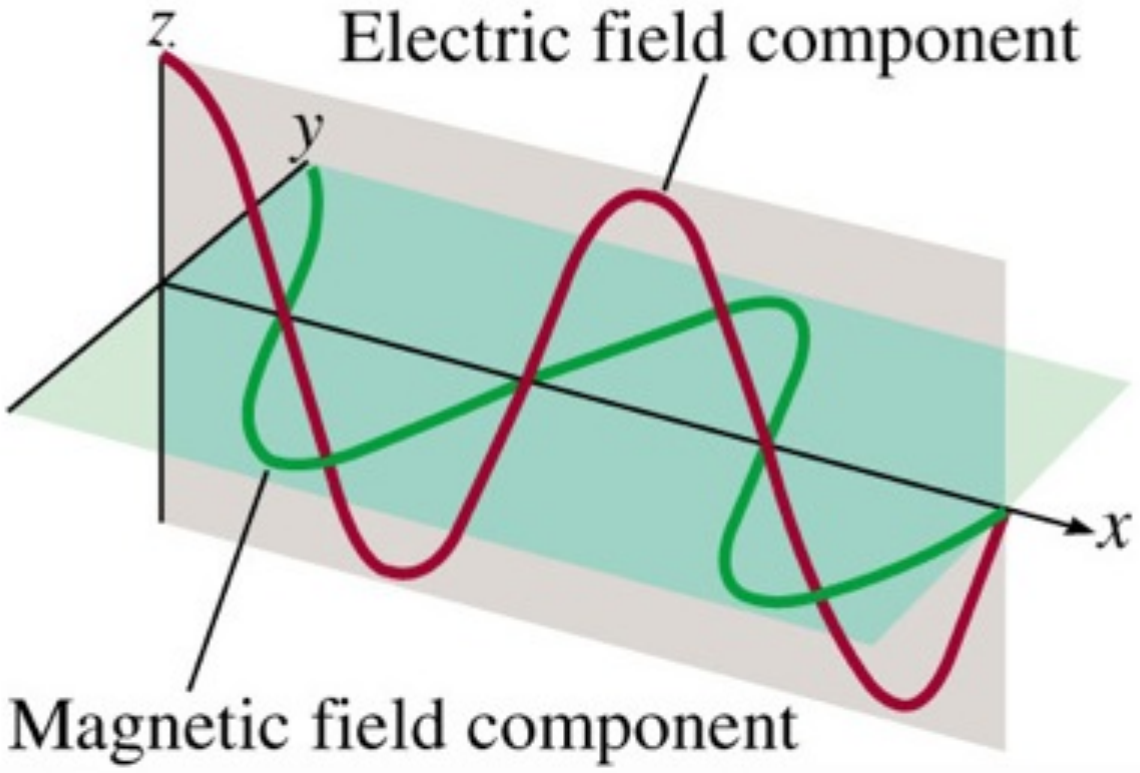
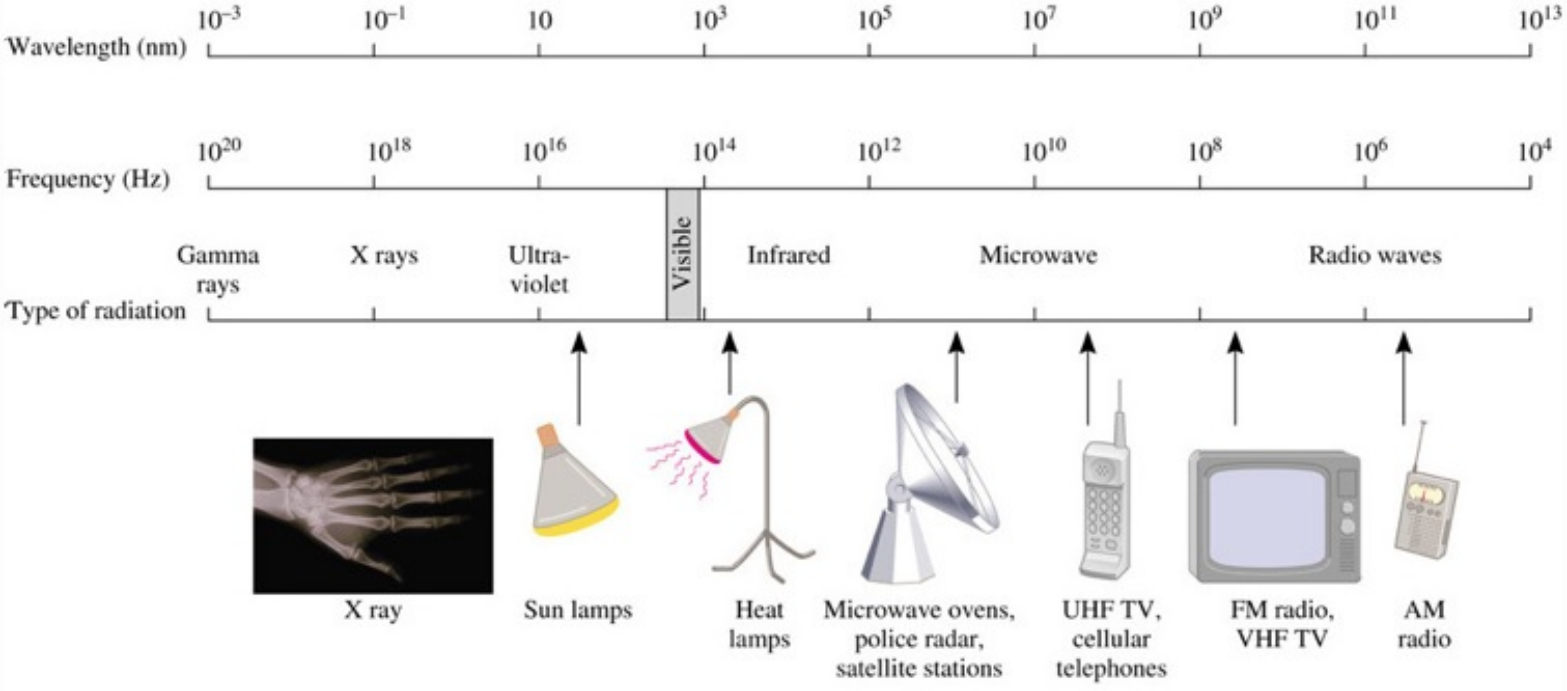
