Disclaimer/s

We hope you find the information on our website and resources useful.

Animations

This resource has been designed with animations to make it as fun and engaging as possible. To view the content in the correct formatting, please view the PowerPoint in 'slide show mode'. This takes you from desktop to presentation mode. If you view the slides out of 'slide show mode', you may find that some of the text and images overlap each other and/or are difficult to read.

To enter slide show mode, go to the **slide show menu tab** and select either **from beginning or from current slide**.

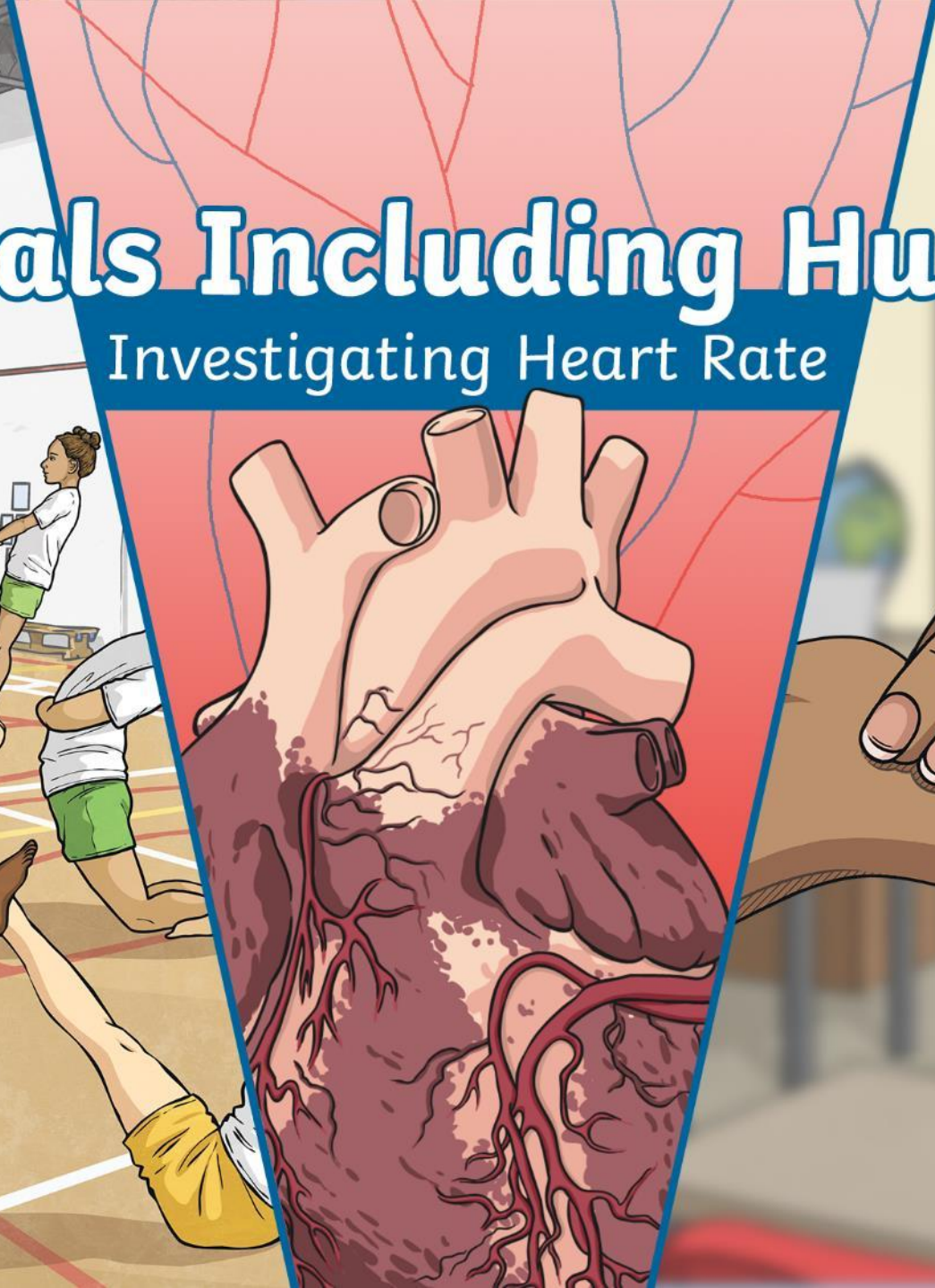
You may wish to delete this slide before beginning the presentation.

