VERTICAL FARMING

1 Choose the correct words for the following text.

Vertical farming is a revolutionary and more (1) ..... method of agriculture, particularly if you need to produce food in environments (2) ..... arable land is unavailable or rare.
In short, it is the practice of producing food in vertically stacked layers, commonly integrated into other structures like a skyscraper, shipping container or repurposed warehouse. (3) ..... main goals are:

- to produce more foods per square meter
- to perfectly combine natural and artificial lights
- to spare soil by replacing it with (4) ..... growing mediums (aeroponic, aquaponic or hydroponic mediums)
- to guarantee a (5) ..... footprint: as less land is used, existing horizontal farmland can be returned to its natural ecosystem
- to spare energy resources and water (70-95 % (6) ..... than required for normal cultivation).

Additional advantages of this farming innovation are:

- it provides a greater certainty of harvest output throughout the year, not being affected by unfavourable weather conditions
- it allows an increased production of organic crops, thanks to a well-controlled indoor environment
- it is human and environmentally friendly: farmers are not exposed to hazards related to heavy farming equipment, poisonous chemicals, etc., and biodiversity can be safeguarded, as no disturbance is caused (7) ..... wildlife.

However, this farming method entails some limitations:

- greens grown in vertical farms are (8) ..... expensive than their traditionally grown counterparts, which means that they are likely out of reach for the average consumer
- construction of vertical gardens is financially and technologically challenging and requires high maintenance compared to horizontal green spaces
- not all plants can be grown using this format: vertical gardens are better suited for plants that grow upwards rather than outwards. Depending (9) ..... the setup, there is often very little space for the roots to grow. Vertical planting structures also are typically unable to support larger plants, unless they are kept in a heavy-duty planter
- as vertical farming takes place in a controlled environment without the presence of insects, the pollination process needs to be done manually, which is labour intensive and costly
- if, on the one (10) ..... it needs fewer workers, on the other, it needs more skilled and costly labour
- the entire vertical farming is extremely dependent on various technologies for lighting, maintaining temperature, and humidity: unfortunately, the technologies in use today may not be ready for mass adoption.

1.	**a.** sustained	**b.** sustainable	**c.** sustaining
2.	**a.** where	**b.** which	**c.** whom
3.	**a.** Its	**b.** It's	**c.** It
4.	**a.** alternated	**b.** alternative	**c.** traditional
5.	**a.** consistent	**b.** smaller	**c.** deeper
6.	**a.** more	**b.** fewer	**c.** less
7.	**a.** for	**b.** by	**c.** to
8.	**a.** roughly	**b.** less	**c.** more
9.	**a.** on	**b.** from	**c.** of
10.	**a.** side	**b.** hand	**c.** corner

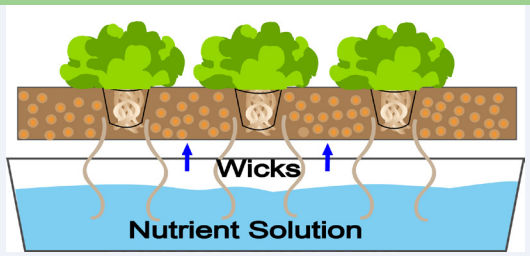
2 Write the jumbled words in the correct order.

1. improve/the/used/efficiency/technology/Modern/is/to/lighting
2. farming/and/innovative/impact/minimal/energy/resources/method/This/guarantees/land/water/on
3. are/common/very/Non-soil/farming/in/mediums/vertical
4. environment/possible/crop/indoor/a/controlled/is/production/Year-round/in
5. farming/to/shortage/answer/could/the/world/food/the/Vertical/be/of/in/the
6. nutrients/submerged/The/in/plants/solution/of/roots/the/are/a/of
7. amounts/emissions/helps/high/water/save/It/of/energy/and
8. production/natural/of/To/methods/preserve/consider/need/habitats/we/to/new/food

A little more about hydroponics

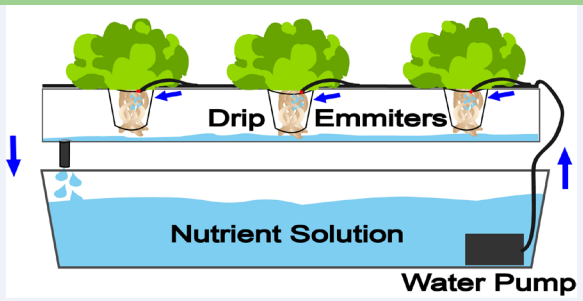
These are some of the different types of hydroponics that are most successfully and commonly used.

