

Heart rate and pulse

LEARNING OUTCOMES

- To develop understanding of the benefits of physical activity on the body, in particular the heart
- To understand the effects of rest and physical activity on heart rate



RESOURCES

- Copies of Resources 1, 2 and 3
- Clocks or watches with second hands or a digital readout showing seconds

RELATED TOPICS

Being active (Theme 2, Topic 1)

HEALTH SKILLS

Pulse rate can give important information about the fitness level of an individual.

Measuring your resting heart rate allows the intensity level at which you should exercise to be calculated (50% of the heart rate reserve for beginners or people at a low level of fitness). Taking heart rate measurements while exercising allows you to monitor your exercise intensity. Monitoring your resting heart rate over a period of time allows you to see how your fitness level is improving.

FUNCTIONAL SKILLS

Monitoring heart rate at rest and after physical activity shows the effect of physical activity. In order to work out their own pulse rate so that they can investigate the effect for themselves, learners need to:

- read and measure time accurately
- calculate with time using simple percentages.

Functional Skills/Core Curriculum

Activities in this topic will contribute to learning in the following curriculum areas:

- understand time in seconds
Maths L1.20 (N/MSS1/L1.3)
- measure and calculate using time
Maths L1.20 (N/MSS1/L1.3)
- understand that there are different ways of calculating percentages
Maths L1.8 (N/N2/L1.3)
- calculate simple percentages
Maths L1.14 (N/N2/L1.9).

- Discuss the effects of physical activity on the body, asking questions such as: 'What happens to your body when you exercise?' (Your heart races; you sweat/feel hot; you are breathless/breathing harder; you are thirsty/tired; you feel livened up; etc.)
- Draw out the fact that any physical activity will cause a change to your heart rate. For example, just getting up out of a chair will change a person's heart rate, because the heart has to work a little bit harder when a person moves.
- Discuss the need for caution before embarking on any planned fitness programme, and the importance of building up intensity and duration levels slowly or asking advice from a doctor or fitness instructor. 'What would you think if I said that I was entering you all for the London marathon this year?' (I am mad/foolish/irresponsible/joking.) 'You're right of course. Why?'
- Point out that your heart is such a vital organ that its health is paramount, but that everyone is at a different fitness level and this can be due to many things – age, level and amount of daily physical activity, job, other health conditions, weight, etc. Stress that it is also not important that everyone attains the same level of fitness. The level of fitness is directly related to individual needs – for some it may mean being able to run the marathon, for others it may mean being able to climb the stairs without getting out of breath. **Note: do stress that it can be dangerous/life threatening to launch into hard physical exercise without the right sort of preparation, and that if anyone is worried about their heart rate they should visit their GP.**
- Explain that the pulse relates to the beating of the heart as it pumps blood round the body. The blood carries the oxygen (the fuel) that the body needs to work.
- Using a clock or watch that shows seconds, demonstrate how it is possible to measure your pulse and calculate your heart rate in beats per minute. Check learners' understanding of time by questioning, e.g. 'How many seconds are there in a minute?'
- Discuss the method of calculating the resting heart rate by counting beats for 15 seconds and multiplying by 4 (because there are 4 lots of 15 seconds in a minute). Note: there is a calculation for this method on Resource 1.
- Ask learners to think of other ways to count and calculate beats per minute (counting number of heart beats for 60 seconds/one minute). Discuss advantages/accuracy of different methods. (The first is quicker, but relies on being able or remembering to multiply by four; the second needs no multiplication skills, but requires a person not to lose count for 60 seconds.)
- Invite learners to have a go at taking their own pulse. Learners may wish to work in pairs. Hand out Resource 1, and make sure that they all have access to a clock or watch showing seconds. Invite learners to report back.
- Discuss the findings and any difficulties learners have had.
- Explain again that heart rates vary between individuals because of various factors including age and fitness. Broadly speaking, the lower your resting heart rate, the more efficient your heart is and the healthier you are.

How do you feel when you have been doing something very physical?

Have you ever noticed your heart working harder? What were you doing?

Why is the heart important? What is its job?

TIP

To multiply by 4, remind learners to double and double again, e.g. 18×4 is double 18 which is 36, and double again which is 72.

ACTIVITY 1**Measure and compare heart rate before and after physical activity**

- Discuss why heart rate speeds up when you are physically active (the body needs more oxygen) and how measuring your pulse rate at rest and immediately after physical activity helps you to monitor how hard the heart is working and how quickly it recovers.
- Invite learners to measure their pulse rate before and just after light exercise, and check how long it takes to return to its original speed. Note: know the physical capability of your learners; you may suggest for example that they walk quickly round the room, or sit down and stand up a few times in succession, or jog lightly on the spot for about a minute. It is important to check before they start whether any learners have heart disease or an artificial pacemaker or are taking medication, as this may affect their capacity for physical activity.
- Learners may record their results on the 'Heart rate log' on Resource 2. (Light exercise is for most people doing some housework or going upstairs, going round the shops, or doing a bit of gardening like weeding.)

