Reading 2

Skills:

- Details
- Author's purpose
- Make inferences
- Make connections
- Vocabulary in context
- Understand negative facts

Getting started: Do you know what kind of technology can be used in agriculture?

THE 6 MOST AMAZING AI ADVANCES IN AGRICULTURE

When we think about agriculture, we tend to think about old-school farming. But although many of us might think that **the agricultural community is behind the curve when it comes to implementing new technologies**, there is lots of evidence that farmers are actually moving quickly to modernize almost everything about the farming process. Surprisingly, they're using artificial intelligence in new and amazing ways to bring the process of food cultivation into the future.

Sowing the Seeds

High-tech agriculture starts at the very second that the seed is first placed in the ground. Experts in the field are familiar with "variable rate planting equipment" that does more than just planting a seed down into the dirt somewhere.

Who's Picking Your Food?

This is a reality now. **Driverless tractors** are harvesting fruits and vegetables **routinely**. Just check out resources from Harvest Croo, which has produced an autonomous strawberry picking machine, and Abundant Robotics, where a vacuum machine harvests mature apples from trees. These technologies operate on the basis of machine vision and sensor fusion to "see" where harvest fruits and berries are. They use sophisticated directed movements to pick precisely. This is the kind of functionality that is very much in the "artificial intelligence" field and mimics human cognition and directed action.

Eye in the Sky

How are farms using artificial intelligence to direct crop planting, harvesting and more, and how are they getting that data in the first place? Nowadays, you can see **unmanned** aerial vehicles or drones with precision sensors in order to run the fields and get the data that's needed. These surveillance engines can look for crops where seeds don't grow, signs of pest or weed damage, dryness and many other variables that are part of the difficulty of farming in general. With all of this data in hand, farmers can **enhance** their production models and their strategies across the land to decrease risk and waste.

Pest and Weed Control

Farmers are quickly adopting new high-tech ways of protecting plants against weeds and various kinds of pests outdoors. We know that artificial intelligence excels at image processing — computers can now "see" almost as well as we can or even better, and the drones, outfitted with competitive image processing, are the farmer's eyes. So, by deploying mobile technologies with AI and computer vision built-in, farmers can find weeds and eradicate them, instead of spraying an entire crop. That makes the food cleaner, and it saves enormous amounts of money.

Boosting Algorithms

The mathematical models behind computer science are the fundamental basis for how we deal with big data to make decisions. Companies are now quickly developing agricultural algorithms that can

show farmers what's going to be best for a crop. Despite some concerns about the difficulty of doing this type of analysis in nature, farmers and others have been able to make quite a lot of advances in maximizing crop profit, simply by applying the algorithms and intelligence generators that are built to help computers imitate our own cognitive abilities.

The Farmer's Alexa

Yes, companies are talking about creating **chatbots** for farmers, artificial intelligence personalities like Amazon's "Alexa", which are able to converse with farmers to help them figure out tough problems. If they're packed with the right answers and analytics information, the farmer's chatbot could be a real tool for busy farm managers who are doing all they can to expand and grow their businesses.

These are some of the best new technologies coming out to help farmers produce all the food that we need in a rapidly changing world. Population growth and climate change will be massive challenges, but artificial intelligence use can help decrease the impact of these and other challenges and make smart farming much more resistant to the problems that farmers face.

**Adapted from https://www.techopedia.com/the-6-most-amazing-ai-advances-in-agriculture/2/33177*

Glossary:

- **Chatbot**: A chatbot is an artificial intelligence (AI) software that can simulate a conversation (or a chat) with a user in natural language through messaging applications, websites, mobile apps or through the telephone.

Answer the following questions:

1. What does the author mean when he/she uses the phrase **the agricultural community is behind the curve when it comes to implementing new technologies** in paragraph 1?
    a. Farmers don't know anything about the existence of farming technologies.
    b. Farmers use traditional farming methods instead of using new techniques.
    c. Farmers refuse to adapt technological devices into their farming procedures.
    d. Farmers could implement new machines if they had the money to do so.

2. What can be inferred about the use of planting equipment in paragraph 2?
    a. These tools must be guided only by experts.
    b. This type of equipment must be very expensive.
    c. This device may analyze when and where is right to sow a seed.
    d. These machines can plant seeds accurately, but only if they're familiar with the field.

3. What are **driverless tractors** in paragraph 3?
    a. Tractors that don't require a driver.
    b. Tractors with a powerful engine.
    c. Tractors which are driven by farmers.
    d. Tractors that only used in strawberry fields.

4. The word **routinely** in paragraph 3 is closest in meaning to
    a. monotonously
    b. on a daily basis
    c. once in a while
    d. rarely

5. The word **unmanned** in paragraph 4 refers to
    a. not having parts built by men
    b. not containing sensors
    c. not using cameras to get data
    d. not having humans inside the machine

6. The word **enhance** in paragraph 4 is closest in meaning to
    a. enable
    b. destroy
    c. improve
    d. decrease

7. What does the author mean when he/she says that, "drones are the farmer's eyes"?
    a. There are farmers whose sight is not accurate.
    b. Mobile technology could never replace human senses.
    c. Machines have the ability to detect certain things humans cannot.
    d. There are very dark places where it is impossible to collect data.

8. According to paragraph 6, what is NOT stated about using algorithms in farming?
    a. Based on data that is provided, farmers can make better choices.
    b. Farmers can make tons of money by implementing their use.
    c. They help exploit a crop more accurately.
    d. They simulate the way humans think.

9. What is stated about chatbots in paragraph 7?
    a. This is a tool that can help farmers find the answer to several issues.
    b. Chatbots are packed with unlimited information about diverse topics.
    c. Amazon is the true pioneer in this revolutionary sort of technology.
    d. This can be a tool for solitary farmers who don't have anyone to talk to.

