This week's issue:
CLONING: THREAT OR OPPORTUNITY?

What makes you who you are? Both your genes and your experiences have an impact on your identity. Your genes contain information about your own unique **design**. They help determine many of your **features**, such as your eye color, your height, and which hand you use to write.

Scientists have invented a process called cloning that allows them to copy the genes of organisms, or living things. Scientists **transfer** some of an adult organism's genes to a new egg. A clone, or copy, of the original organism starts to develop after the genes have been transferred. Researchers are using one type of cloning to study new treatments for diseases like cancer. They believe that cloning has the **potential** to help people with serious illnesses. Many farmers clone plants to produce crops featuring qualities that people like, such as juiciness in tomatoes. Some farmers are interested in cloning animals, too. For instance, they want to clone cattle that produce particularly tasty and tender beef.

In the future, scientists may be able to clone a person. This process could create identical twins born at different times. But is that a good idea? Many people worry about how cloning would **impact** our lives. And what would happen if people could design other people? What if, for example, leaders could choose the features they wanted their soldiers to have and then make an army of clones? What if parents could clone their children? Should people be allowed to clone their pets? How might we take advantage of the benefits cloning offers while preventing potential problems?

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design | feature | impact | potential | transfer

USE THE FOCUS WORDS *and alternate parts of speech

design *(noun)* a plan; a blueprint; a drawing

➡️ *Sample Sentence:* Your genes contain information about your own unique **design**.

🗩 *Turn and Talk:* If you could create the **design** for a new park in your neighborhood, what would you include?

*design *(verb)* to plan; to outline or sketch

➡️ *Sample Sentence:* For the Future Inventors competition, Jabari **designed** an unbreakable smartphone screen.

🗩 *Turn and Talk:* Do you think it's possible to **design** a perfect school? Why or why not?

feature *(noun)* quality, trait, characteristic

➡️ *Sample Sentence:* Genes help determine many of your **features**, such as your eye color and height.

🗩 *Turn and Talk:* What is one **feature** of a smartphone that you think is necessary or important?

*feature *(verb)* to include or display

➡️ *Sample Sentence:* Jackson's final project **featured** a live performance of Chief Joseph's "Surrender" speech.

🗩 *Turn and Talk:* Should reality television shows **feature** children? Why or why not?

impact *(verb)* to affect or influence

➡️ *Sample Sentence:* Many people worry about how cloning will **impact** our lives.

🗩 *Turn and Talk:* What is something you can do every morning to positively **impact** your day?

*impact *(noun)* effect; influence

➡️ *Sample Sentence:* Hand washing has had an enormous **impact** on the prevention of disease.

🗩 *Turn and Talk:* Who has had a greater **impact** on your personality: your family or your friends?

potential *(noun)* possibility, future capability

➡️ *Sample Sentence:* They believe that cloning has the **potential** to help people with serious illnesses.

🗩 *Turn and Talk:* Do you think that computers have the **potential** to eliminate books?

*potential *(adjective)* possible in the future

➡️ *Sample Sentence:* Companies try to attract **potential** customers with catchy slogans and bright colors.

🗩 *Turn and Talk:* What do you think are some **potential** problems with cloning?

transfer *(verb)* to move from one place to another

➡️ *Sample Sentence:* Scientists **transfer** some of an adult organism's genes to a new egg.

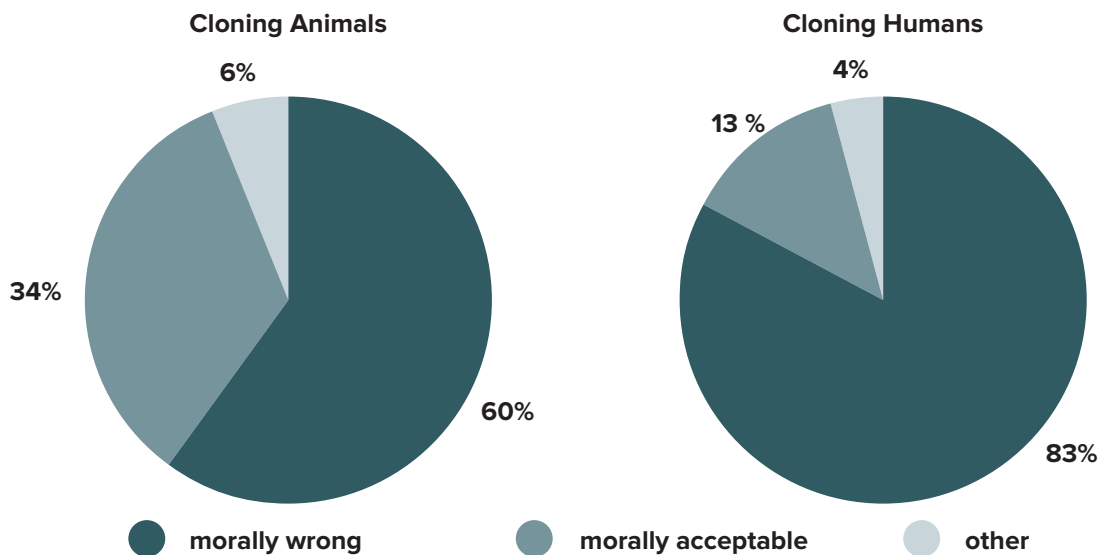🗩 *Turn and Talk:* Why is it important to **transfer** photos from your phone to a computer or hard drive?

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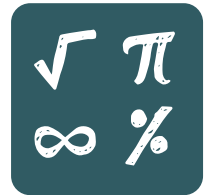
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DO THE MATH

Cloning an organism means **transferring** its genes to a new egg, and allowing a copy to develop with the same **design** as the original. Scientists are already cloning cows for the beef industry. They choose cows with especially tender meat or other desirable **features**. There are many other **potential** applications of cloning. Should we clone endangered species? Many people need new organs to survive. Are clones of human organs the answer? Despite the **potential** for good, many people worry about the **impact** of this new technology on our society.