Support

- Learners may prefer to work in pairs – one exercising, the other taking their pulse.
- Assist learners with calculations using their preferred method.

ESOL

- In order to follow and talk through heart-beat calculations, check that learners understand words like 'count' and 'multiply', and know how to express 'beats/1 minute' = 'beats per minute'.
- Set up pairs to ask and answer questions about each learner's heart rate before and after exercise, for example:
 - Q: What was your heart rate before exercise?
 - A: beats per minute.

Why does your heart beat faster when you are physically active?

What do you consider to be light exercise? Is it the same for everyone?

ACTIVITY 2**Calculate personal maximum heart rate and understand the importance of not exceeding it**

- Hand out Resource 3 and discuss the notion of calculating a personal maximum heart rate for exercise purposes as shown on 'Working to the max'. Talk about the importance of not exceeding this limit except for brief periods. Note: read the notes at the bottom of the page to the group.
- Discuss how learners can work out 50% and 75% of their maximum, making connections to fractions (half, three-quarters) and decimals to aid understanding.
- Working in pairs, learners calculate their personal maximum heart rates.
- You can also give learners an alternative way of telling if they are exercising at the right level:
 - If you can hold a conversation with someone quite easily, without feeling out of breath, you are not working hard enough. Try harder!
 - If you can hold a conversation, but feel a bit breathless, this is about right. Keep it up!
 - If you find it very difficult to speak at all, you are working too hard. Ease up!
 Discuss the meaning of these guidelines, explaining unfamiliar words (e.g. 'ease up') as necessary.

How can you work out your personal maximum heart rate?

Why is it important to exercise at the right level?

Support

- Look at different strategies for finding 50% of small amounts, for example:
 - 50% is the same as $\frac{1}{2}$
 - to find $\frac{1}{2}$ divide by 2
 - so therefore 50% or half of 200 is 100, and 50% or half of 300 is 150.
- Look at different strategies for finding 25% and 75% of small amounts:
 - 25% is the same as $\frac{1}{4}$
 - to find $\frac{1}{4}$, halve and halve again, e.g. if half of 200 is 100 then half of 100 is 50, so a quarter of 200 is 50
 - 75% is the same as $\frac{3}{4}$; to find $\frac{3}{4}$, find $\frac{1}{2}$, find $\frac{1}{4}$, and add your answers
 - so if half of 200 is 100 and a quarter is 50 then three-quarters is 150.
- Use a calculator to investigate some of these strategies.
- Provide plenty of practice.

ESOL

- As preparation, check that learners recognise and know how to express percentages (e.g. 50% – fifty percent, 75% – seventy-five percent, etc.) and fractions ($\frac{1}{2}$ – half, $\frac{3}{4}$ – three-quarters, etc.).
- Read out some examples of percentages and fractions and ask learners to note them down. Then get them to practise saying them.
- Explain colloquial terms such as 'working to the max'.

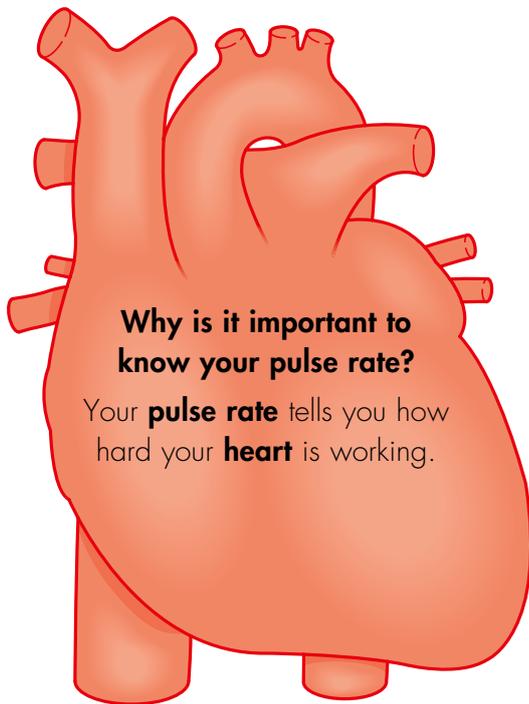
Action

- If learners wish to extend the activity of calculating heart rates, they could suggest different methods for calculating heart rate (e.g. counting beats for 60 seconds, counting beats for 30 seconds and multiplying by 2, counting beats for 20 seconds and multiplying by 3, etc.). They could also compare the accuracy of calculating heart rate using these different methods. If learners have access to a machine that will monitor their pulse, they could use this to check their accuracy.
- Ask learners to make a note of how often during the next week they find themselves out of breath or at least breathing harder, and what they were doing when it happened, so they can compare notes in the next session.