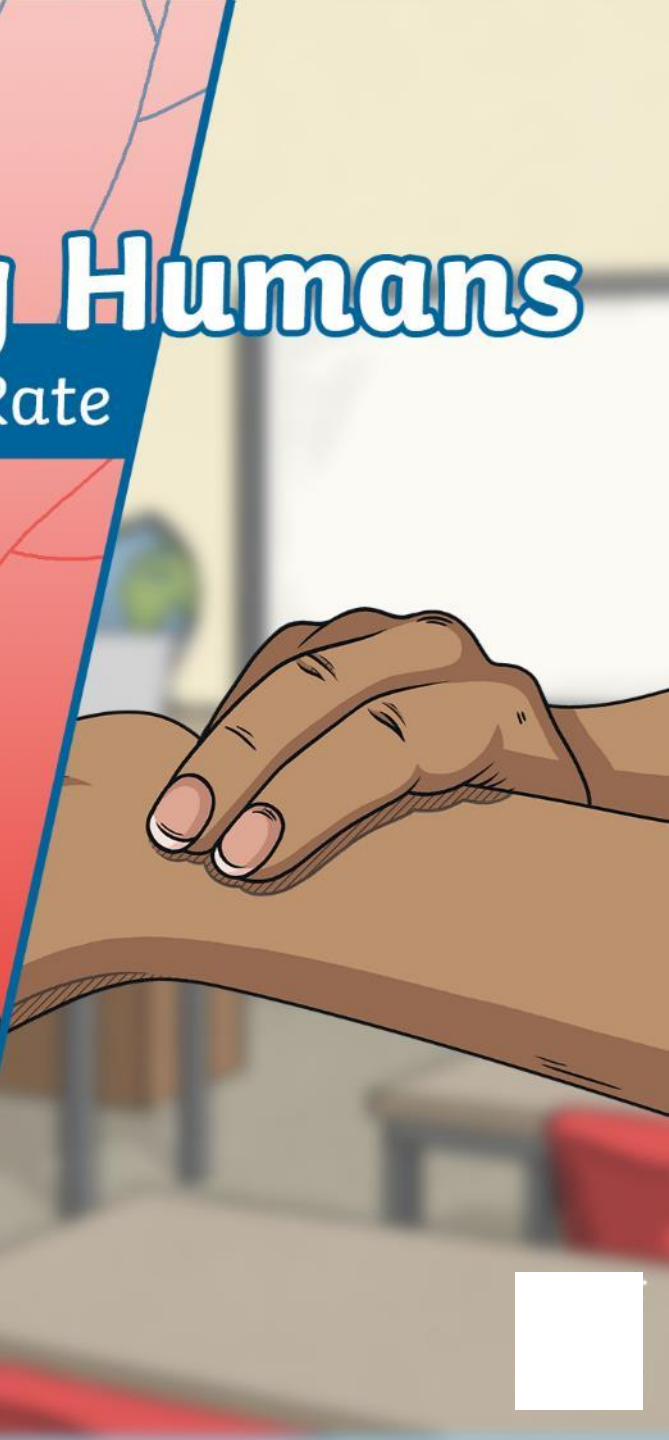
Science

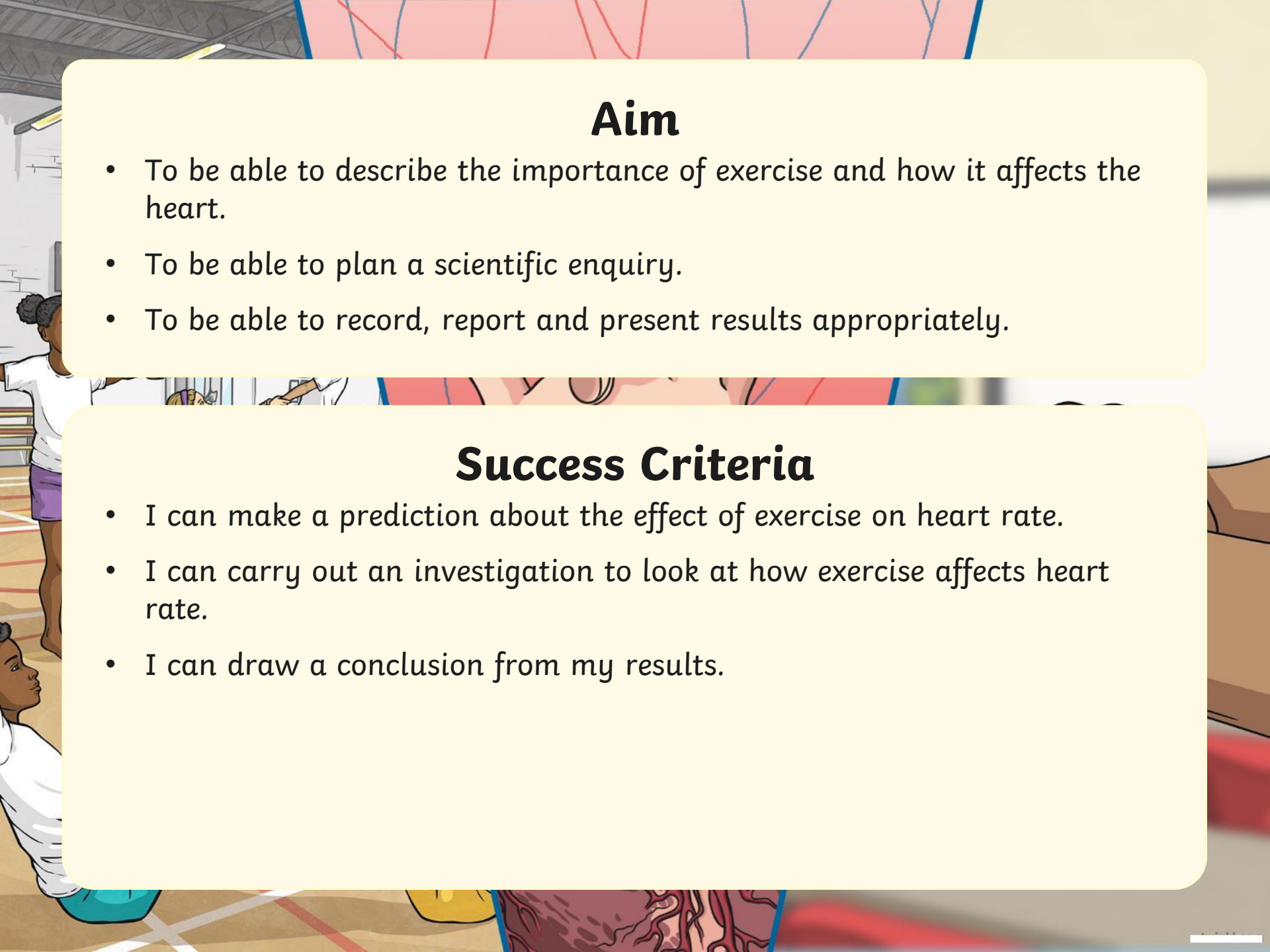
Animals Including Humans

Animals Including Humans

Investigating Heart Rate







Aim

- To be able to describe the importance of exercise and how it affects the heart.
- To be able to plan a scientific enquiry.
- To be able to record, report and present results appropriately.

