**CONCEPT:** INTRODUCTION TO CELL SIGNALING

●**Cell** _____: the ability for all cells to *produce*, *receive* & *respond to* external signals/conditions.

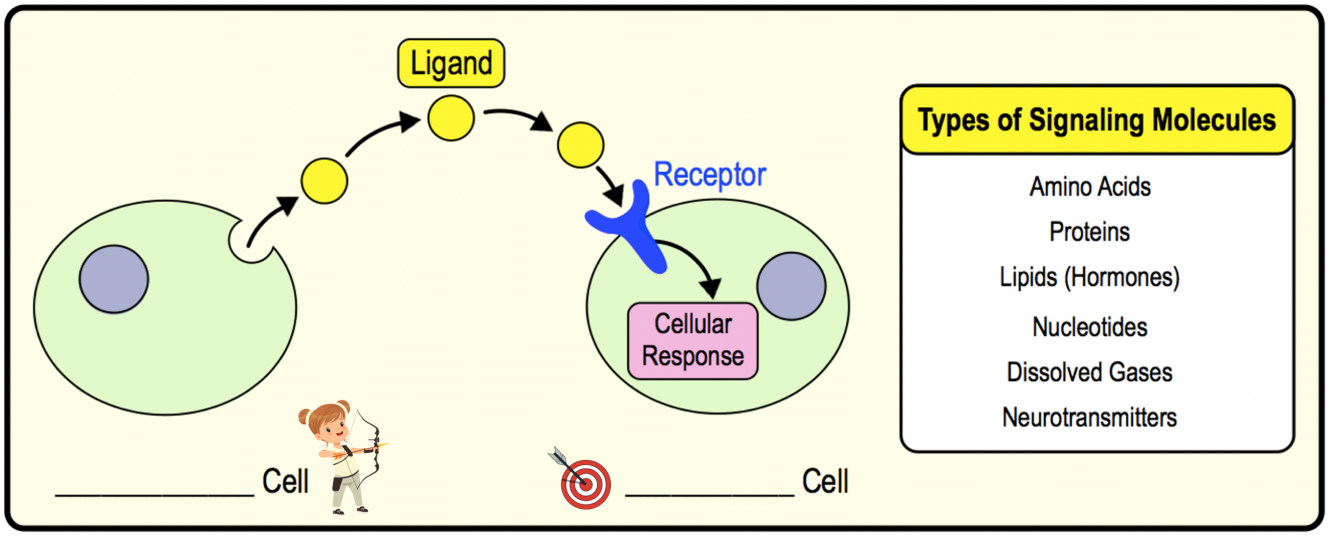
□ Allows for effective cellular *communication*.

●*Cell signaling* requires a *minimum* of _____ key components:

1) _____: a small signaling molecule that binds & forms a complex with a *biomolecule/receptor*.

2) _____: biomolecule (protein) that changes _____ (or *conformation*) upon ligand binding.

□ Conformational change leads to a series of events, ultimately ending with a *cellular* _____.




**PRACTICE:** The cells of multicellular organisms use a variety of molecules as signals which are

a) Amino acids and proteins.
b) Nucleotides and lipids.
c) Dissolved gases like nitric oxide.
d) Only a and b.
e) a, b, and c.

**PRACTICE:** Which of the following is likely to be a response by a receptor protein to an approaching signal molecule?

a) The receptor protein binds to the signal if it has a complementary shape.
b) If the signal is able to bind to the receptor it induces a change in the receptor protein's shape.
c) The change in the receptor protein's shape results in cellular action.
d) All of the above are correct.

**CONCEPT:** INTRODUCTION TO CELL SIGNALING

**3 Steps of Cell Signaling**

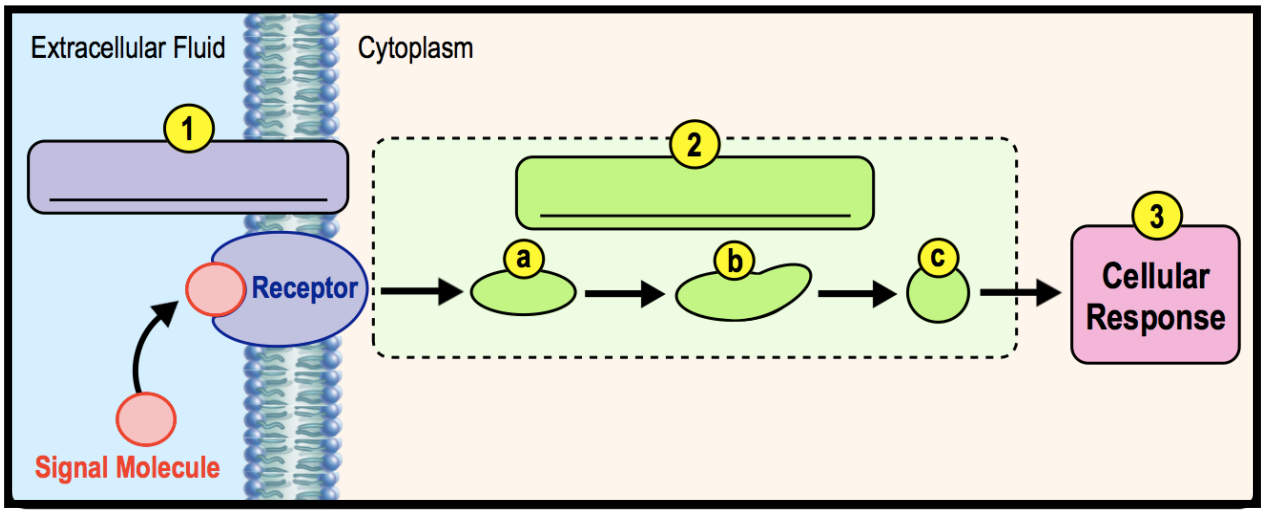
●Cells *receive* external signals in a series of _____ steps:

1) _____**:** ligand binds to a *specific* receptor causing it to *change* its _____.

2) **Transduction:** pathway of interactions in the cell that _____ the *signal* to a *change* in the cell.

3) **Cellular** _____**:** end result causing a physical or chemical *change* in response to the ligand.

**EXAMPLE:** Steps of Cell Signaling.




**PRACTICE:** Signal transduction pathways:

a) Are necessary for signals to cross the membrane.

b) Include the intracellular events caused by a signal binding to a receptor.

c) Include the extracellular events caused by a signal binding to a receptor.

d) Carry a signaling molecule to the nucleus of a cell.

**PRACTICE:** What does it mean to say that a signal is transduced?

a) The signal enters the cell directly and binds to a receptor inside.

b) The physical form of the signal changes as it passes from the cell membrane to the intracellular target.

c) The signal is amplified, such that even one signal molecule evokes a large response.

d) The signal triggers a sequence of phosphorylation events inside the cell.