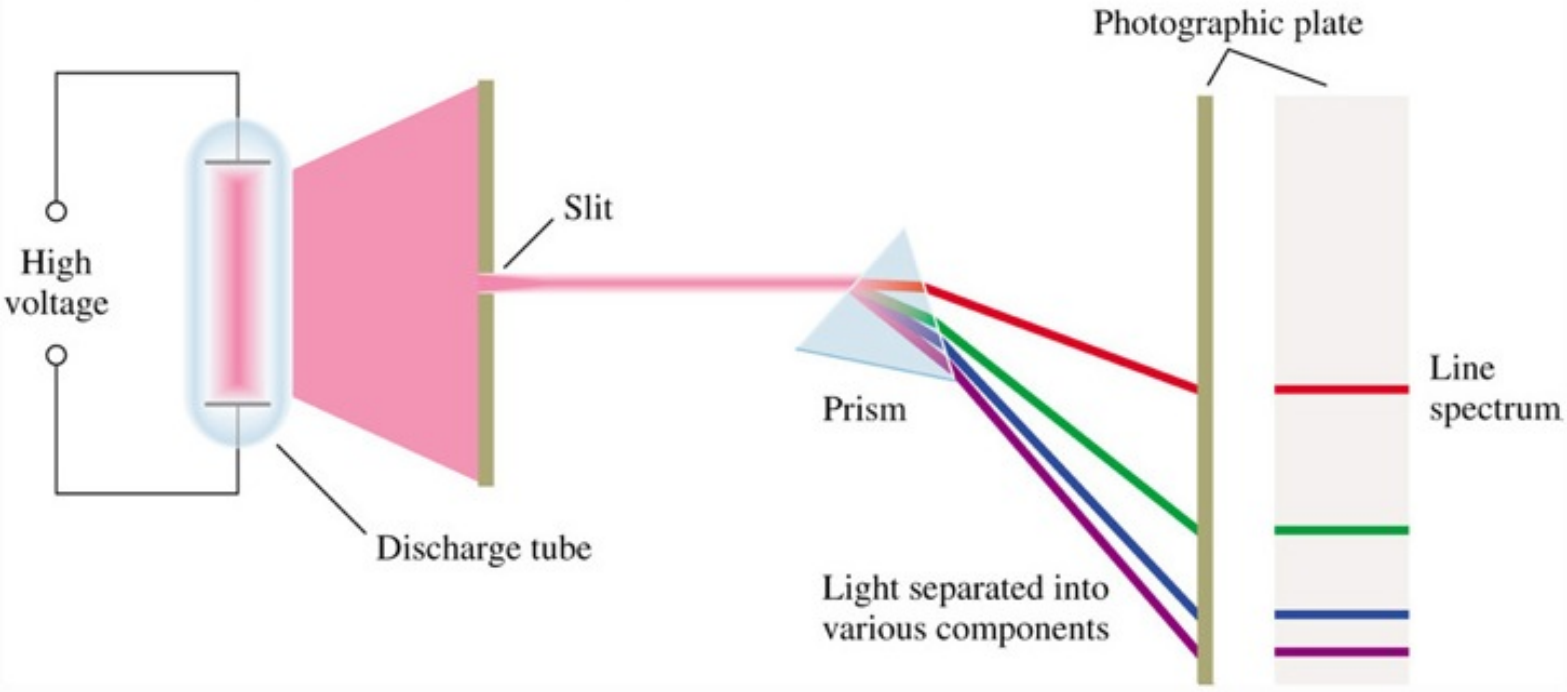
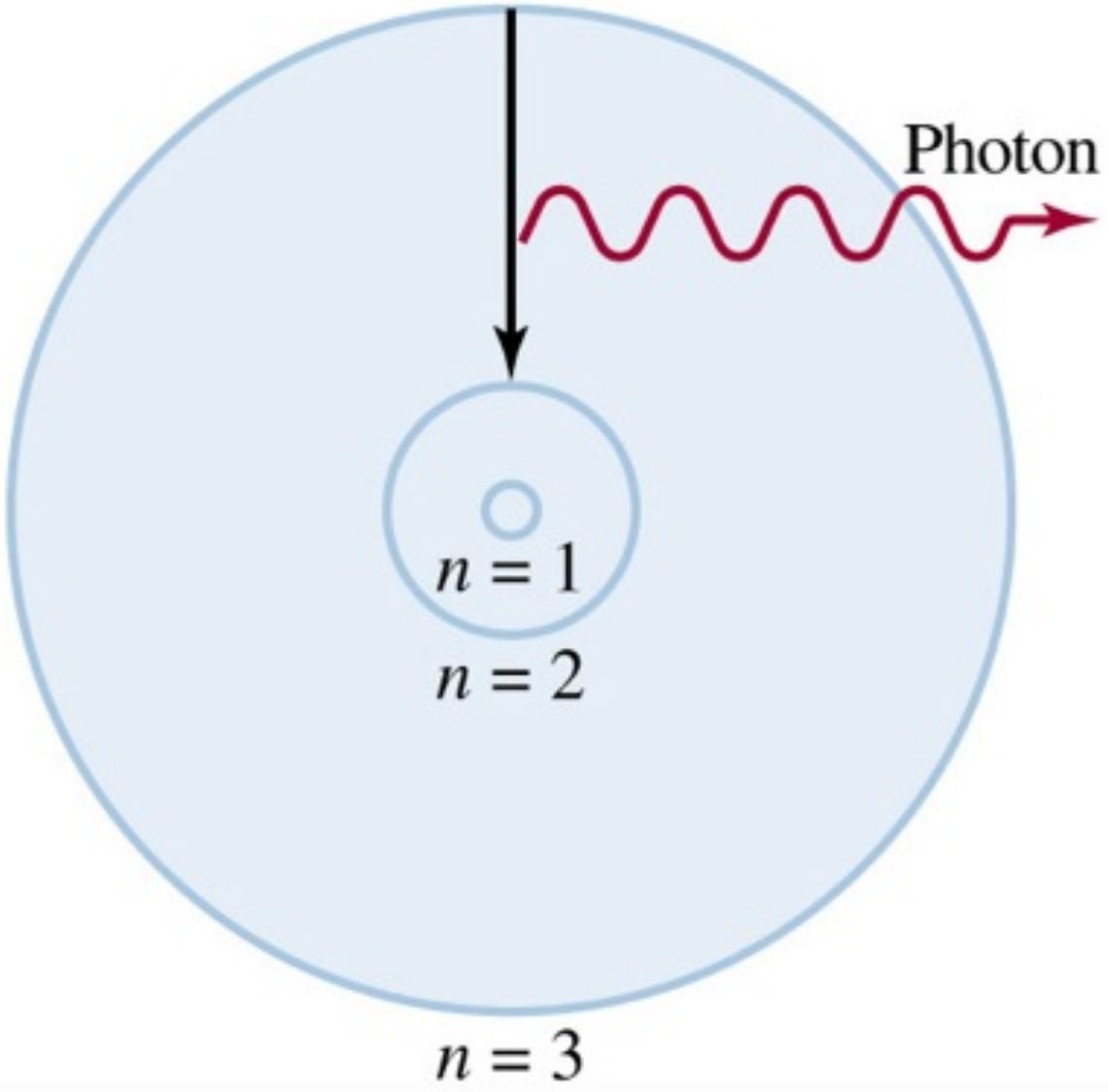