What do you think?

In which cases should agriculture continue using traditional methods?

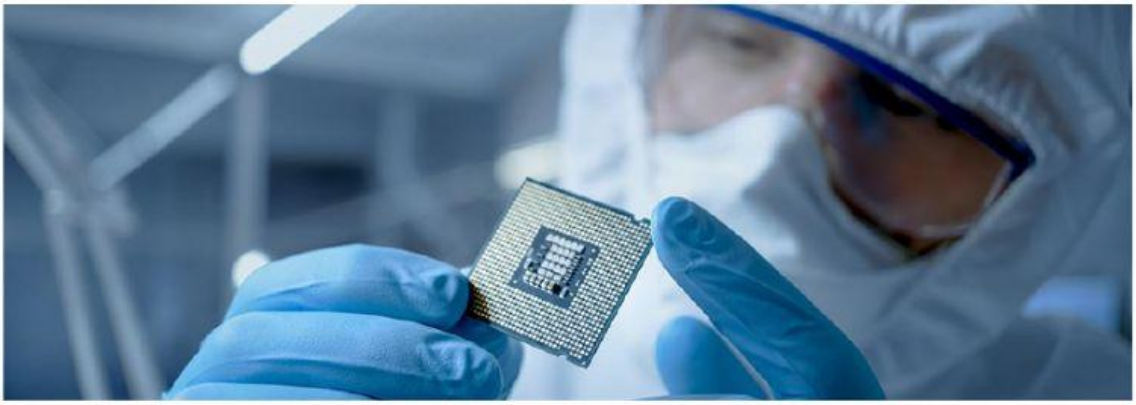
Reading 3

Skills:

- Details
- Make associations
- Understand synonyms

Getting started: Do you know what nanotechnology is? Are you familiar with current applications of nanotechnology?

NANOTECHNOLOGY AND THE FUTURE OF MANUFACTORING



Nanotechnology involves the manipulation of matter on the atomic and molecular scale, structures between one and 100 nanometers in size, being a nanometer the equivalent to of a one thousand-millionth of a meter. To put that into perspective, comparing a nanometer to a meter is like comparing the size of a marble to the size of the earth.

Nanomanufacturing focuses on the development of scalable processes for the commercial production of materials, structures, devices and systems at the nanoscale. Recently, it has been a growing area of research and development (R&D) for manufacturing applications. Engineers can synthesize nanomaterial in two ways, the first is by using the top down method, the process of carving nanomaterial out of something bigger. This is the most common method, often used to make computer

chips and other everyday items. The alternative is the bottom up method, the process of assembling a structure at the molecular level, one atom at a time. This method is still in the experimental stage of development and is time-consuming and complex.

Extensive R&D has led to significant advances in nanotechnology, some which could revolutionize manufacturing processes. Exploration into what can be achieved using the bottom down method has encouraged research into creating molecular components that can self-assemble into a specific structure without the need for external interaction. Three applications in particular reveal tangible evidence of what the future of manufacturing will look like.

Improving Safety

The integration of nanomaterial into layers has led to a great progression in safety wear and has become increasingly popular for biotextiles. When nanosized carbon particles are dispersed within the original fibers of the clothes, they create a covering of nanofibers. Using carbon nanofibers as a textile composite makes the clothes liquid repellent, stain resistant and even antimicrobial. In manufacturing, this safety wear can be used to protect workers in hazardous areas.

Fuel Efficiency

Polymer nanotechnology involves dispersing nanoparticles into an existing polymer's matrix to develop adhesives, sealants, coatings, and encapsulation compounds. Incorporating nanoparticle fillers to these applications has the potential to develop characteristics of thermal stability, water and chemical resistance, higher tensile strength and even flame resistance. Polymer nanocomposites have become an important addition to the automotive industry for tire manufacturing. The chemical and flame-resistant particles offer better performance at a lighter weight to traditional tires, subsequently offering higher fuel efficiency.

Reducing Friction

Introducing nanotechnology to the production of lubricants has unlocked the possibilities for more diverse solutions in manufacturing. In instances where oils are typically used to reduce the friction between two objects, nanoparticles can be used instead. These nanoparticles act like tiny ball connections, rolling between the two surfaces and reducing the opportunity for heat, wear and oil

failure. A diminishing supply of fossil fuels means this development could be revolutionary not just for the future of manufacturing, but for the environment too.

Nanometers may be the size of a marble when compared with the earth, but that doesn't diminish the significance of nanotechnology. With further research dedicated to the progression of nanomaterials, there's a bright future for more industries to incorporate nanotechnology into their day-to-day procedures.

**Adapted from https://www.automation.com/en-us/articles/2019/nanotechnology-and-the-future-of-manufacturing*

Answer the following questions:

1. What kind of processes these descriptions have to do with? Write Top down method or bottom up method.
    a. A machine compacts a series of atoms to produce a chip. _____
    b. Out of a piece of steel, a small particle is obtained. _____

2. What do the following statements refer to? Write **1** for safety, **2** for fuel efficiency or **3** for reducing friction.
    a. Spilling coffee onto your shirt would not be a problem anymore.
    b. Certain kind of fuels would not be necessary anymore.
    c. Your car would not spend so much gasoline.
    d. Nanotechnology can help reduce pollution.
    e. A more efficient type of glue could be created thanks to nanotechnology.
    f. A virus like the SARS-CoV-2 could not attach to your clothes.

3. Look at the words below. Find their synonyms in the text.
    a. Include
    b. Lately
    c. Improvements
    d. Inside
    e. Significant
    f. Chances

What do you think?

What's the benefit of using nanotechnology in our modern world?