Read the passage. Then answer each question.

HOW TO MAKE ANIMATIONS

It's Saturday morning. You wake up, grab a bowl of cereal, and relax in front of the TV watching cartoons. Have you ever wondered how those animated cartoons you enjoy are made?

The process begins with an idea. Artists make sketches and put them up on a storyboard, to get an outline of the story. Then writers create the script, and actors record the voices. The sound needs to be recorded before the real animations, so that the artists can draw the cartoons to match up with the actors' voices. A sound engineer or a computer program analyzes all the sounds the voices make, what mouth positions match each sound, and tells the artists how many different drawings to make. The artists need to draw many pictures to show how the characters' mouths move while they're talking, and how their bodies move.

There are usually about 12 to 24 drawings for every second of a cartoon! That means, for a 20 minute cartoon, artists have to make around 26,000 drawings - wow! When characters are moving or speaking quickly, the artist will need more drawings. If the characters are moving slowly, they won't need as many drawings. Sometimes artists draw the background just once, then use transparent sheets to draw the characters. This saves the artists some time.

Once they have all of the drawings to match the sound, they use computers to string all of the images together. When the computer scrolls through all of the images quickly, it looks like the characters are moving. The sound is recorded and played with the string of images. The production team looks very carefully at the cartoon to make sure all the sounds match up the right way, so the artists sometimes may need to add extra pictures or change some pictures to make sure it flows together smoothly.

Some animations are not drawn on paper, but are made using clay. When artists want to use clay for animations, they use a technique called stop

motion. These artists still make a storyboard and the soundtrack, but instead of drawing all of the individual pictures, they make clay characters. They place the clay characters in front of a camera, snap a picture, and then move the character a little bit. They snap another picture, maneuver the character again, and so on, and so forth. When the pictures are uploaded onto a computer, the computer can string them together and scroll through them quickly, which makes it look like the clay characters are moving on their own. The artists move the characters only a little bit, so when the pictures are played together quickly, the movements look smooth. They might only move a character's arm a fraction of an inch in each picture, so that it takes many pictures just for a character to raise its hand.

These are just two of the techniques used to create animated shows and movies. They are extremely time consuming and take a lot of dedication and inspiration. If you'd like, you can find apps that let you make your own computer animations or stop motion animations!

Answer each question:

1. What are two of the ways to make animations? Which way sounds more difficult to you? Why?

2. Name two similarities between cartoon animation and stop motion animation.

3. What does "maneuver" mean in the 5th paragraph? How do you know?

4. Look at the 3rd paragraph. Why would artists use transparent sheets to draw the characters?

5. Do you know of another technique used to create animations? How could you find out more information about animation?