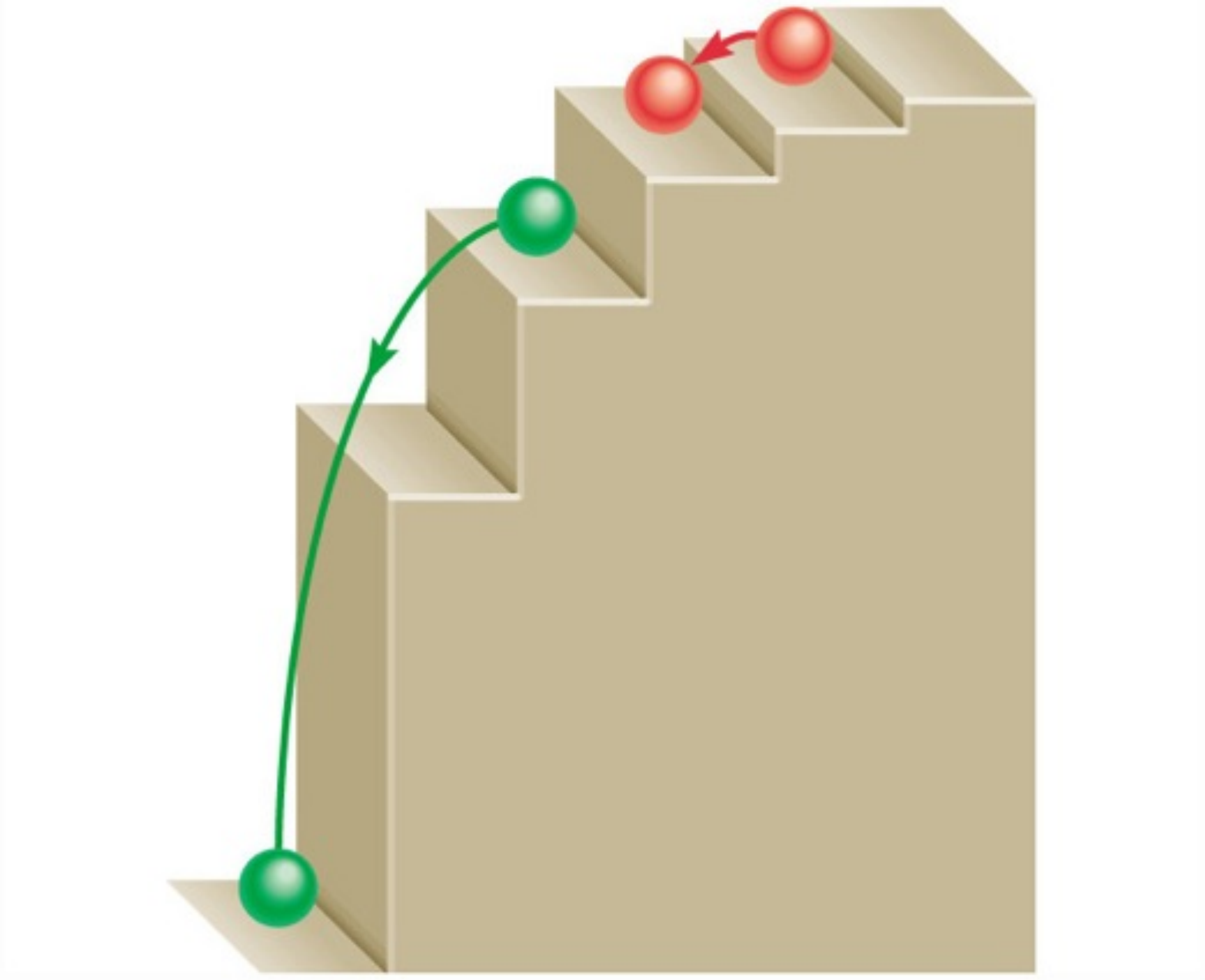


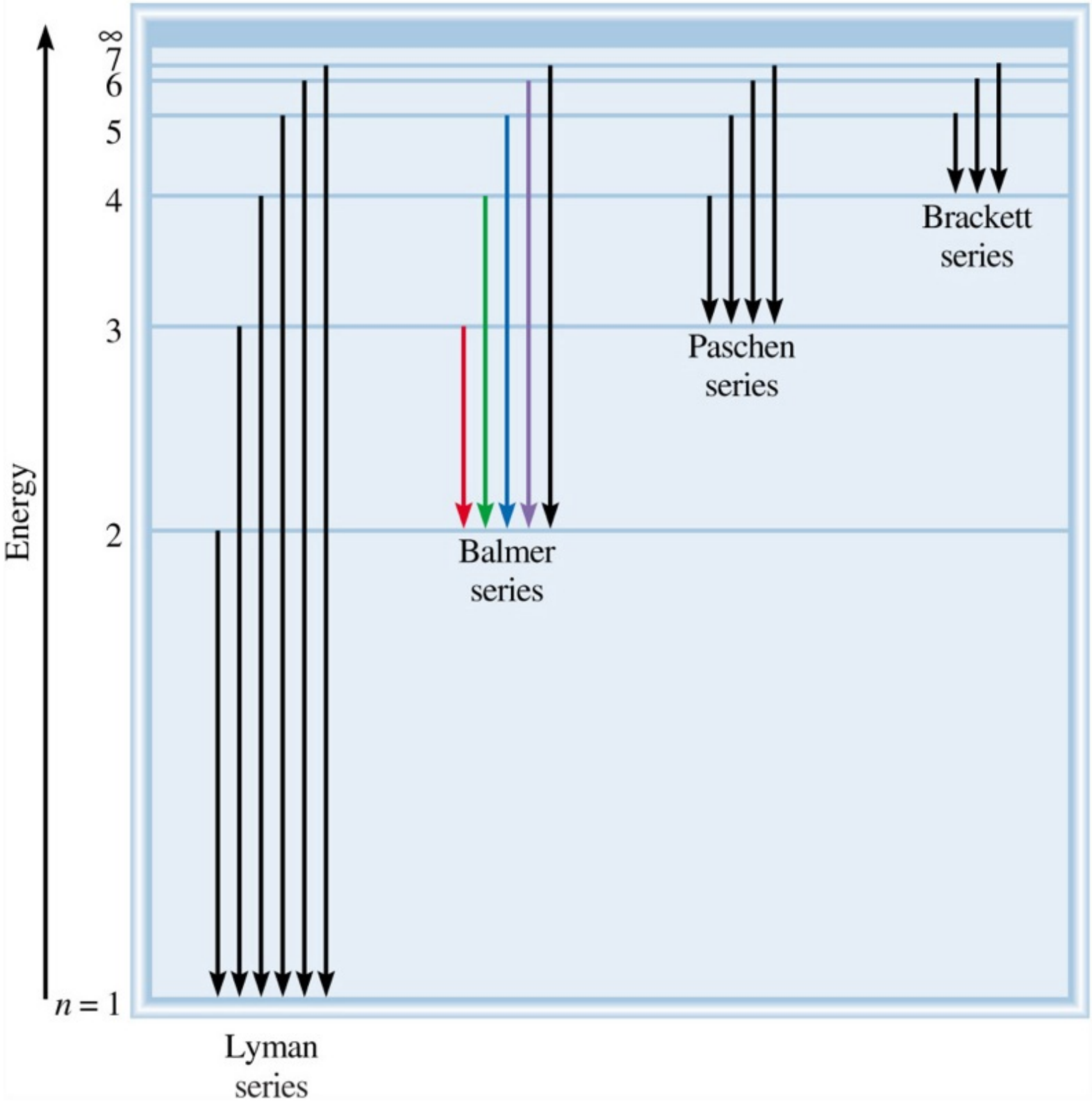

(a)

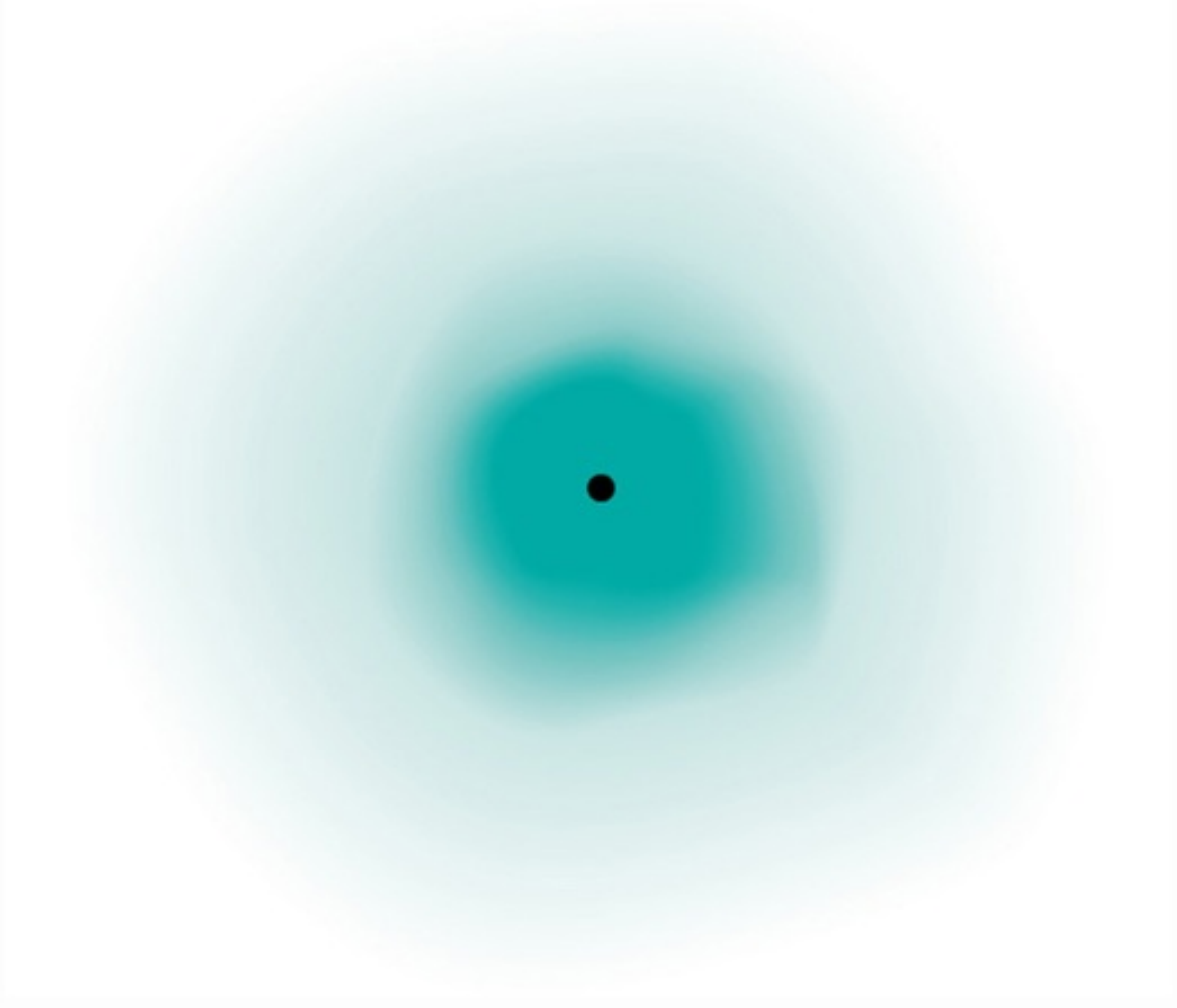

(b)

