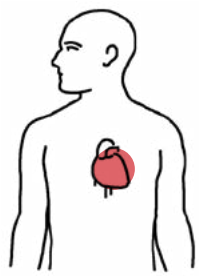
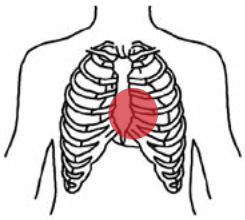
Azim Premji University

TEACHER'S GUIDE: THINKING ABOUT THE HUMAN HEART

This guide is designed to support classroom discussion on the human heart. It presents a set of facts along with 1–3 related prompts that can help students observe, reason, and connect ideas to their own bodies. You may choose to use a few selected facts rather than all of them in a single class. Encourage students to think about each of the prompts in pairs and respond in their own words. It may be useful to tell them that the focus of this exercise is less on finding correct answers and more on thinking about and explaining their ideas. Their responses can be used to guide a wider classroom discussion. Where possible, invite them to use their bodies or immediate surroundings. This could include, for example, identifying the location of their heart, feeling their pulse, and measuring volume.

Since the functioning of the human heart may not be covered in detail in the textbook, teachers may first need to briefly introduce the idea of how the heart works, or connect it to related concepts such as respiration. Teachers may use simple charts, diagrams, or short videos to support this introduction before or during the activity.

S. No.	Facts	Possible prompts 
1	**Location:** The heart is in the middle of the chest, slightly to the left, behind the breastbone. It is also slightly tilted to the left. 	• Where do you think your heart is located? Place your hand on your chest to indicate its position. • How did you decide the location of your heart—did you use what you have just learnt, something you have seen before, or your heartbeat? • Try to feel your heartbeat. Where does it feel strongest? Does this match what you expected?
2	**Protection:** Your ribs protect your heart. 	• Feel your ribs. Where is your heart in relation to them? • Gently press your chest. Now press your cheek, your belly, and your knee one by one. Do you notice any differences in how soft or hard each area feels? • Does the heart need such strong protection? Why?

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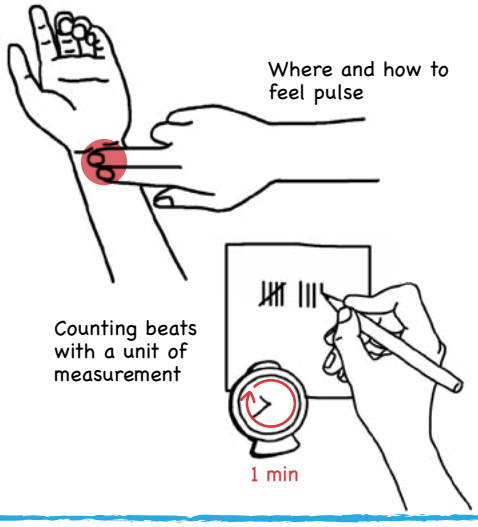
3	**Size:** An adult heart is about the size of two hands clasped together. A child's heart is about the size of a single fist.	• Make a fist and place it against your chest. Does this seem like a reasonable size for your heart? Why or why not? What other everyday things can you think of that are this size?
4	**Weight:** The actual weight of a person's heart depends on factors such as body size, sex, age, physical activity level, and overall health. On average, an adult heart weighs about 200–425 g. A middle-school student's heart weighs roughly 150–300 g and continues to grow as the body grows.	• Pick up or think of an object (for example, a book, pencil box, or water bottle) that weighs as much as your heart? • How does the weight of your heart compare with the weight of your body? Does this surprise you? Why?
5	**Energy:** The heart uses a huge amount of energy each day. This amount would help move a truck about 30–32 km.	• Think of a place about 30 km away. Does this seem like a short or long distance to you? • What does this comparison help you imagine about how much work the heart is doing? • From where do you think the heart gets the energy it needs to keep working? • What might the heart use this much energy for?
6	**Heart rate:** An adult heart beats about 60–100 times per minute. The average heart rate (beats per minute) is around 80 beats per minute. This can vary from person to person and with activity (for example, during physical work or running).  	• Find your pulse. Count how many times **your** heart beats in one minute. Is this number within the average range? • Does your heart rate change through the day? Can you think of some factors that may make it faster or slower (for example, movement, rest, emotions)? How would you test this? • How do you think your heart rate would compare with that of your classmates? Do you expect any differences and why? • Now, really compare your actual heart rate with that of your classmates. Did it match what you had predicted? Why?

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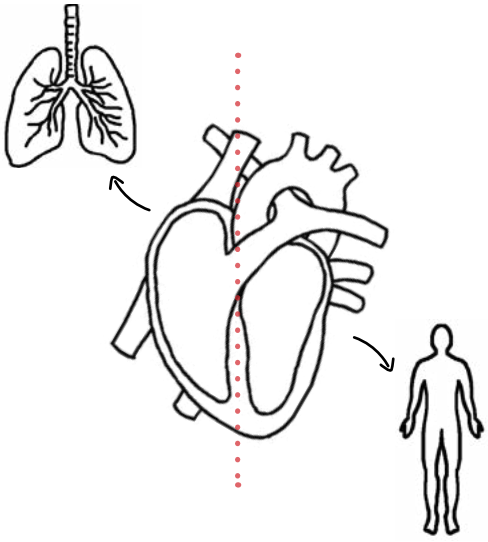
7	**Variations in heart rate:** Your heart beats more slowly when you sleep than when you are awake.	• Think about how your body feels when you are resting or asleep. What do you think changes about it at this time? • Why might the body need less work from the heart during sleep? • What do you think might happen if the heart did not slow down during sleep? • Contrast this with times when your heart beats faster. Can you record such instances?
8	**Work:** The heart pumps about 70 mL of blood with each beat.	• Each heartbeat pumps about 70 mL of blood. Use your heart rate to calculate how much blood **your** heart pumps in one minute. Now extend this to estimate how much blood it pumps in a day. • What might these numbers tell you about how much work your heart does each day? Does this change how you think about your heart? Why?
9	**Structure:** Your heart has four chambers. But they are not all the same size.	• Look at a model or diagram of the human heart. Which parts look bigger than the others? • Why might some chambers need to be larger than the others? Can you guess their function?
10	**Function:** The right side of the heart sends blood to the lungs. The left side sends blood to the rest of the body. 	• Why do you think the heart is divided into two sides? Why might it be useful to keep these pathways separate? • Which side of the heart do you think has to work harder? Why? • The wall of one side of the heart is thicker than that of the other. Can you predict which side would be thicker and why? • Do you think there might be a difference in the kind of blood that is pumped by different sides of the heart? Why?

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11	**Blood vessels:** Your body has a vast network of blood vessels. If all of them were joined end to end, their total length would be about 96,000 km. This length is twice the distance around the Earth at the equator.	• Use a measuring tape or scale to measure the distance from the centre of your chest to your fingertip or toe. How far apart are the two? • How does this length compare with the length of blood vessels? Why might blood need to travel such long distances in the body? • What might happen if this network were shorter or broken? How would it affect the body?

As students engage in pairs with these prompts, their responses may vary in accuracy and detail. It may be helpful to remind them that the focus is on how they use observation, measurement, and reasoning to make sense of their ideas. Their explanations, drawings, and comparisons can reveal how they are thinking about the heart—its structure, its work, and its connection to the rest of the body. Pair work can end with an invitation to students to share their responses to questions such as: *Which of these facts surprised you the most? Do you notice any connections between them? What would you like to understand better about your heart? What new questions do you have about how it works?* Class discussion can be used to refine and extend student understanding as well as to explore their questions.

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