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The Atomic Building

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Instructions For Designing The Atomic Building

1. The shape of the building looks like an inverted skyscraper.
2. Each floor in the atomic building accommodates certain number of classrooms.
3. The number and the name of each classroom is determined by following the quantum number rules for n and l .
4. Each classroom is fitted with specially designed benches that can accommodate a maximum of only two students. The number of benches in each classroom is determined by the quantum number m_l .

Atomic floor $n = 1$

Goal: How many benches (**orbitals**) are available for the students (**electrons**)

$n = 1$ (**shell**)

$l = 0, \dots, (n-1)$

How many
classrooms

(**subshells**) are on
floor 1?

Name the
classroom

$m_l = -l, \dots, 0, \dots, +l$

How many
benches (**orbitals**)
are available in
those classrooms
on floor 1?

Total number of benches (**orbitals**) available for the students (**electrons**) on level $n = 1$

Atomic floor $n = 2$

Goal: How many benches (**orbitals**) are available for the students (**electrons**)

$n = 2$ (shell)

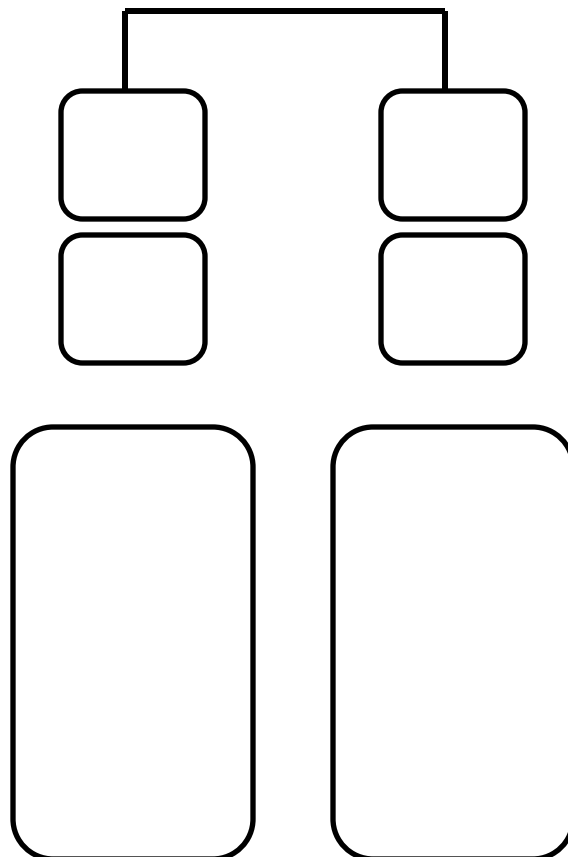
$l = 0, \dots, (n-1)$

How many
classrooms
(**subshells**) are on
floor 2?

Name the
classroom

$m_l = -l, \dots, 0, \dots, +l$

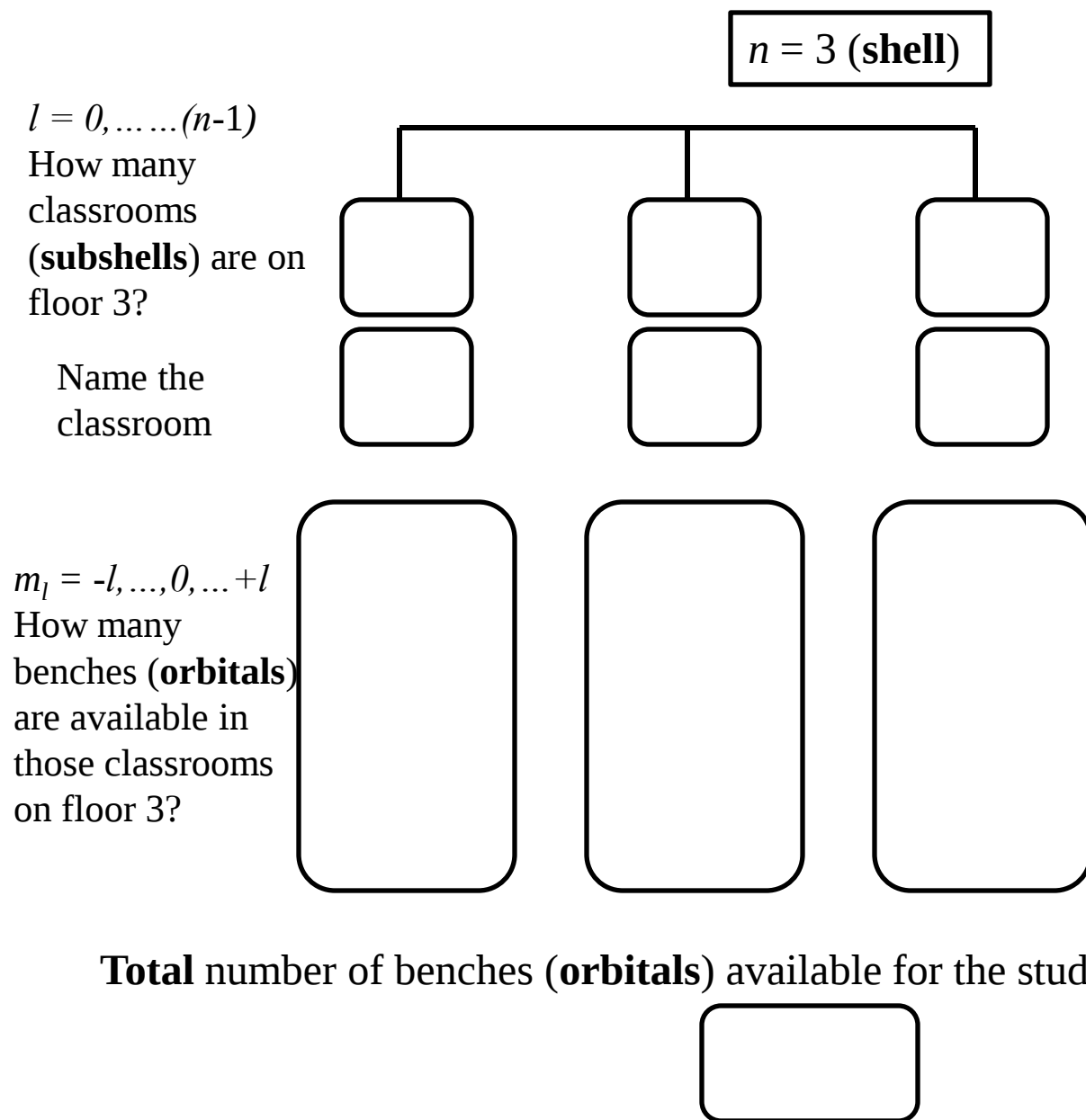
How many
benches (**orbitals**)
are available in
those classrooms
on floor 2?