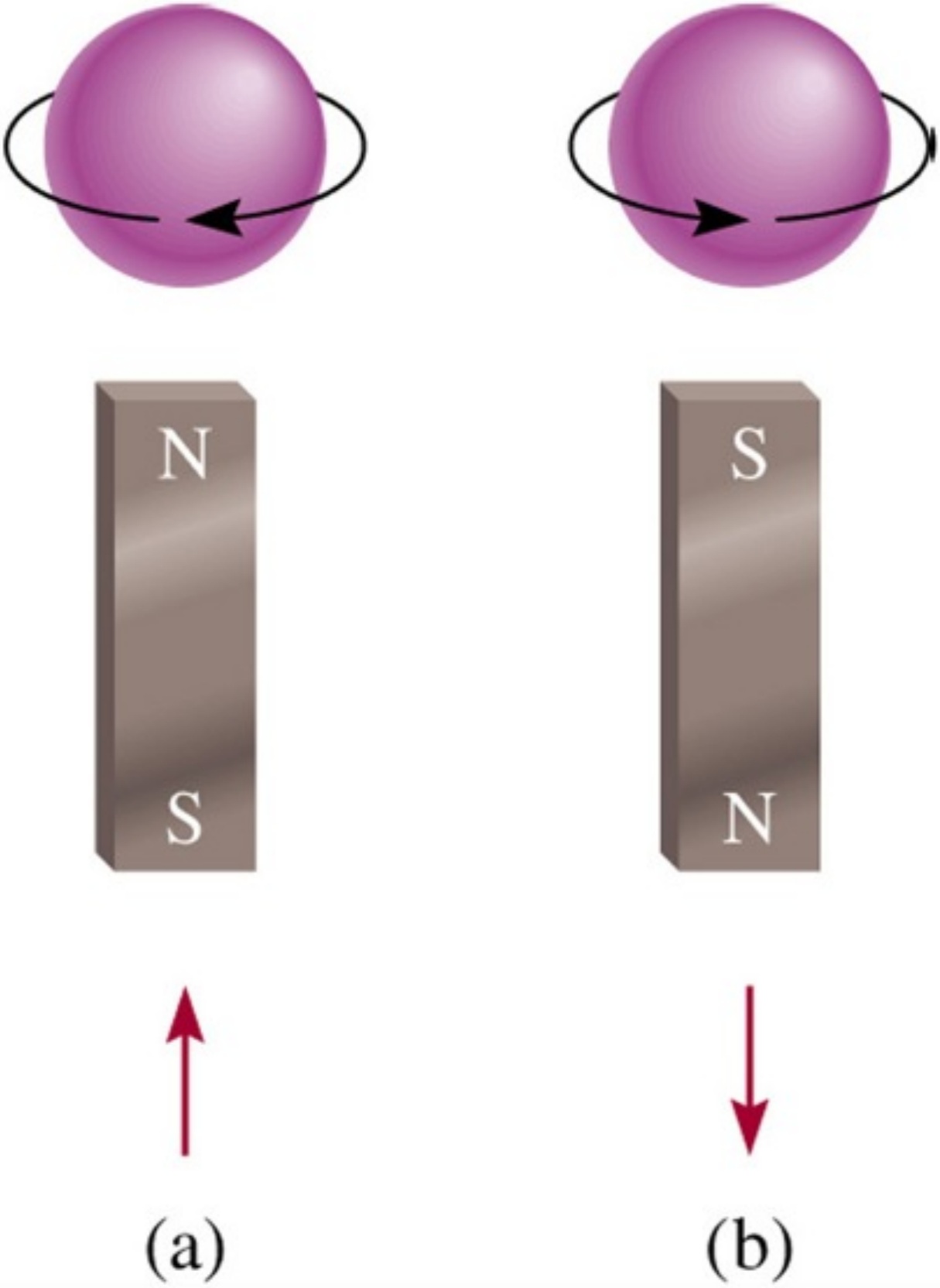


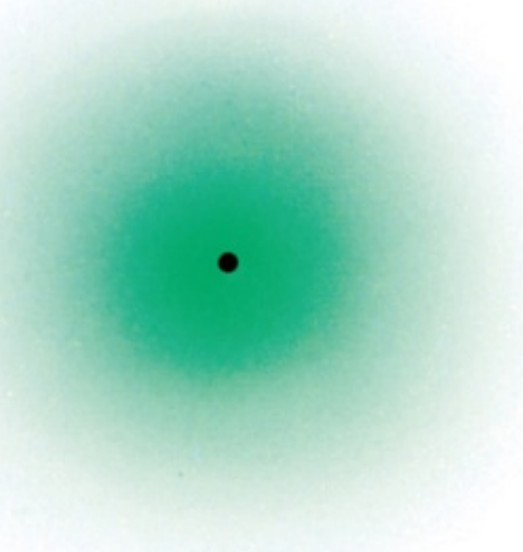




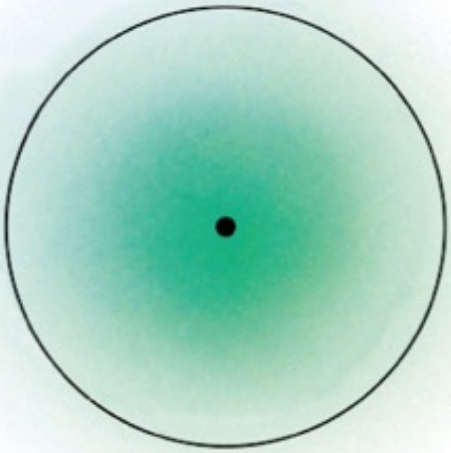








(a)