Success Criteria

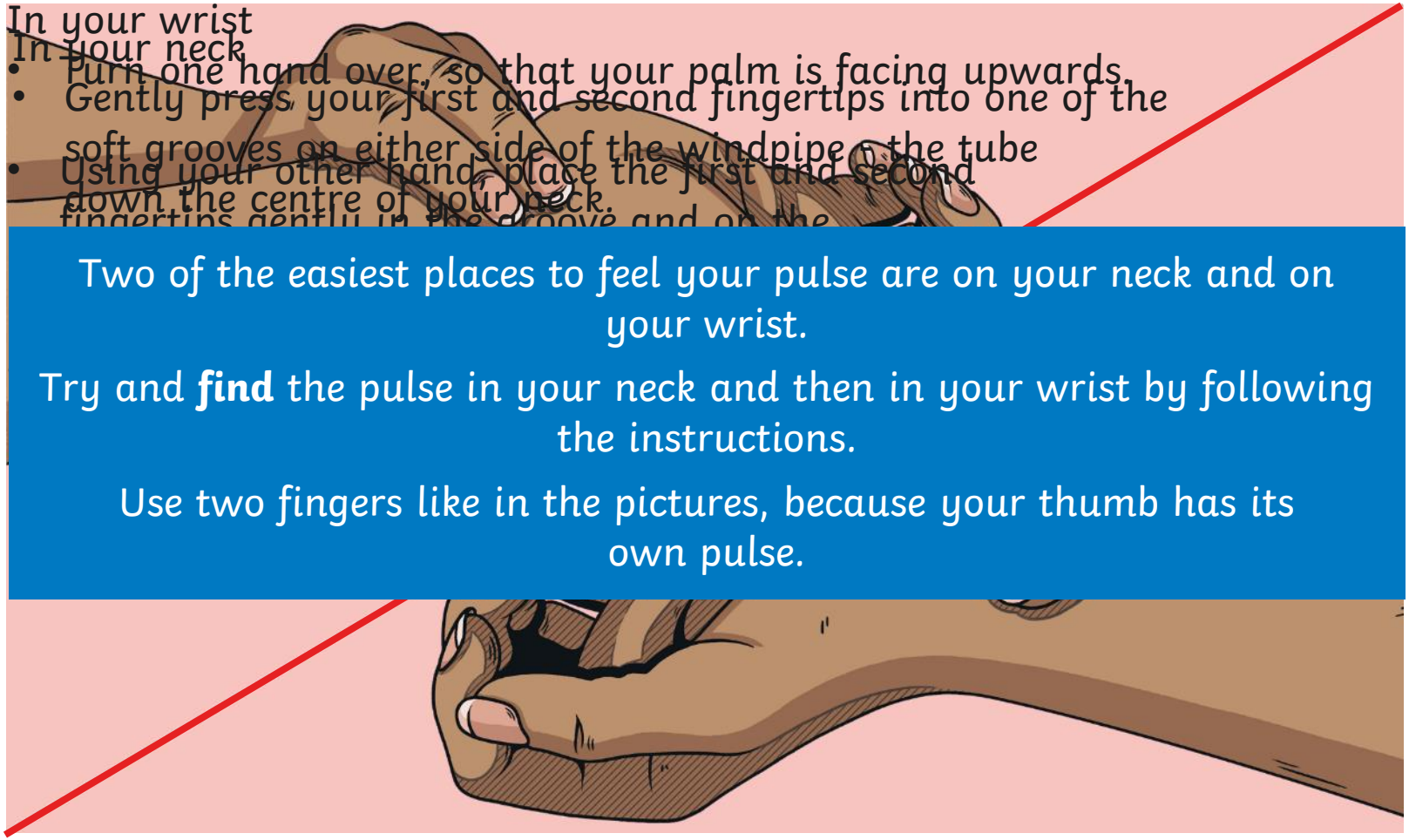
- I can make a prediction about the effect of exercise on heart rate.
- I can carry out an investigation to look at how exercise affects heart rate.
- I can draw a conclusion from my results.

Remember It

How many parts is our blood made up of?

Discuss the name and role of each blood cell with your partner.

Finding Your Pulse



In your wrist

In your neck

- Turn one hand over, so that your palm is facing upwards.
- Gently press your first and second fingertips into one of the soft grooves on either side of the windpipe - the tube
- Using your other hand, place the first and second down the centre of your neck.

fingertips gently in the groove and on the

Two of the easiest places to feel your pulse are on your neck and on your wrist.

Try and **find** the pulse in your neck and then in your wrist by following the instructions.

Use two fingers like in the pictures, because your thumb has its own pulse.

Heart Rate Investigation

The heart pumps blood around the body to get oxygen and other nutrients to every cell. Your heart rate is the rate at which your heart pumps blood around your body and it stays the same. Mine is always 72 beats per minute.