Here are the results of a 2014 Gallup poll that told how Americans felt about cloning.

Cloning Animals

6%

34%

60%

Cloning Humans

4%

13 %

83%

⬤ morally wrong   ⬤ morally acceptable   ⚪ other

Option 1: Based on the graphs, which of the following statements is true?

    A.   Most Americans think that cloning humans is morally okay.
    B.   Most Americans think that cloning humans is morally equivalent to (or the same as) cloning animals.
    C.   Most Americans think that neither animals nor humans should be cloned.
    D.   Most Americans think that cloning animals is morally okay.

Option 2: True or False: Based on the graphs, 23% of Americans believe that cloning animals is okay, but cloning people is not.

Discussion Question: Many people believe that each human being is uniquely **designed** by God. Our society is built on the idea that each human has certain responsibilities and rights. Is this idea in danger? Are you a unique and special individual, or are you simply a collection of **features**, like hair color, height, and IQ? What **impact** would human cloning have on the idea of human rights? Would human rights **transfer** to human clones? Why do so many Americans think cloning is wrong? What are some **potential** problems with cloning humans?

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THINK SCIENTIFICALLY

The students in Mr. Seemy's class are arguing about the **potential impact** of cloning on society. Suddenly Chris says, "Wait a minute. I'm not sure I even understand what cloning is. I imagine some sort of bizarre copy machine, or a giant test tube or fish tank with copies of people and animals growing in it, but I have a feeling that's just science fiction."

Miranda says, "It has something to do with DNA, the molecule that controls what physical **features** get **transferred** from parents to their children. Usually a baby gets a mix of its parents' DNA, but cloning somehow involves copying just one individual's DNA to make another individual. But I don't know how that's actually done."

"The first mammal that scientists cloned was a sheep, back in 1996," says Mr. Seemy. "They named the cloned sheep Dolly, and she was probably the world's most famous sheep! Why don't you two do a little research on how Dolly was cloned?"

Chris and Miranda did some research and put together the following short description of the cloning process used to produce Dolly. This is still the general approach used for cloning animals.

On the left is Miranda and Chris's simplified five-step summary of how to clone an animal. But the images on the right, **designed** to illustrate the process, are all mixed up. See if you can match each step to its correct illustration. The first one is done for you.

Step 1: Take an egg cell from a female sheep and remove the nucleus from the egg. (The nucleus is where a cell's DNA is.)

Step 2: Take a non-reproductive cell (not an egg or sperm cell) from the sheep you want to clone. **Transfer** the nucleus from that cell to the nucleus-free egg.

Step 3: Give the egg cell a small electric shock to make it start dividing. As it divides, it grows into an embryo, which is an unborn organism in the earliest stages of development.

Step 4: Put the embryo into another sheep who will be the surrogate (substitute) mother.

Step 5: The surrogate mother sheep gives birth to a sheep that is a genetic copy—a clone—of the sheep that provided the DNA from its non-reproductive cell.
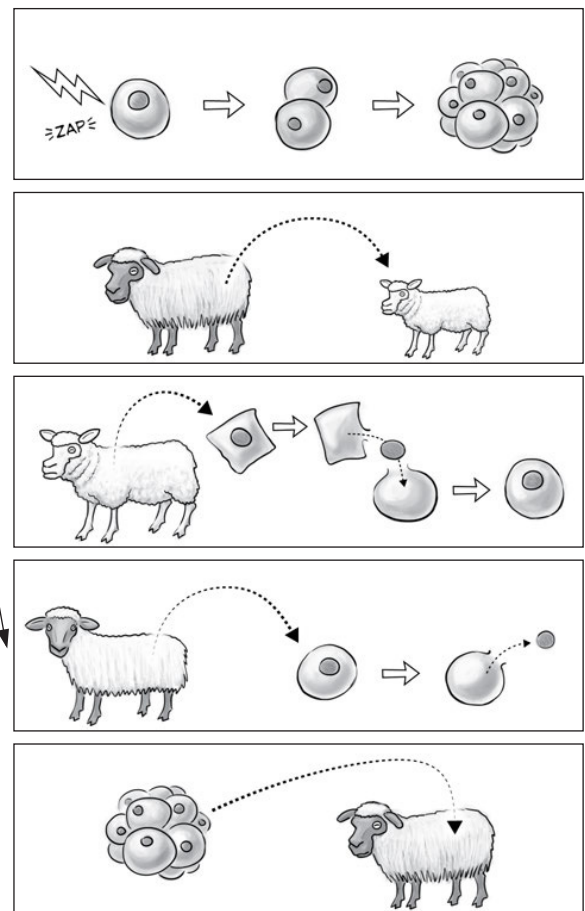
*How would you **design** a cloning experiment to produce a male sheep? A female sheep?*

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DEBATE THE ISSUE

Pick one of these positions (or create your own).

A ☐ Cloning of any kind should be forbidden.

OR

B ☐ Cloning of plants should be allowed, but cloning of animals and humans should be forbidden.

OR

C ☐ Cloning should be allowed for research about treating diseases (therapeutic cloning), but human cloning (reproductive cloning) should not be allowed.

OR

CREATE YOUR OWN ☐ _____
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Jot down a few notes on how to support your position during a discussion or debate.

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Be a strong participant by using phrases like these:

Can you show me evidence in the text that...

I believe that...

You make a good point, but have you considered...

I agree with you, but...

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TAKE A STAND

Support your position with clear reasons and specific examples. Try to use relevant words from the Word Generation list in your response.

design | feature | impact | potential | transfer

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