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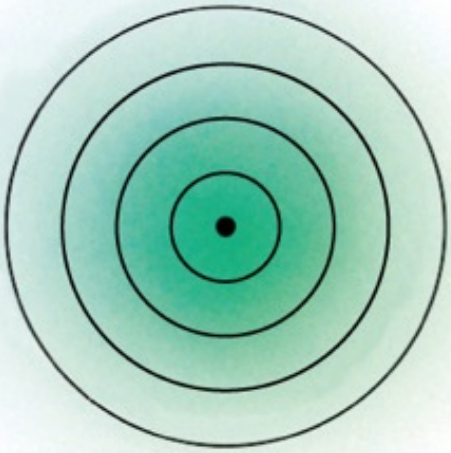
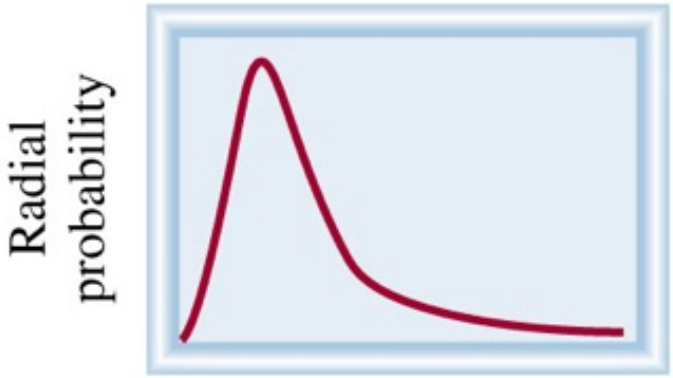
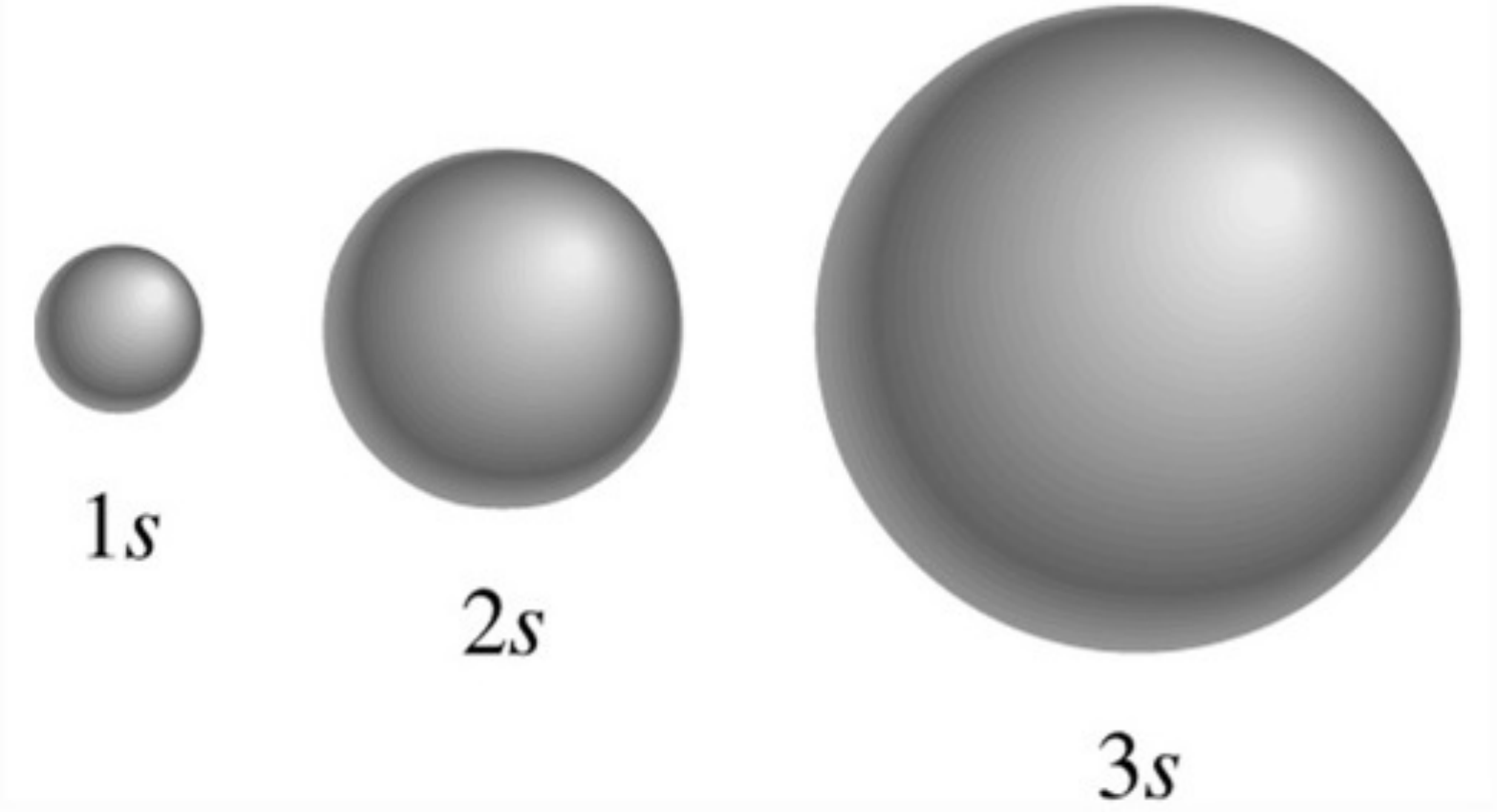
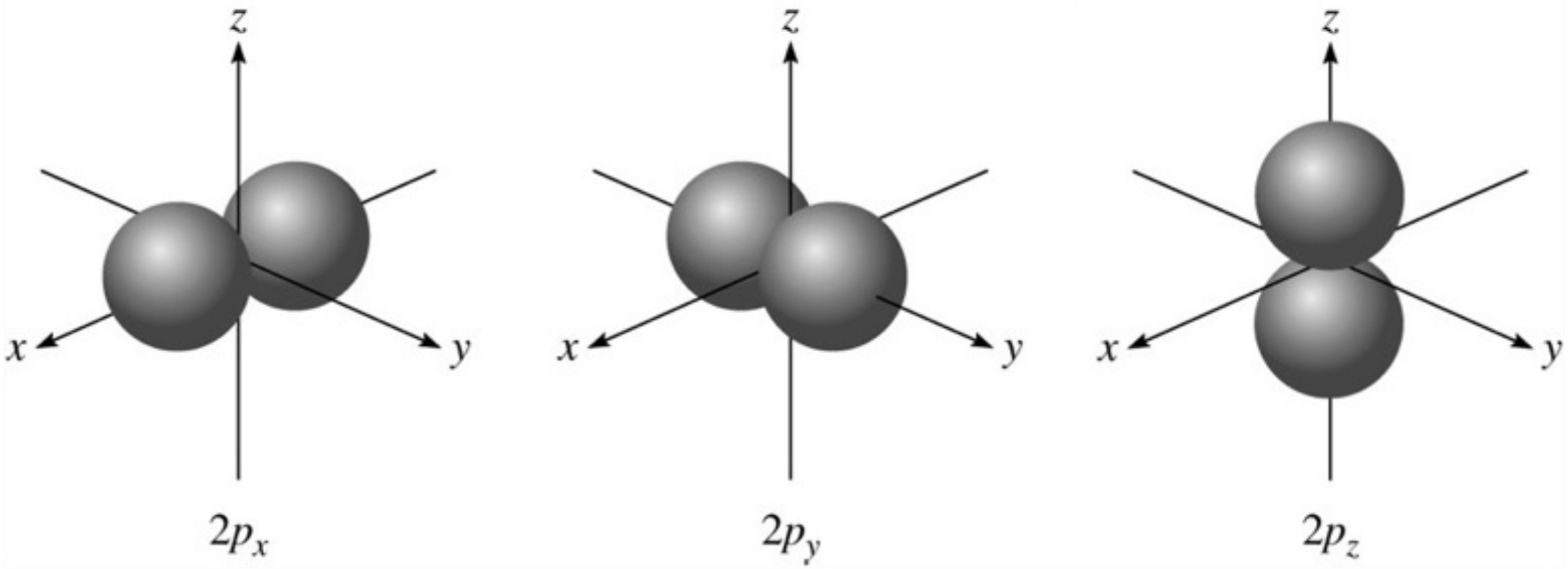
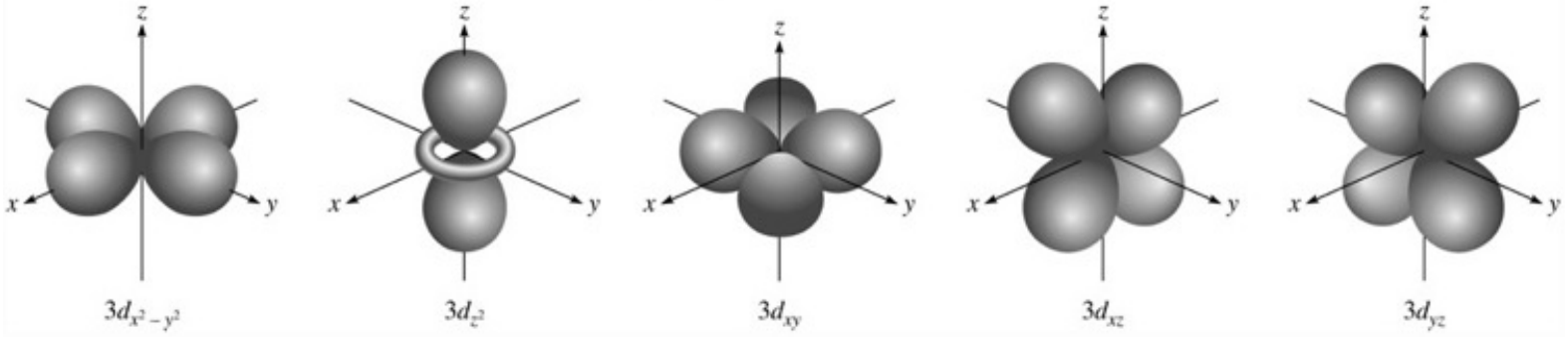