What physical activity do you do to make your heart work harder?

Heart rate and pulse

RESOURCE 1



How to take your pulse

Step 1: Place your first two fingers just below the base of your thumb as shown here.

Step 2: Press gently.

Step 3: Count the beats.



How to find your resting heart rate

Step 1: Take a moment while you are sitting quietly.

Step 2: Count how many beats you feel in 15 seconds.

Step 3: Multiply by 4 to find the beats per minute.

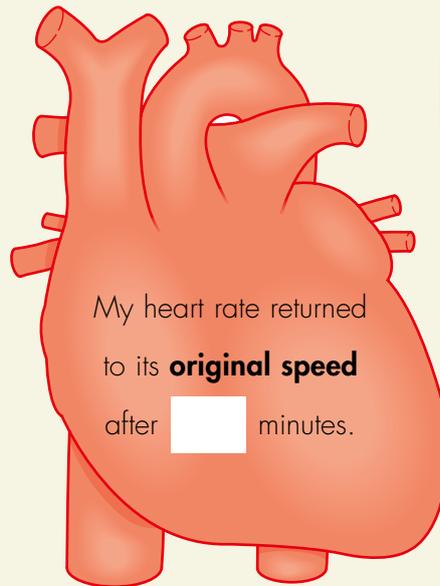
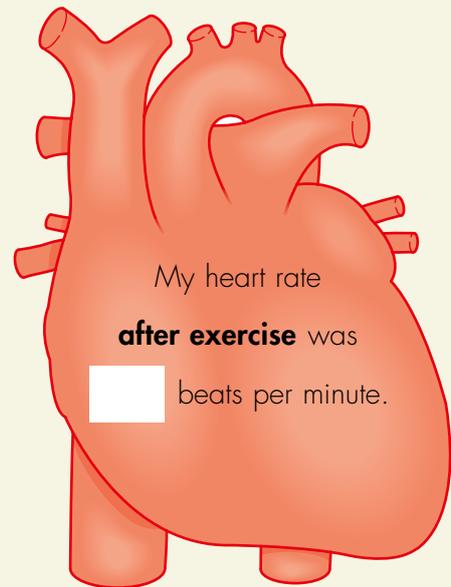
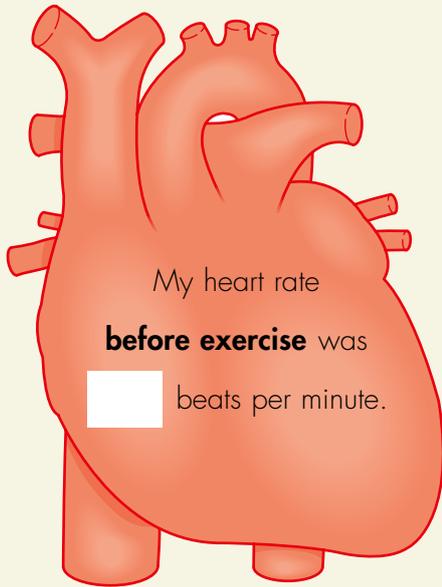
15 seconds = _____ beats

4 × _____ = _____

Answer = _____ beats per minute



Heart rate log



Date: _____

Description of exercise: _____ minutes of _____

How I felt during and after this exercise: _____

What does this tell me about how fit I am?

Working to the max

During physical activity, your heart should be working hard enough to help keep you healthy, but not so hard that it is overworked.

The **maximum** number of beats your heart should work at is about 220 minus your age. For example, if you are 52 years old, your maximum safe heart rate is $220 - 52 = 168$ beats per minute.

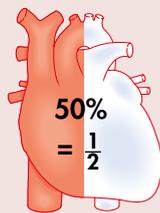
My **maximum safe heart rate** is:

220 – my age (_____) = _____ beats per minute.

Are you ready to get fit?

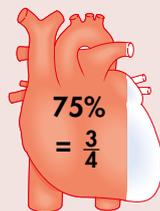
If you are new to exercise, aim to work your heart at **50%** of your **maximum** safe heart rate.

50% of my maximum safe heart rate is _____ beats per minute.



Try to build up to **75%** of your **maximum safe heart rate**.

75% of my maximum safe heart rate is _____ beats per minute.



Note: these numbers may not apply to you, especially if you:

- take medication that slows your heart rate (e.g. beta-blockers)
- have an artificial pacemaker
- have certain forms of heart disease.

In any of the above cases, or if the target heart rate does not feel right to you, ask your doctor about your target heart rate when you exercise.