I agree that the heart pumps blood around the body to get nutrients and oxygen to every cell. I don't think that your heart rate always stays the same - I think it changes when you exercise or when you are sleeping.

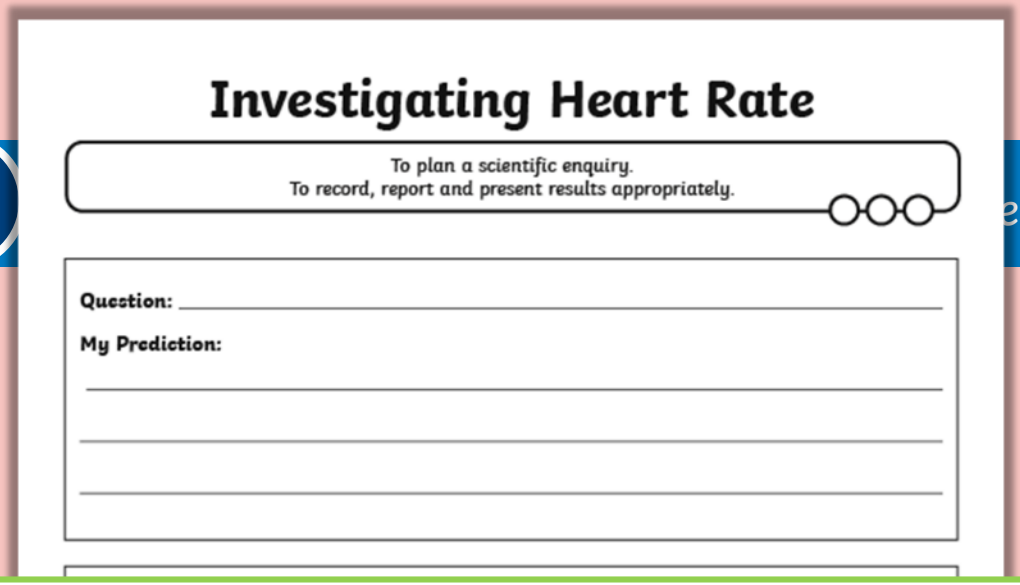
Who do you agree with?
Discuss with your partner and give reasons for your choice.

Heart Rate Investigation

Thinking about your discussion around the concept picture on the previous slide, fill in your **Prediction** on your **Investigating Heart Rate Activity Sheet**.

1 How can you find out if your ideas are correct?

2 e?



Investigating Heart Rate

To plan a scientific enquiry.
To record, report and present results appropriately.

Question: _____

My Prediction:

_____

_____

_____

X Can you make a prediction about the effect of exercise on heart rate?

Heart Rate Investigation

1. What do you need to measure?

2. What kind of exercise will you do?

3. What equipment will you use to measure your results?

to measure time

Heart Rate Investigation

Everyone find your pulse.

We are going to time 30 seconds.

Count how many beats you feel during the 30 seconds. Then multiply the answer by two to find your heart rate in beats per minute (bpm).

☐ × 2 = _____ bpm

In your wrist

- Turn one hand over, so that your palm is facing upwards.
- Using your other hand, place the first and second fingertips gently in the groove and on the arteries, down from the base of the thumb.
- When you have found the correct position, you should feel your heartbeat.

Record your resting heart rate in the table on your **Investigating Heart Rate Activity Sheet**.

Heart Rate Investigation

Equipment:

- PE kit or trainers
- A stopwatch

Method:

Sit on your chair and measure your resting heart rate (in bpm).

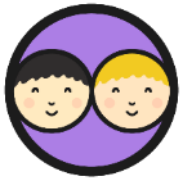
Record your rate above the results table on the **Investigating Heart Rate Activity Sheet**.

Stand up and make sure you have enough space. Do some energetic exercise for 2 minutes (for example, star jumps).

Restart your timer and keep it running. Then, straight away, measure your pulse for 30 seconds and work out your heart rate in beats per minute (remember to times your answer by two). Record it in the results table.

Using the timer, take your pulse rate every minute until you have measured your heart rate another 5 times.