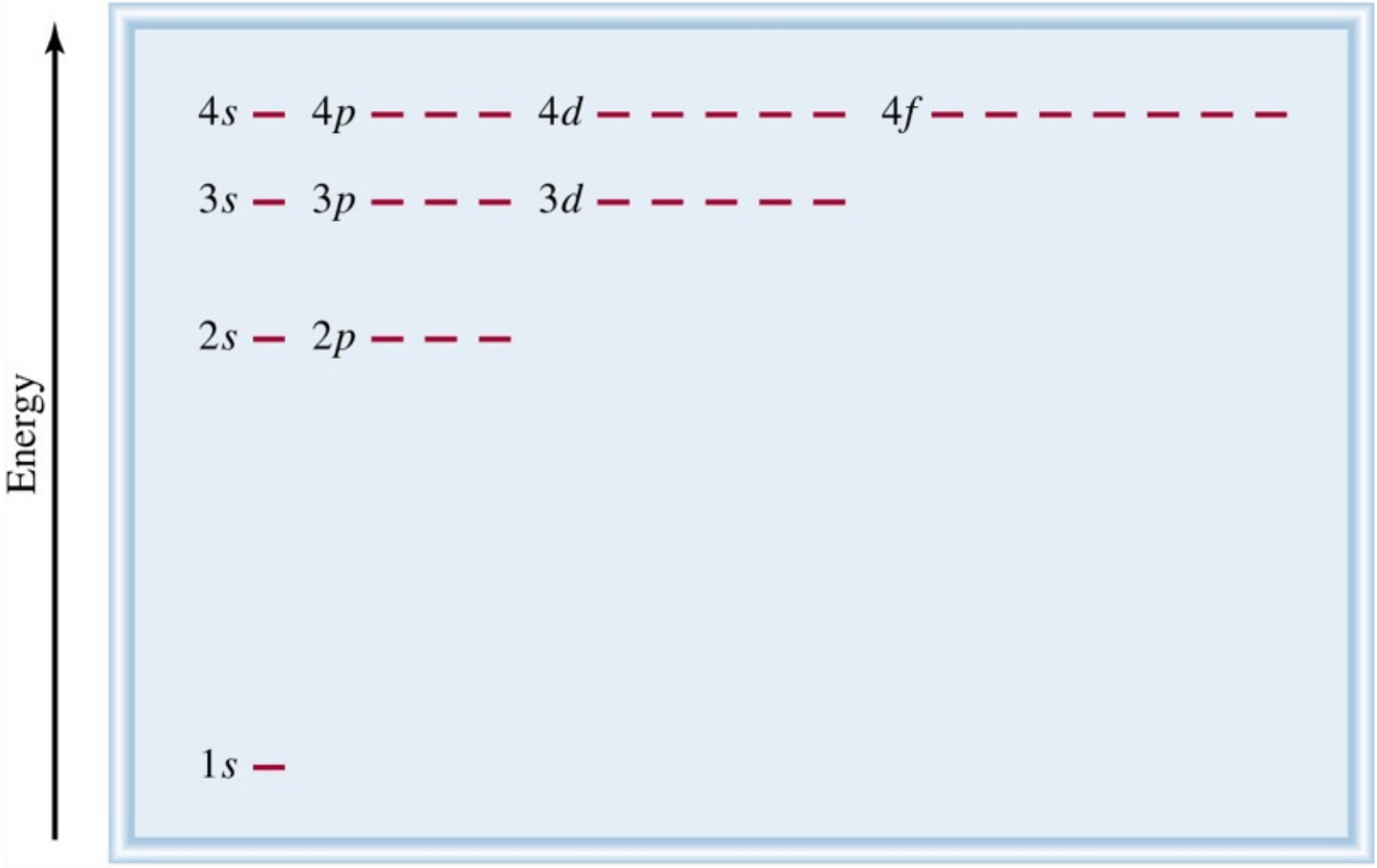


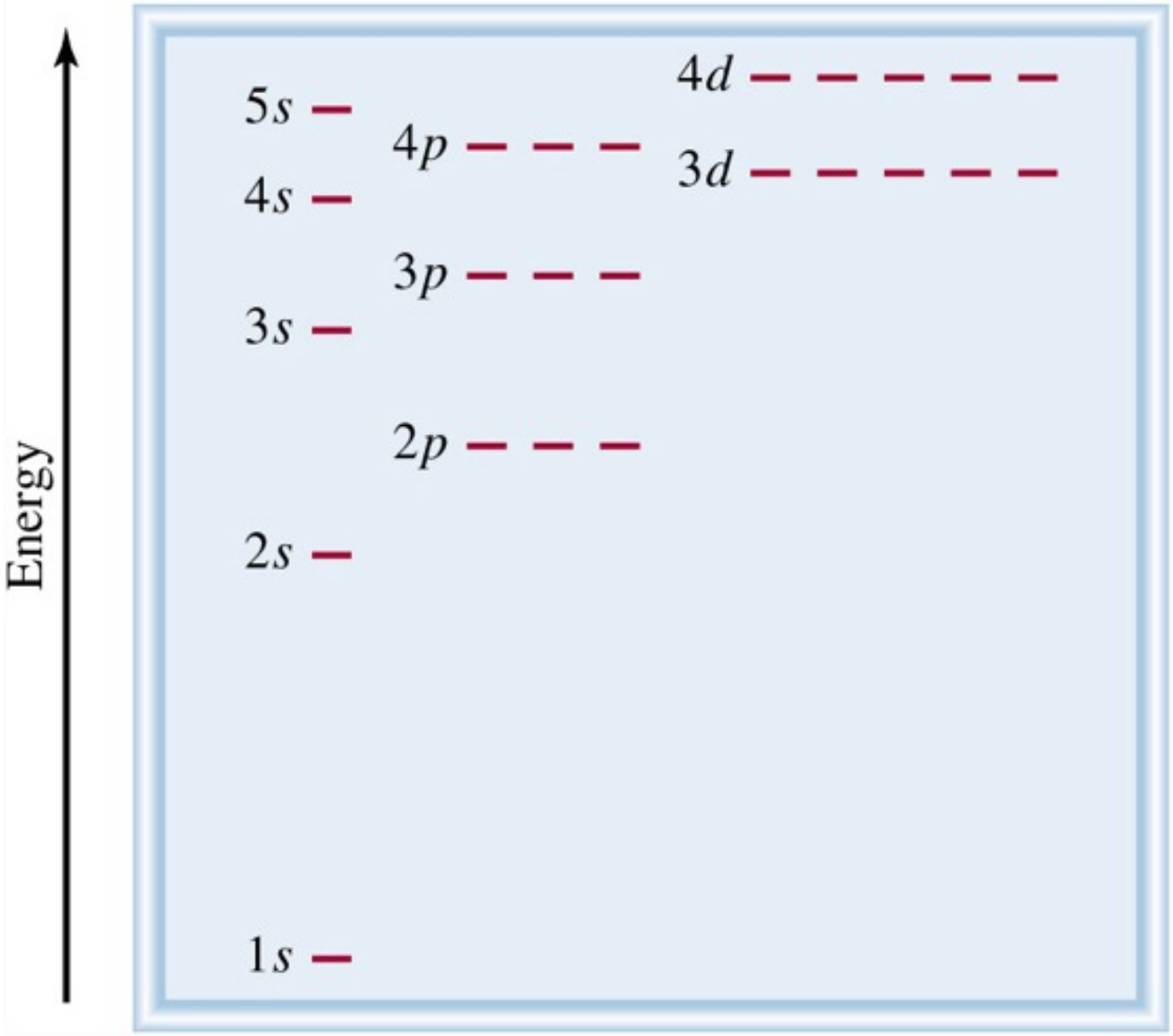

(c)

