



Holt Hall

Lockdown Fieldwork

Fit Graph

KS3, KS4 Biology, Maths

Make a Distance-Time Graph and measure your heart rate

Are you going for a run every day? Are you getting fitter?

Biology: When you exercise, your heart rate increases. A faster heart rate means that blood is pumped faster around the body. During exercise, muscle cells are respiring faster. This means that they need more oxygen and glucose and release more carbon dioxide. The blood takes oxygen and glucose to cells faster and removes carbon dioxide faster.

Heart rate can be measured by taking your pulse at your wrist or neck. It is usually measured as number of beats per minute. When someone exercises regularly, the left ventricle of their heart enlarges and can push a greater volume of blood per beat, even at rest. With regular exercise, the resting heart beat drops because each beat can push a larger amount of blood so fewer beats are needed. This takes work off your heart and is good for heart health. It's important not to overdo it though. Stay within your limits and vary the types of exercise that you do.

Thinking Scientifically: How will you know if you are getting fitter?

This is a great activity to practice thinking scientifically. Which variables will you need to change, and which must stay the same?

A distance-time graph would help you to record your exercise and your heart rate and find out how fast you have been moving.

Method: Record the time that you leave the house. During your run, stop and measure your heart beat for a minute using a stop watch. Record any time that you stop and rest and the time that you start moving again and record the time that you get home. You'll need to know how far you've travelled. One way to find out is to measure your route on google maps, right click and choose 'measure distance'.

Results: Draw your times onto a distance-time graph to find out how fast you were moving and annotate it with your heart beat. The steeper the gradient of the graph, the faster you are moving because you're covering a greater distance in a shorter amount of time. In other words your 'rate of change' of distance with time has increased. If you stop, the graph will be flat because your rate of change of distance with time has stopped.

Conclusions: Is there a correlation between exercise and heart beat – did your heart rate increase as you went faster? Have you noticed any difference in your speed or the distance you can cover over a week?

Discussion: Have you found any changes in running speed or heart rate? Why do you think you found the results you have found? Was your experiment a fair test? Could you improve it?

In the example, the person's heart rate increased when they started walking and was fastest when they had just been running. It is healthy to get the blood moving around your body and to exercise your heart muscles so for most people it's a good idea to do some walking and running.

In the example the person took 32 minutes to travel 2000m. If they wanted to know if they were getting fitter, a good indication would be that they could cover the same distance in a shorter time. They may also be able to run faster or run for a longer period of time without stopping. If they continue to take regular exercise, they may find that their resting heart rate becomes slower and their heart rate does not increase as much with exercise because their heart can push more blood with each beat, so it does not have to work so hard.

Good luck with your exercise routine. Take care; it is important to stay within your abilities and stay safe.