Heart Rate Investigation



Fill in the Equipment and Method section on your **Investigating Heart Rate Activity Sheet**.

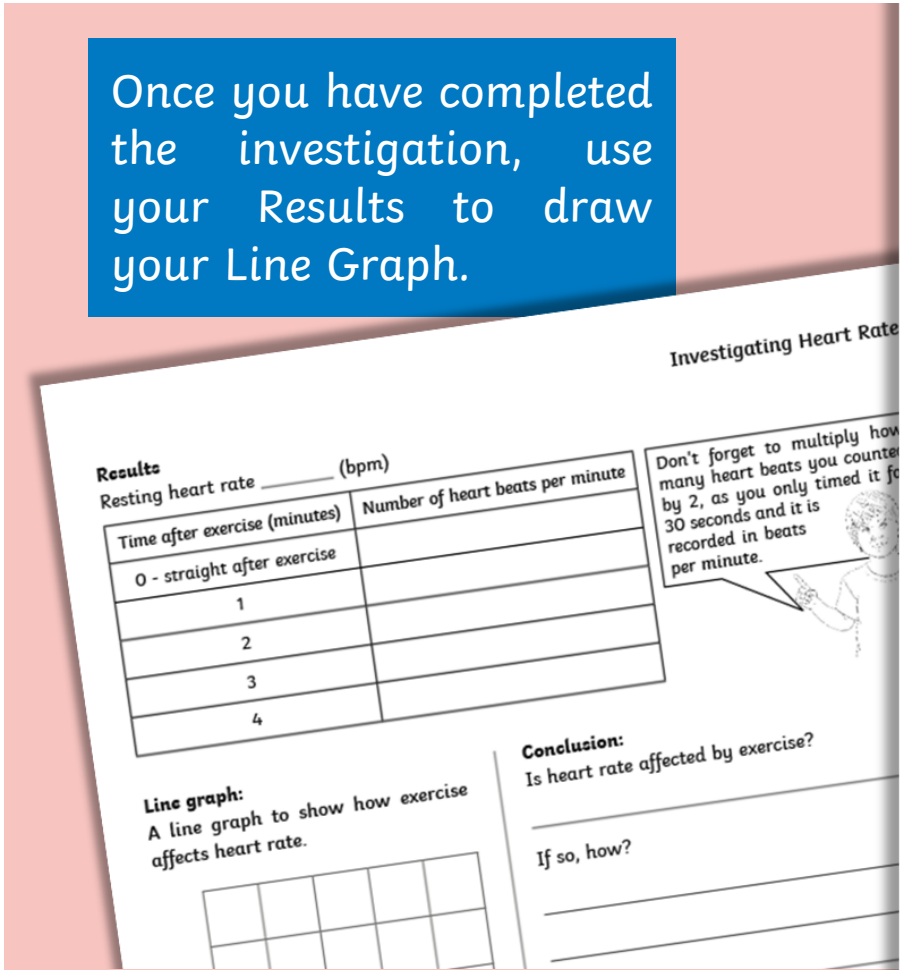
Decide with your partner who is going to exercise and who is going to record, then start your investigation.

It is important that you fill in the results as you go so that you don't forget them.

Time after exercise (minutes)	Number of heart beats per minute
0 – straight after exercise	
1	
2	
3	
4	
5	

Heart Rate Investigation Write Up

Once you have completed the investigation, use your Results to draw your Line Graph.



Investigating Heart Rate

Results

Resting heart rate _____ (bpm)