Wick System



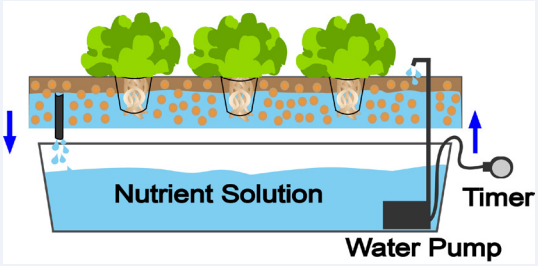
- The **Wick** system is the simplest of all the hydroponics and doesn't require any pumps or electricity. This is a great starter system to get involved in if you are new to hydroponics. Whereas it doesn't work so well for bigger plants that suck up a lot of water, it is mostly suitable for non-fruiting plants like lettuce and herbs. In this system, plants in their pots sit just above the reservoir containing the nutrient solution. Through the capillary action, a minimum of two wicks transport the nutrient solution to the plants. A drawback with the wick system is the unevenly absorption of nutrients, which could cause a toxic build-up in the growing medium; in addition, water in the reservoir could become stagnant and mould could pollute the system if not cleaned regularly.

Drip System



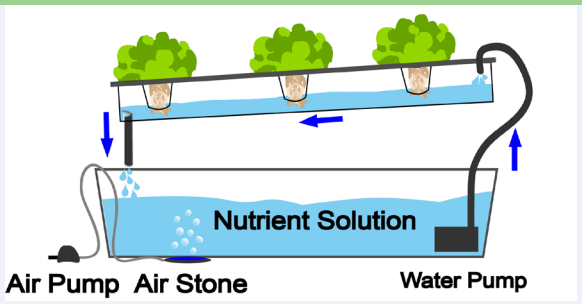
- **Drip** hydroponics can be set up for almost any type of plants you would like to grow. This system is rather simple: water is pumped in tubing to one or more plants; the nutrient-rich water then flows over the grow medium and drips down over the plant roots. Drip systems can be set up in either a recovery or a non-drip recovery method, depending on the reuse of the nutrient solution after it is dripped over the roots.

Ebb And Flow



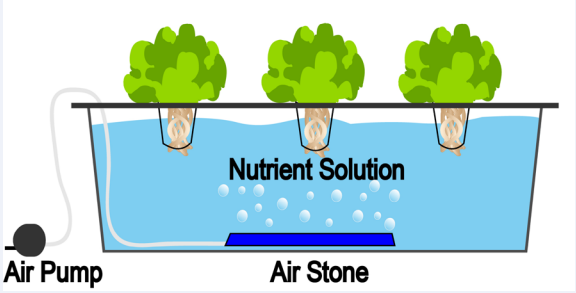
- An **Ebb & Flow** hydroponic system, also known An **Ebb & Flow** hydroponic system, also as a flood and drain system, functions by flooding the growing area with the nutrient solution at specific intervals. The nutrient solution then slowly drains back into the reservoir. The pump is hooked to a timer, so the process repeats itself at specific intervals in order to provide the desired amount of nutrients. As the water solution drains from the grow tray, it allows to oxygenate the root system, thus promoting fast and healthy growth.

Nutrient Film Technique



- Due to its simple yet effective design, the **Nutrient Film Technique** system (or **NFT** system) is quite popular with hydroponic growers. This versatile system is often used to grow smaller and quick growing plants like different types of lettuces, herbs, baby greens and strawberries. Two are its main components: the grow tray (or channel) and the reservoir that contains water and nutrients. In the grow tray, net pots with growing media (perlite, coconut, Rockwool) hold the plants and reserve nutrients from the nutrient solution. The plant roots grow into a dense mat in the channel and the foliage sits on top, sometimes provided with support by a trellis system. The NFT system uses a pump to deliver water to the grow tray and a drained pipe to recycle the unused water nutrient solution. The grow tray is placed at an angle to let the water flow down towards the nutrient return pipe. The excess nutrient solution will flow out of this pipe and move into another channel or tube, where it is recirculated through the system again. The roots of the plants hang down to the bottom of the channel where they come into contact with the shallow film of the nutrient solution and absorb the nutrients from them. The thin film of the nutrient solution allows the plants to be watered but not entirely soaked. This thinness also allows the upper part of the roots to remain dry and have access to oxygen in the air.

Deep Water Culture (DWC)



- A **Deep Water Culture** system (**DWC**) is one of the simplest and the most efficient types of hydroponics available. All you need to set up the system is: a container/reservoir to hold the nutrient solution, an aquarium air pump, an air line/hose, a soaker hose to create small bubbles, baskets, pots or cups to hold the plants, and finally some type of growing media. With DWC, plants are suspended in baskets right above the nutrient solution in the reservoir. The roots hang down from the baskets directly into the nutrient solution, where they remain submerged, getting the air and oxygen they need from air bubbles rising through the nutrient solution and from dissolved oxygen in the water itself.