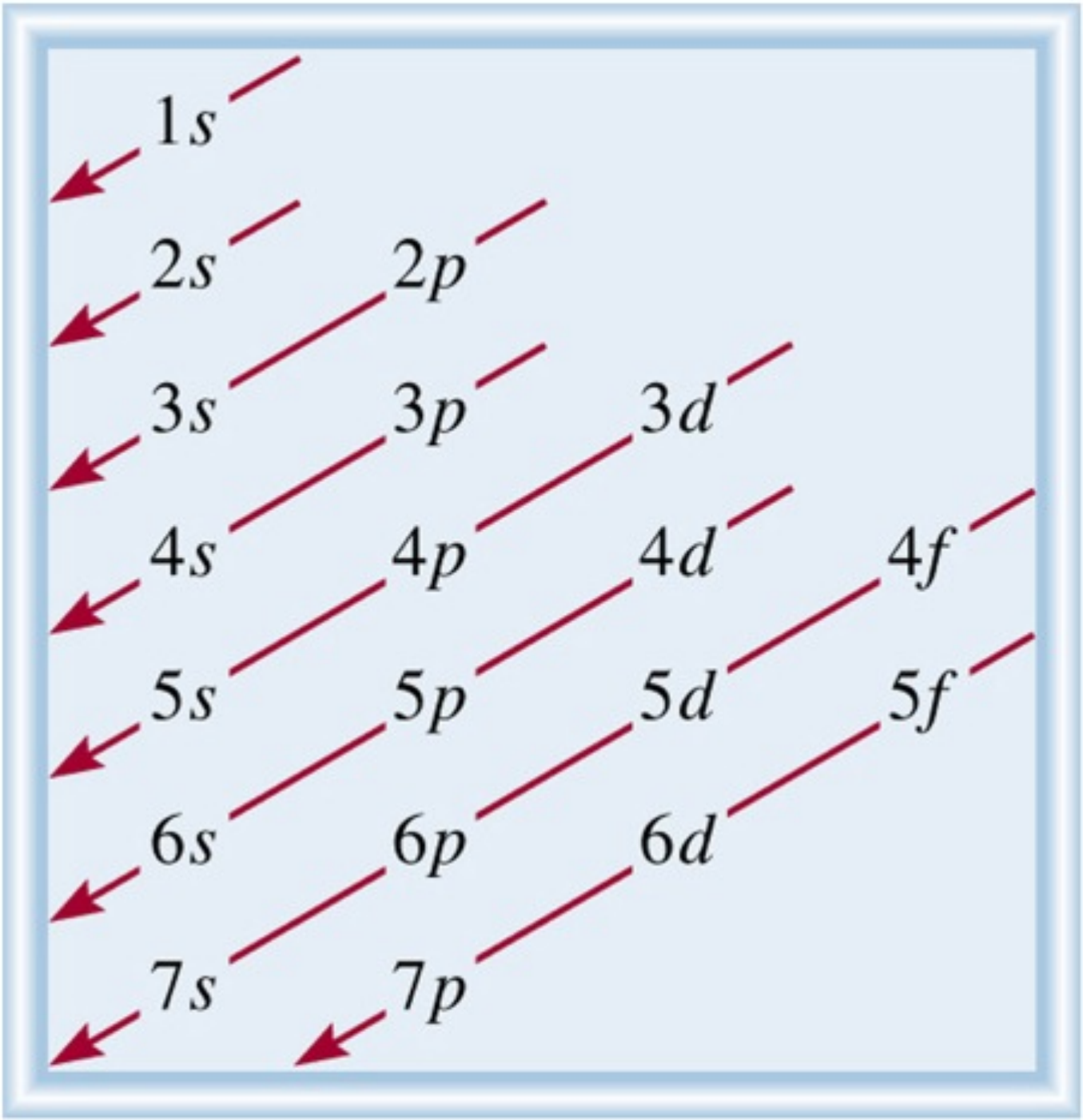


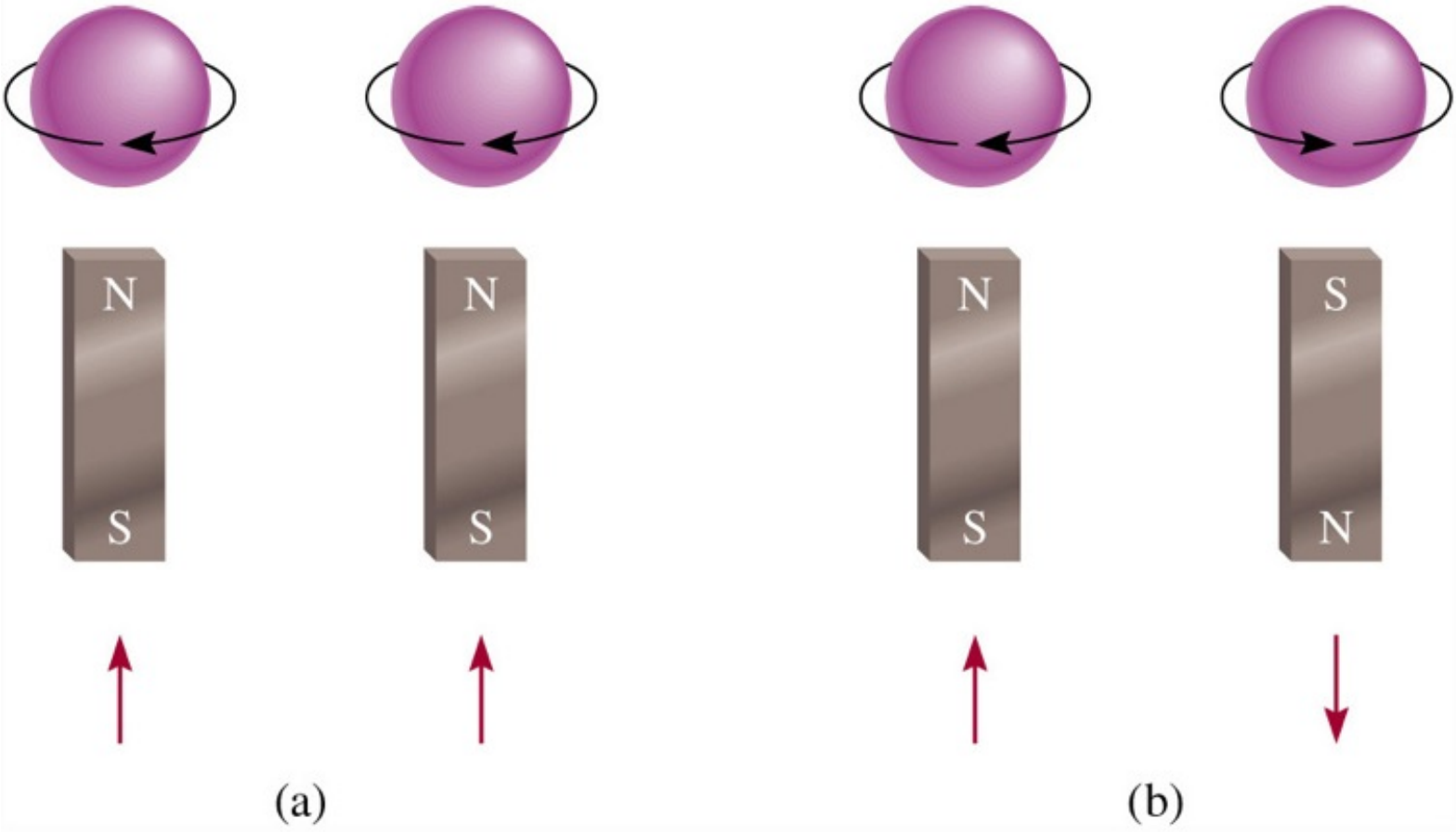


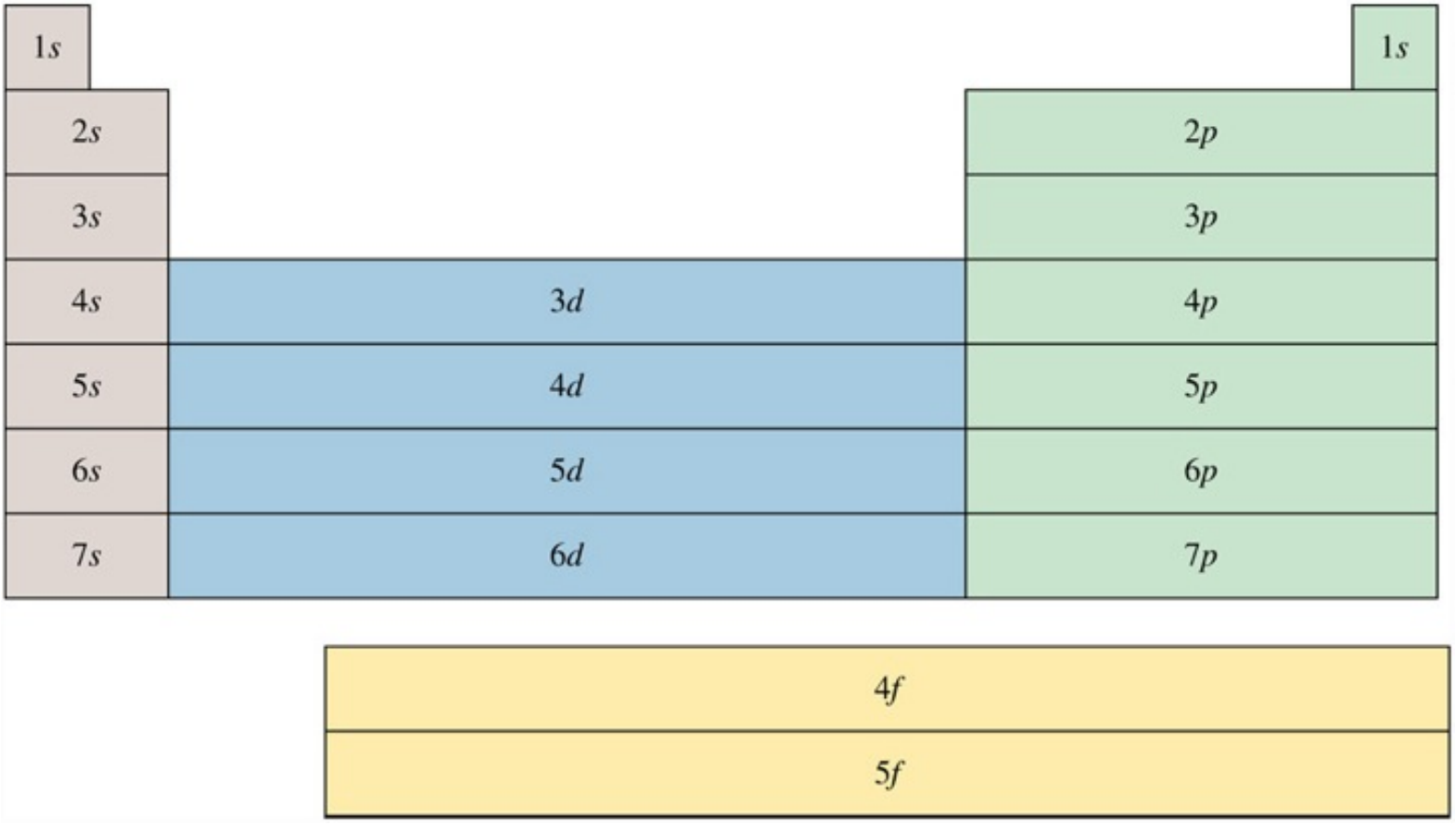












## Table 7.2 Relation Between Quantum Numbers and Atomic Orbitals

| $n$ | $\ell$ | $m_\ell$ | Number of Orbitals | Atomic Orbital Designations |
|---|---|---|---|---|
| 1 | 0 | 0 | 1 | $1s$ |
| 2 | 0 | 0 | 1 | $2s$ |
| | 1 | $-1, 0, 1$ | 3 | $2p_x, 2p_y, 2p_z$ |
| 3 | 0 | 0 | 1 | $3s$ |
| | 1 | $-1, 0, 1$ | 3 | $3p_x, 3p_y, 3p_z$ |
| | 2 | $-2, -1, 0, 1, 2$ | 5 | $3d_{xy}, 3d_{yz}, 3d_{xz},$ |
| | | | | $3d_{x^2-y^2}, 3d_{z^2}$ |
| ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |