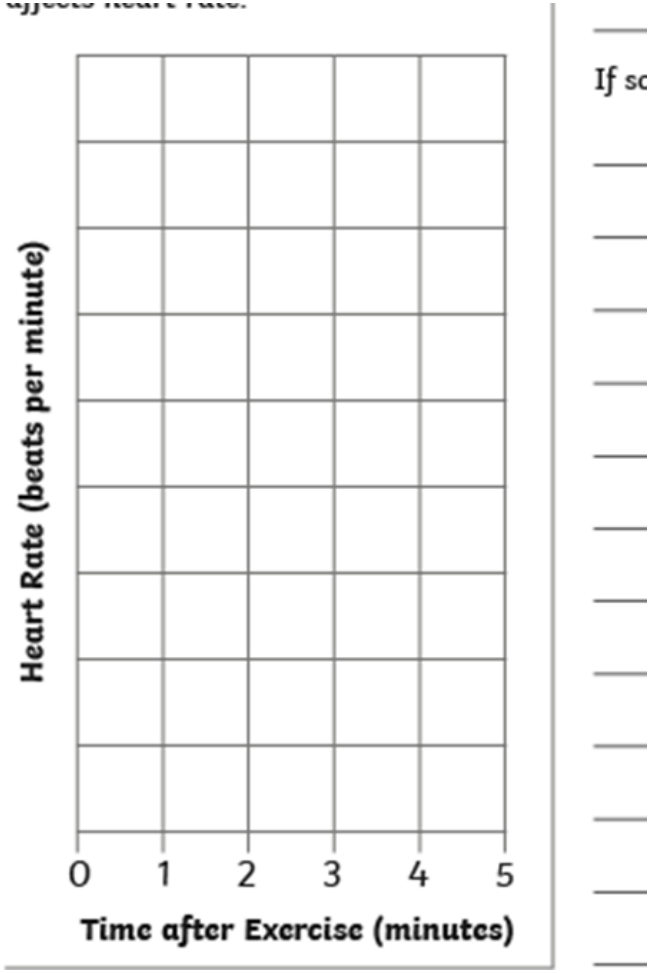
Time after exercise (minutes)	Number of heart beats per minute
0 - straight after exercise	
1	
2	
3	
4	

Don't forget to multiply how many heart beats you counte by 2, as you only timed it fo 30 seconds and it is recorded in beats per minute.

Line graph:
A line graph to show how exercise affects heart rate.

Conclusion:
Is heart rate affected by exercise?

If so, how?



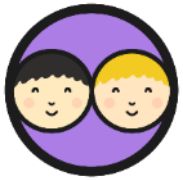
What Did We Discover?

The heart pumps blood around the body to get oxygen and other nutrients to every cell. Your heart rate is the rate at which your heart pumps blood around your body and it stays the same. Mine is always 72 beats per minute.

I agree that the heart pumps blood around the body to get nutrients and oxygen to every cell. I don't think that your heart rate always stays the same - I think it changes when you exercise or when you are sleeping.

Who did you agree with?
Has your opinion changed?
Why/why not?

What Did We Discover?



Fill in the Conclusion section on your sheet to show what you have found out.

1. How did your heart rate change after exercise?
2. Did your heart rate stay like that?
3. What do think might happen to your heart rate when you are asleep?
4. Can you compare your results with someone else? Are there any similarities?

X

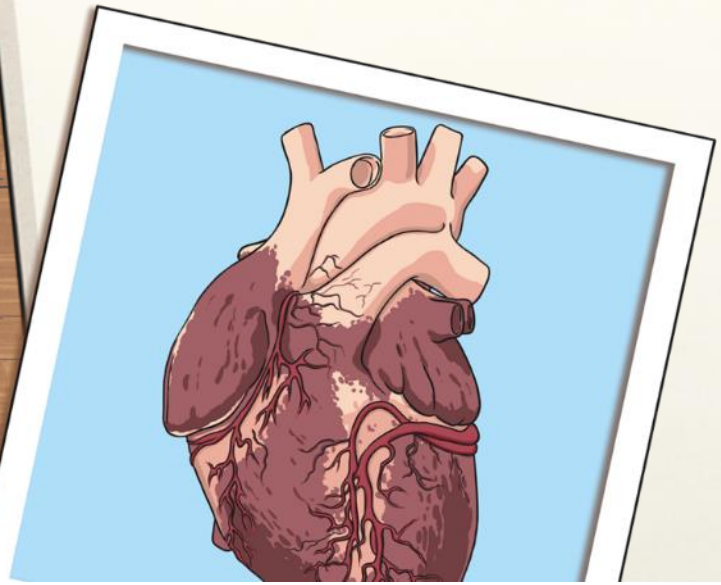
Can you draw a conclusion from your results?

