

Pumping Up the Heart

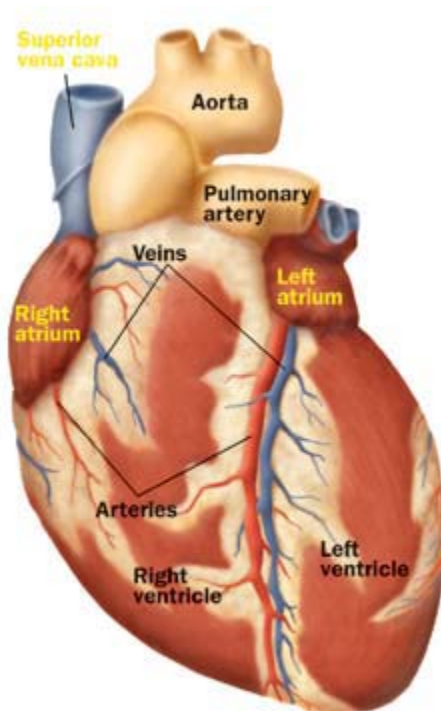
Make a fist with one of your hands. Your fist is about the size of your heart.

Your heart beats between 85 and 90 times per minute. It pumps about 5 quarts of blood through your body's 60,000 miles of blood vessels in one minute!

Even though the heart is a powerful muscle, many people's hearts don't work properly. A new study by Dr. Eric Rose indicates that a mechanical pump might help many of those patients.

Pump May Save Lives

Some people's heart muscles are so weak that the heart can't pump enough blood through the body. That condition is called heart failure, and it can be deadly.



Leigh Haeger

The drawing shows some parts of the heart. Look up what each part does.

About 5 million Americans suffer from heart failure. Another 400,000 people develop it each year.

Powerful drugs or a heart transplant can help many people who suffer from heart failure. But the drugs don't always work, and heart transplants are risky.

For years, doctors have inserted a mechanical pump in the bodies of some patients who were waiting for a heart transplant. The pump helped the heart do its job.

The new study shows that the pump could be used permanently, instead of a heart transplant. Pumps may eventually be able to save the lives of up to 100,000 Americans a year, the study says.

The VAD

The mechanical pump is known as a VAD, or ventricular assist device. VADs come in several sizes and shapes. The smallest one is about the size of a portable CD player. The pump is implanted in a person's heart and belly. A tube goes from the pump through the skin to a battery pack worn on the person's shoulder and belt.

Doctors are working with scientists from around the world to make even smaller VADs. Heart surgeon Robert Kormos said that about 30 new designs for heart pumps are being developed.

"This technology is going to make huge leaps in the next two to three years," Kormos predicted.

Name: _____ Date: _____

1. According to the passage, how many American people suffer from heart failure?

- A 100,000
- B 20 million
- C 5 million
- D 400,000

2. The passage states that a solution to the problem of heart failure is the VAD. How many lives could the pumps save?

- A 5 million a year
- B 100,000 a year
- C 60,000 a year
- D 85 a year

3. Based on the passage, it is likely that

- A heart transplants are very safe
- B more doctors will use mechanical pumps instead of heart transplants
- C powerful drugs are the best treatment for heart failure patients
- D heart failure is not a problem in the U.S.

4. Read the following sentences and answer the question below: "For years, doctors have inserted a mechanical pump in the bodies of some patients who were waiting for a heart transplant. The new study shows that the pump could be used permanently, instead of a heart transplant."

What does the word **permanently** mean?

- A a short time
- B forever
- C once in a while
- D never

5. Which of the following best describes the central idea of this passage?

- A the use of a mechanical pump as a solution to heart failure
- B how to live a healthier life to prevent heart failure
- C the different designs of health pumps to choose from
- D how doctors put heart pumps into a body

6. What are two solutions doctors have used to help heart failure patients other than the mechanical pump?

7. Read the following sentences: "For years, doctors have inserted a mechanical pump in the bodies of some patients who were waiting for a heart transplant. The new study shows that the pump could be used permanently, instead of a heart transplant."

Based on the passage, why will pumps most likely be able to save the lives of up to 100,000 Americans a year?

8. The question below is an incomplete sentence. Choose the word that best completes the sentence.

A healthy human heart is a powerful muscle, _____ people with heart failure have hearts with weak muscles that can't pump enough blood through the body.

- A but
- B because
- C so
- D after

9. Answer the following questions based on the sentence below.

Doctors inserted a mechanical pump in bodies of patients because the patients were waiting for a heart transplant.

Who? doctors

(did) What? _____

Where? _____

Why? _____

10. Read the vocabulary word and definition below and complete questions 10a, 10b, and 11.

Vocabulary Word: risky (risk · y): a situation, activity, or action that is dangerous; something that is more likely to fail than to succeed.

10a. Read the sentences below and underline the word **risky**.

1. Doctors think that heart transplants are risky because sometimes patients do not survive the operation.
2. Cliff jumping is a risky activity because many people can hurt themselves on the rocks.
3. Walking by yourself at night can be risky, so always make sure that you walk with someone else.
4. Driving in a car without a seatbelt is risky, because you never know when an accident might happen.
5. The acrobat liked to do risky things, like walk on a wire between two buildings, in order to shock people.

10b. Which image shows a more risky animal to play with?



