Heart Health

Name: _____ Class: _____ Date: _____

Read and Learn

How the Heart Pumps Blood

The heart's muscular walls contract and relax in a coordinated cycle.

- The **atria contract**, pushing blood into the ventricles through the open atrioventricular valves.
- The **ventricles contract**, increasing pressure. The atrioventricular valves close, preventing backflow into the atria. The semilunar valves open when ventricular pressure exceeds the pressure in the arteries.
- The ventricles relax, and the semilunar valves close, preventing backflow from the arteries. The chambers fill again.

Valves open and close because of **pressure differences**. The main "lub-dub" heart sounds are associated with valves closing.

Monitoring Heart Activity

Method	What it shows
ECG — electrocardiogram	Records the heart's electrical activity, providing information about heart rate and rhythm.
Pulse rate	Measures pressure waves in arteries produced by heartbeats, usually counted in beats per minute (bpm).
Listening with a stethoscope	Allows heart sounds associated with valve closure to be heard.

An ECG records electrical activity rather than directly measuring the amount of blood pumped.

During exercise, muscles respire more rapidly. Heart rate usually increases, helping deliver more oxygen and glucose and remove carbon dioxide more quickly.

Coronary Heart Disease

The **coronary arteries** supply the heart muscle with oxygenated blood. In coronary heart disease (CHD), fatty deposits called **plaques** narrow these arteries. A blood clot can block an artery, potentially causing a heart attack.

Risk factors include smoking, an unhealthy diet, lack of exercise, long-term stress, genetic predisposition, increasing age, and sex. Men tend to develop CHD earlier, while risk in women increases after menopause. A risk factor increases the chance of disease; it does not guarantee it.

A balanced diet containing vegetables, fruit, whole grains, and suitable sources of unsaturated fats can support heart health. Limiting excess salt and replacing some saturated fat with unsaturated fat can help manage blood pressure and cholesterol. Regular physical activity also helps reduce CHD risk. These measures reduce risk but do not eliminate it.

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Multiple Choice

1. What pushes blood from the atria into the ventricles?

A. Contraction of the atrial muscles
B. Contraction of the coronary arteries
C. Closure of the semilunar valves
D. Relaxation of all blood vessels

2. What is the main function of heart valves?

A. Produce oxygen
B. Prevent backflow of blood
C. Record electrical activity
D. Make new blood cells

3. What does an ECG record?

A. Blood glucose concentration
B. The thickness of artery walls
C. The heart's electrical activity
D. The volume of air in the lungs

4. Which blood vessels supply the heart muscle itself?

A. Pulmonary veins
B. Venae cavae
C. Pulmonary arteries
D. Coronary arteries

Complete the Sentences

Word bank: atria • carbon dioxide • pressure • ventricles

1. The _____ receive blood returning to the heart.
2. The _____ pump blood into the arteries leaving the heart.
3. Differences in _____ cause heart valves to open and close.
4. Increased blood flow during exercise helps carry _____ away from working muscles.

Match the Monitoring Method

Write **ECG**, **pulse rate**, or **stethoscope**.

1. A trace shows the pattern of electrical activity during successive heartbeats. _____

2. A student counts pressure waves at the wrist. _____

3. A healthcare professional listens to the "lub-dub" sounds. _____

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Investigating Exercise and Heart Rate

A student investigates recovery after two minutes of exercise.

Time relative to exercise	Heart rate (bpm)
Before exercise, after resting	72
Immediately after exercise	132
1 minute after exercise	108
2 minutes after exercise	88
3 minutes after exercise	76

1. Calculate the increase in heart rate immediately after exercise compared with the resting value.

Working: _____

Answer: _____ bpm

2. Describe the pattern during recovery.

3. Explain why heart rate increased during exercise. Refer to respiration and substance transport.

4. Had heart rate returned exactly to its original resting value after three minutes? Use data to support your answer.

5. The student wants to compare different exercise durations. Identify:

Independent variable: _____

Dependent variable: _____

Two variables to keep constant: _____

6. Suggest one way to improve the reliability of the investigation.

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Coronary Heart Disease: Risk Factors

Classify each factor as **modifiable** — something a person can change or manage — or **non-modifiable**.