Total number of benches (**orbitals**) available for the students (**electrons**) on level $n = 2$

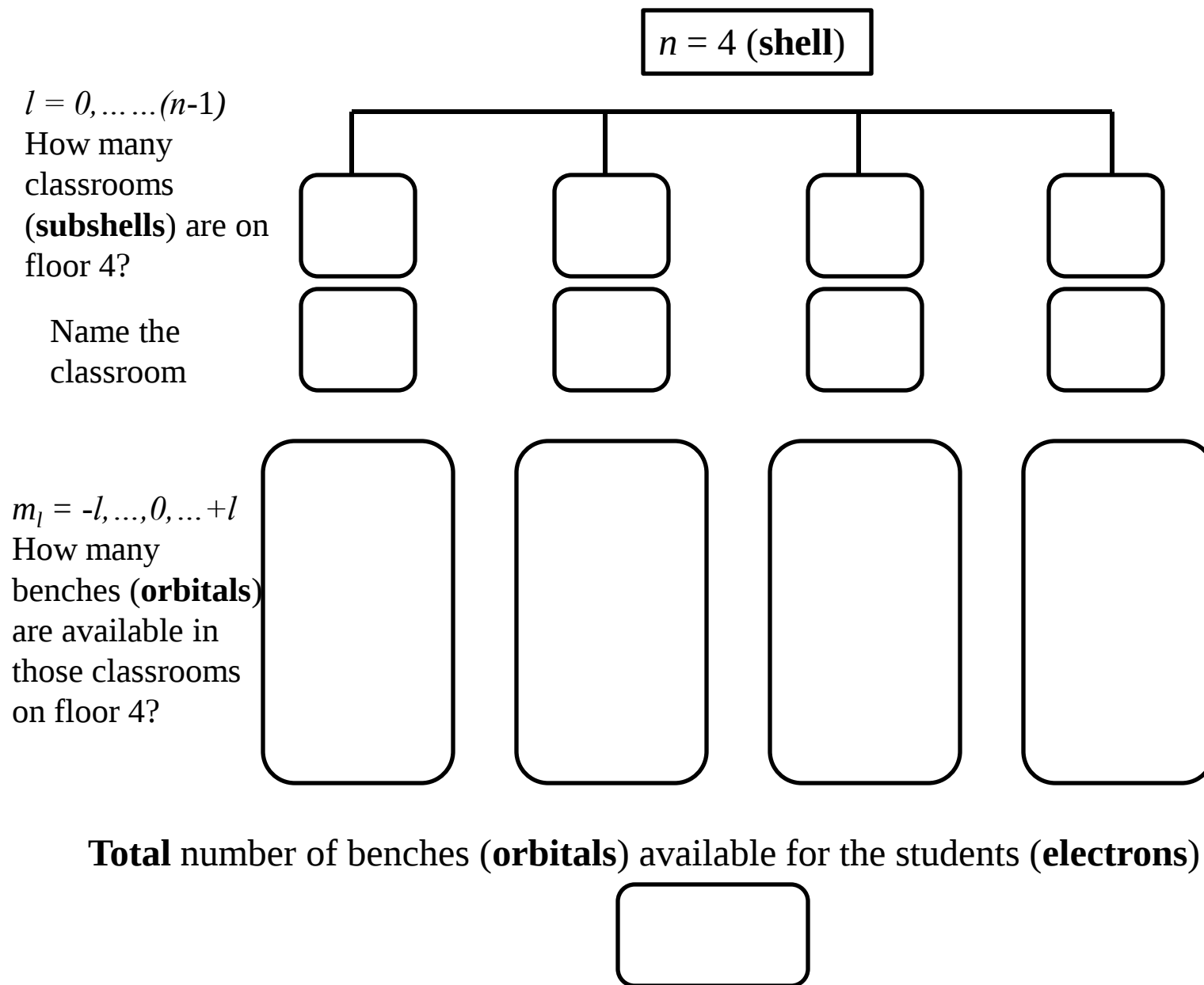
Atomic floor $n = 3$

Goal: How many benches (**orbitals**) are available for the students (**electrons**)



Atomic floor $n = 4$

Goal: How many benches (**orbitals**) are available for the students (**electrons**)



Atomic floor $n = 5$

Goal: How many benches (**orbitals**) are available for the students (**electrons**)

$n = 5$ (**shell**)

$l = 0, \dots, (n-1)$

How many