## Table 7.3 The Ground-State Electron Configurations of the Elements*

| Atomic Number | Symbol | Electron Configuration | Atomic Number | Symbol | Electron Configuration | Atomic Number | Symbol | Electron Configuration |
|---|---|---|---|---|---|---|---|---|
| 1 | H | $1s^1$ | 38 | Sr | $[Kr]5s^2$ | 75 | Re | $[Xe]6s^24f^{14}5d^5$ |
| 2 | He | $1s^2$ | 39 | Y | $[Kr]5s^24d^1$ | 76 | Os | $[Xe]6s^24f^{14}5d^6$ |
| 3 | Li | $[He]2s^1$ | 40 | Zr | $[Kr]5s^24d^2$ | 77 | Ir | $[Xe]6s^24f^{14}5d^7$ |
| 4 | Be | $[He]2s^2$ | 41 | Nb | $[Kr]5s^14d^4$ | 78 | Pt | $[Xe]6s^14f^{14}5d^9$ |
| 5 | B | $[He]2s^22p^1$ | 42 | Mo | $[Kr]5s^14d^5$ | 79 | Au | $[Xe]6s^14f^{14}5d^{10}$ |
| 6 | C | $[He]2s^22p^2$ | 43 | Tc | $[Kr]5s^24d^5$ | 80 | Hg | $[Xe]6s^24f^{14}5d^{10}$ |
| 7 | N | $[He]2s^22p^3$ | 44 | Ru | $[Kr]5s^14d^7$ | 81 | Tl | $[Xe]6s^24f^{14}5d^{10}6p^1$ |
| 8 | O | $[He]2s^22p^4$ | 45 | Rh | $[Kr]5s^14d^8$ | 82 | Pb | $[Xe]6s^24f^{14}5d^{10}6p^2$ |
| 9 | F | $[He]2s^22p^5$ | 46 | Pd | $[Kr]4d^{10}$ | 83 | Bi | $[Xe]6s^24f^{14}5d^{10}6p^3$ |
| 10 | Ne | $[He]2s^22p^6$ | 47 | Ag | $[Kr]5s^14d^{10}$ | 84 | Po | $[Xe]6s^24f^{14}5d^{10}6p^4$ |
| 11 | Na | $[Ne]3s^1$ | 48 | Cd | $[Kr]5s^24d^{10}$ | 85 | At | $[Xe]6s^24f^{14}5d^{10}6p^5$ |
| 12 | Mg | $[Ne]3s^2$ | 49 | In | $[Kr]5s^24d^{10}5p^1$ | 86 | Rn | $[Xe]6s^24f^{14}5d^{10}6p^6$ |
| 13 | Al | $[Ne]3s^23p^1$ | 50 | Sn | $[Kr]5s^24d^{10}5p^2$ | 87 | Fr | $[Rn]7s^1$ |
| 14 | Si | $[Ne]3s^23p^2$ | 51 | Sb | $[Kr]5s^24d^{10}5p^3$ | 88 | Ra | $[Rn]7s^2$ |
| 15 | P | $[Ne]3s^23p^3$ | 52 | Te | $[Kr]5s^24d^{10}5p^4$ | 89 | Ac | $[Rn]7s^26d^1$ |
| 16 | S | $[Ne]3s^23p^4$ | 53 | I | $[Kr]5s^24d^{10}5p^5$ | 90 | Th | $[Rn]7s^26d^2$ |
| 17 | Cl | $[Ne]3s^23p^5$ | 54 | Xe | $[Kr]5s^24d^{10}5p^6$ | 91 | Pa | $[Rn]7s^25f^26d^1$ |
| 18 | Ar | $[Ne]3s^23p^6$ | 55 | Cs | $[Xe]6s^1$ | 92 | U | $[Rn]7s^25f^36d^1$ |
| 19 | K | $[Ar]4s^1$ | 56 | Ba | $[Xe]6s^2$ | 93 | Np | $[Rn]7s^25f^46d^1$ |
| 20 | Ca | $[Ar]4s^2$ | 57 | La | $[Xe]6s^25d^1$ | 94 | Pu | $[Rn]7s^25f^6$ |
| 21 | Sc | $[Ar]4s^23d^1$ | 58 | Ce | $[Xe]6s^24f^15d^1$ | 95 | Am | $[Rn]7s^25f^7$ |
| 22 | Ti | $[Ar]4s^23d^2$ | 59 | Pr | $[Xe]6s^24f^3$ | 96 | Cm | $[Rn]7s^25f^76d^1$ |
| 23 | V | $[Ar]4s^23d^3$ | 60 | Nd | $[Xe]6s^24f^4$ | 97 | Bk | $[Rn]7s^25f^9$ |
| 24 | Cr | $[Ar]4s^13d^5$ | 61 | Pm | $[Xe]6s^24f^5$ | 98 | Cf | $[Rn]7s^25f^{10}$ |
| 25 | Mn | $[Ar]4s^23d^5$ | 62 | Sm | $[Xe]6s^24f^6$ | 99 | Es | $[Rn]7s^25f^{11}$ |
| 26 | Fe | $[Ar]4s^23d^6$ | 63 | Eu | $[Xe]6s^24f^7$ | 100 | Fm | $[Rn]7s^25f^{12}$ |
| 27 | Co | $[Ar]4s^23d^7$ | 64 | Gd | $[Xe]6s^24f^75d^1$ | 101 | Md | $[Rn]7s^25f^{13}$ |
| 28 | Ni | $[Ar]4s^23d^8$ | 65 | Tb | $[Xe]6s^24f^9$ | 102 | No | $[Rn]7s^25f^{14}$ |
| 29 | Cu | $[Ar]4s^13d^{10}$ | 66 | Dy | $[Xe]6s^24f^{10}$ | 103 | Lr | $[Rn]7s^25f^{14}6d^1$ |
| 30 | Zn | $[Ar]4s^23d^{10}$ | 67 | Ho | $[Xe]6s^24f^{11}$ | 104 | Rf | $[Rn]7s^25f^{14}6d^2$ |
| 31 | Ga | $[Ar]4s^23d^{10}4p^1$ | 68 | Er | $[Xe]6s^24f^{12}$ | 105 | Db | $[Rn]7s^25f^{14}6d^3$ |
| 32 | Ge | $[Ar]4s^23d^{10}4p^2$ | 69 | Tm | $[Xe]6s^24f^{13}$ | 106 | Sg | $[Rn]7s^25f^{14}6d^4$ |
| 33 | As | $[Ar]4s^23d^{10}4p^3$ | 70 | Yb | $[Xe]6s^24f^{14}$ | 107 | Bh | $[Rn]7s^25f^{14}6d^5$ |
| 34 | Se | $[Ar]4s^23d^{10}4p^4$ | 71 | Lu | $[Xe]6s^24f^{14}5d^1$ | 108 | Hs | $[Rn]7s^25f^{14}6d^6$ |
| 35 | Br | $[Ar]4s^23d^{10}4p^5$ | 72 | Hf | $[Xe]6s^24f^{14}5d^2$ | 109 | Mt | $[Rn]7s^25f^{14}6d^7$ |
| 36 | Kr | $[Ar]4s^23d^{10}4p^6$ | 73 | Ta | $[Xe]6s^24f^{14}5d^3$ | 110 | Ds | $[Rn]7s^25f^{14}6d^8$ |
| 37 | Rb | $[Kr]5s^1$ | 74 | W | $[Xe]6s^24f^{14}5d^4$ | 111 | Rg | $[Rn]7s^25f^{14}6d^9$ |

*The symbol [He] is called the helium core and represents $1s^2$. [Ne] is called the neon core and represents $1s^22s^22p^6$. [Ar] is called the argon core and represents $[Ne]3s^23p^6$. [Kr] is called the krypton core and represents $[Ar]4s^23d^{10}4p^6$. [Xe] is called the xenon core and represents $[Kr]5s^24d^{10}5p^6$. [Rn] is called the radon core and represents $[Xe]6s^24f^{14}5d^{10}6p^6$.