Risk factor	Modifiable or non-modifiable?
Smoking	_____
Genetic predisposition	_____
Lack of exercise	_____
Increasing age	_____
Diet high in saturated fat and excess salt	_____
Sex	_____
Long-term stress	_____

True or False?

Write **T** or **F**. Correct each false statement.

1. The blood inside the heart's chambers supplies all the oxygen needed by the thick heart muscle directly. _____

2. Heart valves actively contract to pump blood forward. _____

3. A person with a family history of CHD can still reduce some aspects of their risk. _____

Apply Your Understanding

1. Explain how a blocked coronary artery can damage heart muscle.

2. Suggest two dietary changes that could reduce CHD risk. Explain how one of these changes helps.

3. Explain how regular physical activity can reduce CHD risk.

4. Challenge: A student says, "My resting pulse is normal, so my coronary arteries cannot be narrowed." Explain why this conclusion is not justified.

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Heart Health — Answer Key

Accept scientifically correct answers in students' own words.

Multiple Choice

1. **A** — Contraction of the atrial muscles.
2. **B** — Prevent backflow of blood.
3. **C** — The heart's electrical activity.
4. **D** — Coronary arteries.

Complete the Sentences

1. **atria**
2. **ventricles**
3. **pressure**
4. **carbon dioxide**

Match the Monitoring Method

1. **ECG**
2. **Pulse rate**
3. **Stethoscope**

Investigating Exercise and Heart Rate

1. Increase in heart rate

Increase = 132 − 72 = **60 bpm**

2. Pattern during recovery

Heart rate decreases from **132 bpm immediately after exercise** to **76 bpm after three minutes**, approaching the resting value of 72 bpm.

3. Why heart rate increased

Working muscles respire more rapidly and need more oxygen and glucose. An increased heart rate helps increase blood flow, delivering these substances and removing carbon dioxide more quickly.

4. Return to resting value

No. After three minutes, heart rate was **76 bpm**, which was **4 bpm above** the original resting value of 72 bpm.

5. Variables

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- **Independent variable:** Exercise duration.
- **Dependent variable:** Heart rate immediately after exercise, or the change from resting heart rate.
- **Control variables:** Accept any two suitable examples: exercise type, exercise intensity, participant, rest period before each trial, timing of the measurement, or pulse-counting method.

6. Improving reliability

Repeat each exercise duration several times, allowing full recovery between trials, and calculate a mean result.

Coronary Heart Disease: Risk Factors

Risk factor	Classification
Smoking	**Modifiable**
Genetic predisposition	**Non-modifiable**
Lack of exercise	**Modifiable**
Increasing age	**Non-modifiable**
Diet high in saturated fat and excess salt	**Modifiable**
Sex	**Non-modifiable**
Long-term stress	**Modifiable/manageable**

True or False?

1. False. The coronary arteries deliver oxygenated blood to the heart muscle. Blood inside the chambers cannot supply enough oxygen directly through the thick muscle walls.

2. False. Heart muscle contractions pump blood. Valves open and close passively because of pressure differences, preventing backflow.

3. True.

Apply Your Understanding

1. How can a blocked coronary artery damage heart muscle?

A blockage reduces or stops blood flow to part of the heart muscle. The affected cells receive insufficient oxygen for aerobic respiration and cannot release enough usable energy. A prolonged blockage can cause cells to die, resulting in a heart attack.

2. Dietary changes

Accept two suitable changes, such as:

- Replace some foods high in saturated fat with sources of unsaturated fat.
- Reduce excess salt.
- Eat more vegetables, fruit, whole grains, and other fibre-rich foods.

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Explanation: Replacing saturated fat with unsaturated fat can help lower LDL cholesterol. Reducing excess salt can help control blood pressure.

3. How does regular physical activity reduce CHD risk?

Regular activity can help control blood pressure, improve cholesterol levels, support a healthy body mass, and improve blood glucose regulation. These effects reduce factors associated with coronary artery disease.

4. Why does a normal resting pulse not prove coronary arteries are clear?

Pulse rate measures how frequently the heart beats; it does not show whether coronary arteries are narrowed. Someone may have narrowed coronary arteries while having a normal resting pulse, so pulse rate alone cannot rule out CHD.

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