classrooms
(**subshells**) are on
floor 5?

Name the
classroom

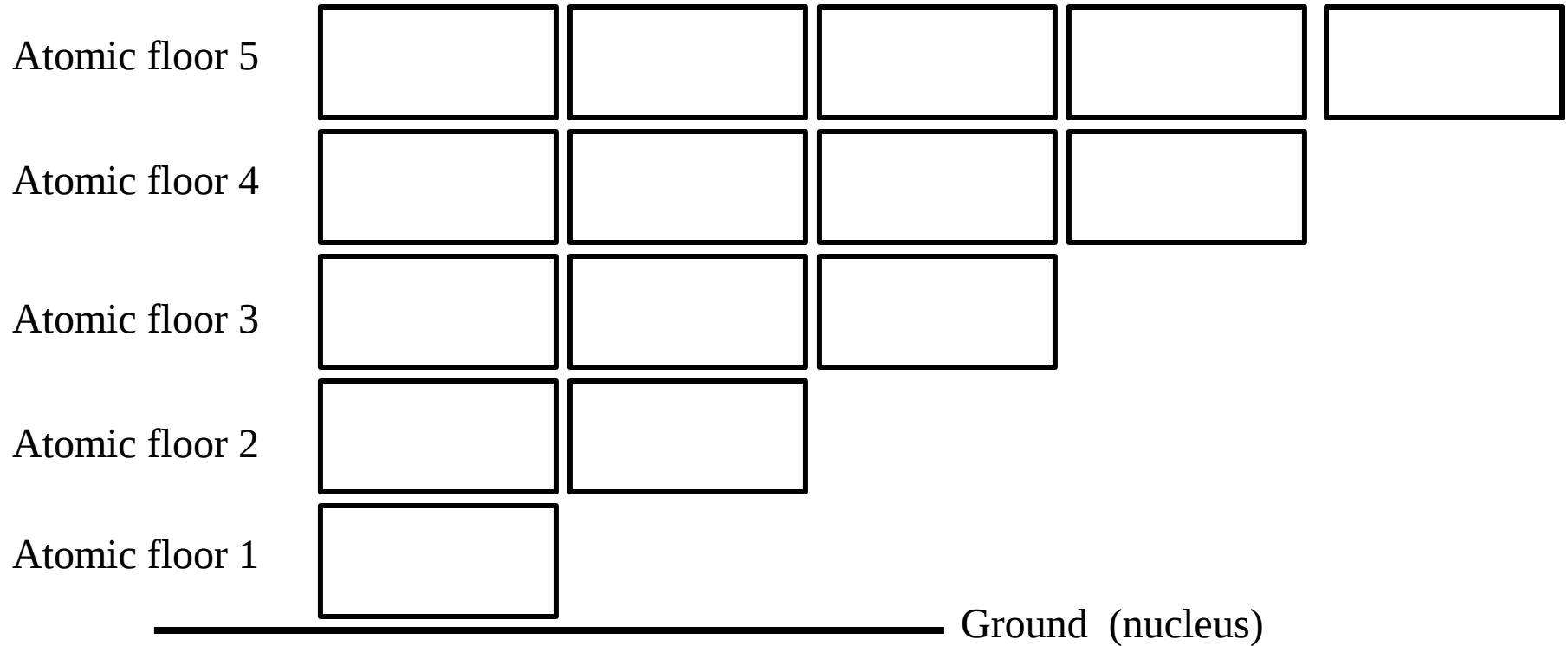
$m_l = -l, \dots, 0, \dots, +l$

How many
benches (**orbitals**)
are available in
those classrooms
on floor 5?

Total number of benches (**orbitals**) available for the students (**electrons**) on level $n = 5$

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Summary: The Atomic Building



Note: Each



is a classroom and has a unique name

Let's put it all together

The Orbitals in a Hydrogen Atom

