

Name _____



Heart Beats

- Purpose:**
1. To observe and measure the pulse.
 2. To discover what causes differences in the rate of the heartbeat.



Background Information: Your heart is a muscle that pumps the blood through your body. To get an idea of its size, make a fist. That is about the same size as your heart. Open you hand about half way and then close it again. If you do that over and over, you can imagine that it is your heart beating. You can even make heart sounds (lub-dub) if you want to. Keep this pretend heart beating as you read this. Soon your hand will begin to get tired. If you keep opening and closing your hand even after you are tired, it will begin to hurt. Why?

When you move your muscles, a chemical reaction takes place. This chemical reaction is respiration. Normally, **this chemical reaction needs oxygen**. We get this oxygen when we breathe. The air moves into your lungs and the oxygen is absorbed by your blood. Your blood carries the oxygen to your muscles. As long as the muscle has plenty of oxygen, it can keep on moving.

If the muscle uses up oxygen faster than the blood can deliver it, then what happens? The muscle does not instantly shut down when the oxygen runs out. Instead, a **different chemical reaction** takes over. It is still respiration, just a **different type of respiration**. This type of respiration lets your muscles move even if they do not have enough oxygen. The problem with this backup system is that the reaction makes a chemical called lactic acid. If you overdo it, your muscles will be sore the next day. Keep overdoing it and you can damage the muscle.

If your heart is made of muscle, why doesn't it get tired? After all, your heart beats all day and all night, for your entire life. A large part of the answer has to do with blood. Your heart is between your lungs. Blood picks up oxygen from the lungs and flows directly to the heart. This makes sure that the heart always has plenty of oxygen, so it does not get tired. The one exception is if the blood vessels that lead to your heart get blocked. Then the heart muscles run low on oxygen and get tired. The pain that you feel is what tells you that you are having a heart attack.

Athletes exercise regularly to increase the blood flowing to their muscles. If the muscles

get more blood, they get more oxygen. Then they can work harder and longer before they get tired.

Your heart beats are sometimes called your **pulse**. Pulse rates vary with age; from birth through adolescence, the pulse rate drops as the heart becomes larger. Physical condition also changes heart rates. **A trained athlete and a person who engages in regular cardiovascular exercise will have a much lower heart rate than the average person.** A person who has achieved cardiovascular fitness has a very efficient blood-pumping system.

Because the heart is a muscle, it can actually grow larger and stronger when it is exercised regularly. *A fit heart is a more efficient heart* doing its job with less effort. Over a year, a fit person's heart beats 15,768,000 fewer times than an inactive person's heart. A lower pulse rate in adults means that their hearts can do the same amount of work with fewer beats. That gives the heart more time to rest between beats and means that a stronger heart can supply more oxygen to organs and muscles during strenuous exercise. Exercise physiologists suggest that the minimum amount of aerobic exercise a person's heart needs to become fit is 10 to 20 minutes three to four times a week.

Materials:

Clay	Clock with second hand	Toothpick	Stethoscope
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Procedure:

1. Find your heart. Feel your heartbeat with your hand. There are other places where you can feel your heart beat (wrist and sides of throat). Place two fingers against each of the wrist or side of your throat to find a **pulse**. The pulse shows how often a heart beats. (Do not use the thumb because it has a tiny pulse of its own.)
2. Predict how many times you think your heart beats in one minute. Record your prediction. _____
3. Make a pulse meter by sticking a toothpick into a ball of clay about the size of a dime. Place the pulse meter on your wrist, moving the meter around until you find the spot with the strongest beat.
4. Count the number of beats you observe during a **15-second period**. Record results.
5. Repeat the experiment four times. Multiply results by 4 (or add results 4 times) to get the number of beats per minute.
6. Average your results.
7. Compare actual rate with predicted rate.