11. Would it likely be more risky to take a walk on the sidewalk or to go mountain climbing? Why?

Teacher Guide & Answers

Passage Reading Level: Lexile 880

Featured Text Structure: Problem/Solution – the writer poses a problem and suggests possible solutions

Passage Summary: This passage discusses the problem of heart failure, which means that the heart muscles are so weak the heart can't pump enough blood through the body. The solution to this problem is a mechanical pump, the ventricular assist device (VAD).

1. According to the passage, how many American people suffer from heart failure?
 - A 100,000
 - B 20 million
 - C **5 million**
 - D 400,000
2. The passage states that a solution to the problem of heart failure is the VAD. How many lives could the pumps save?
 - A 5 million a year
 - B **100,000 a year**
 - C 60,000 a year
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3. Based on the passage, it is likely that
 - A heart transplants are very safe
 - B **more doctors will use mechanical pumps instead of heart transplants**
 - C powerful drugs are the best treatment for heart failure patients
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4. Read the following sentences and answer the question below: "For years, doctors have inserted a mechanical pump in the bodies of some patients who were waiting for a heart transplant. The new study shows that the pump could be used permanently, instead of a heart transplant."

What does the word **permanently** mean?

- A a short time
 - B **forever**
 - C once in a while
 - D never
5. Which of the following best describes the central idea of this passage?
 - A **the use of a mechanical pump as a solution to heart failure**
 - B how to live a healthier life to prevent heart failure
 - C the different designs of health pumps to choose from
 - D how doctors put heart pumps into a body

6. What are two solutions doctors have used to help heart failure patients other than the mechanical pump?

Suggested answer: Two other solutions doctors have used to help heart failure patients include heart transplants and powerful drugs. [see paragraph 6]

7. Read the following sentences: "For years, doctors have inserted a mechanical pump in the bodies of some patients who were waiting for a heart transplant. The new study shows that the pump could be used permanently, instead of a heart transplant."

Based on the passage, why will pumps most likely be able to save the lives of up to 100,000 Americans a year?

Suggested answer: This study most likely means that doctors might be able to save up to 100,000 lives because the pump can now be used permanently, which means that they won't have to wait for a heart transplant. Also, the passage states that heart transplants are risky, which means that some patients may not survive. [see paragraphs 6-8]

8. The question below is an incomplete sentence. Choose the word that best completes the sentence.

A healthy human heart is a powerful muscle, _____ people with heart failure have hearts with weak muscles that can't pump enough blood through the body.

- A but
- B because
- C so
- D after

9. Answer the following questions based on the sentence below.

Doctors inserted a mechanical pump into bodies of patients because the patients were waiting for a heart transplant.

Who? doctors

(did) what? **inserted a mechanical pump**

Where? **into bodies of patients**

Why? **because the patients were waiting for a heart transplant**

10. ReadWorks recommends that you teach this vocabulary word to the whole class out loud using the four steps listed below.

Vocabulary Word: risky

Step 1: Introduce the word

- a. Teacher writes the word on the board and divides it into syllables: (risk · y)
- b. Teacher says: "This word is risky. What is the word?" [All students reply together out loud: "risky."]

Step 2: Provide a child-friendly definition

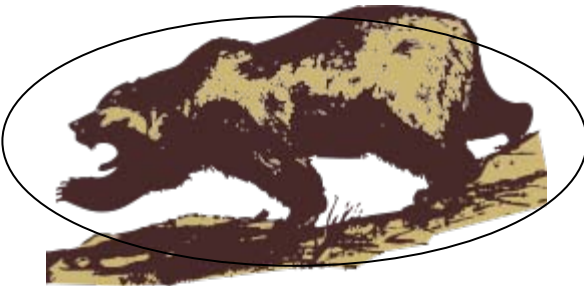
- a. Teacher says: "Risky describes a situation, activity, or action that is dangerous. It can also describe something that is more likely to fail than to succeed."
- b. Teacher says: "In the passage, the writer describes heart transplants as risky. This means that heart transplant procedures can be dangerous for patients, and that it is very likely that the transplant may fail."
- c. Teacher says: "What is the word?" [All students reply together out loud: "risky."]

Step 3: Practice the word

Teacher provides examples and additional opportunities to repeat the word. Read the 1st sentence out loud to your students. Begin reading it again and when you come to the vocabulary word prompt students to say the vocabulary word out loud. Then, finish reading the sentence out loud to your students.

- 10a.**
1. Doctors think that heart transplants are risky because sometimes patients do not survive the operation.
 2. Cliff jumping is a risky activity because many people can hurt themselves on the rocks.
 3. Walking by yourself at night can be risky, so always make sure that you walk with someone else.
 4. Driving in a car without a seatbelt is risky, because you never know when an accident might happen.
 5. The acrobat liked to do risky things, like walk on a wire between two buildings, in order to shock people.

- 10b.** Which image shows a more risky animal to play with?



- 11.** Would it likely be more risky to take a walk on the sidewalk or to go mountain climbing? Why?

Suggested answer: It would be more risky to go mountain climbing, because you are climbing high up and have to use equipment to make sure you are safe. If you fall you will likely hurt yourself more than if you fall on the sidewalk.

Suggested Additional Vocabulary: mechanical, failure, condition, risky, permanently, portable, implanted