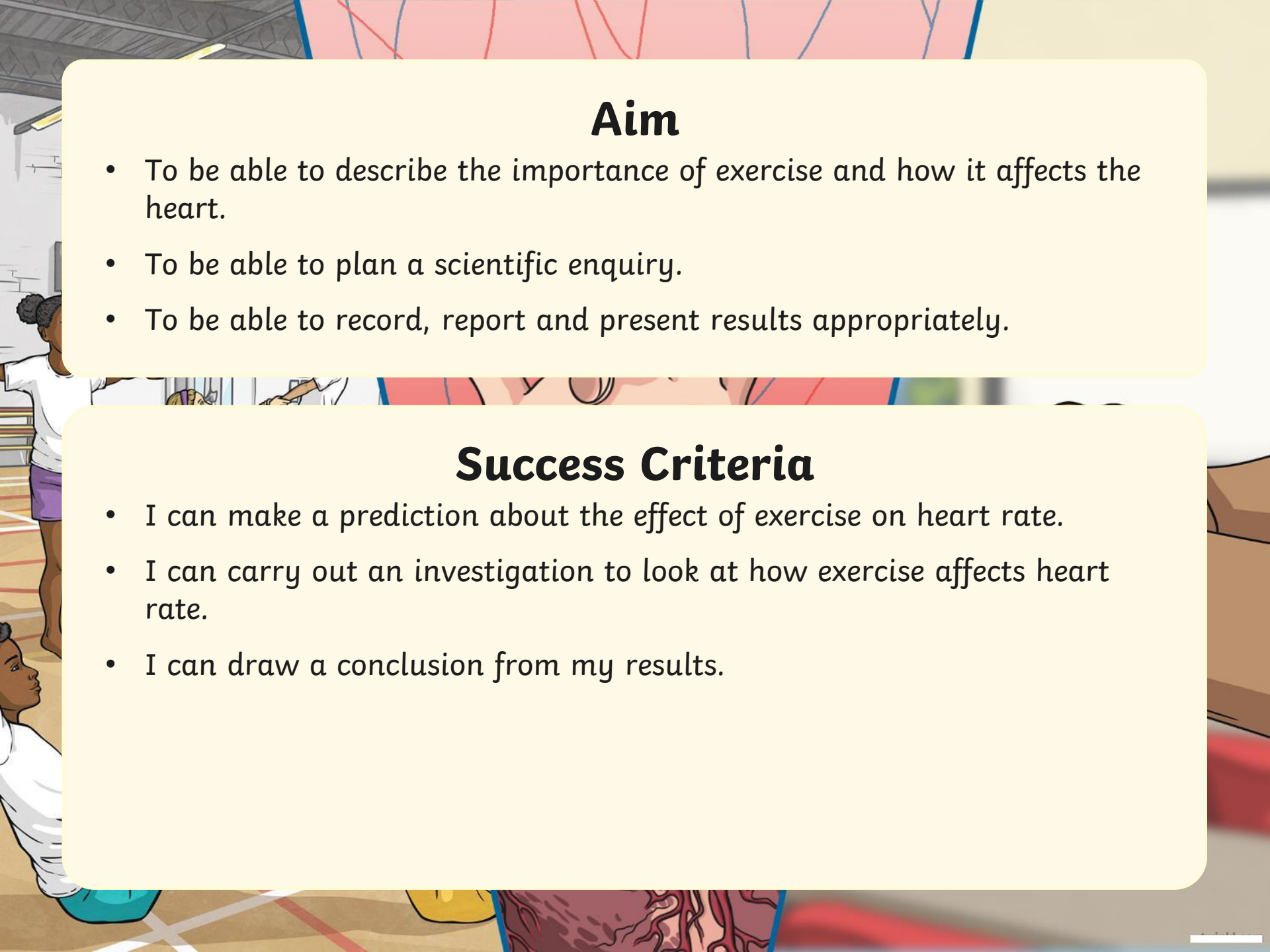
What Did We Discover?

Why is it important to exercise?

How does exercise affect the heart?

What are the long term effects/benefits of regular exercise?





Aim

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Success Criteria

- I can make a prediction about the effect of exercise on heart rate.
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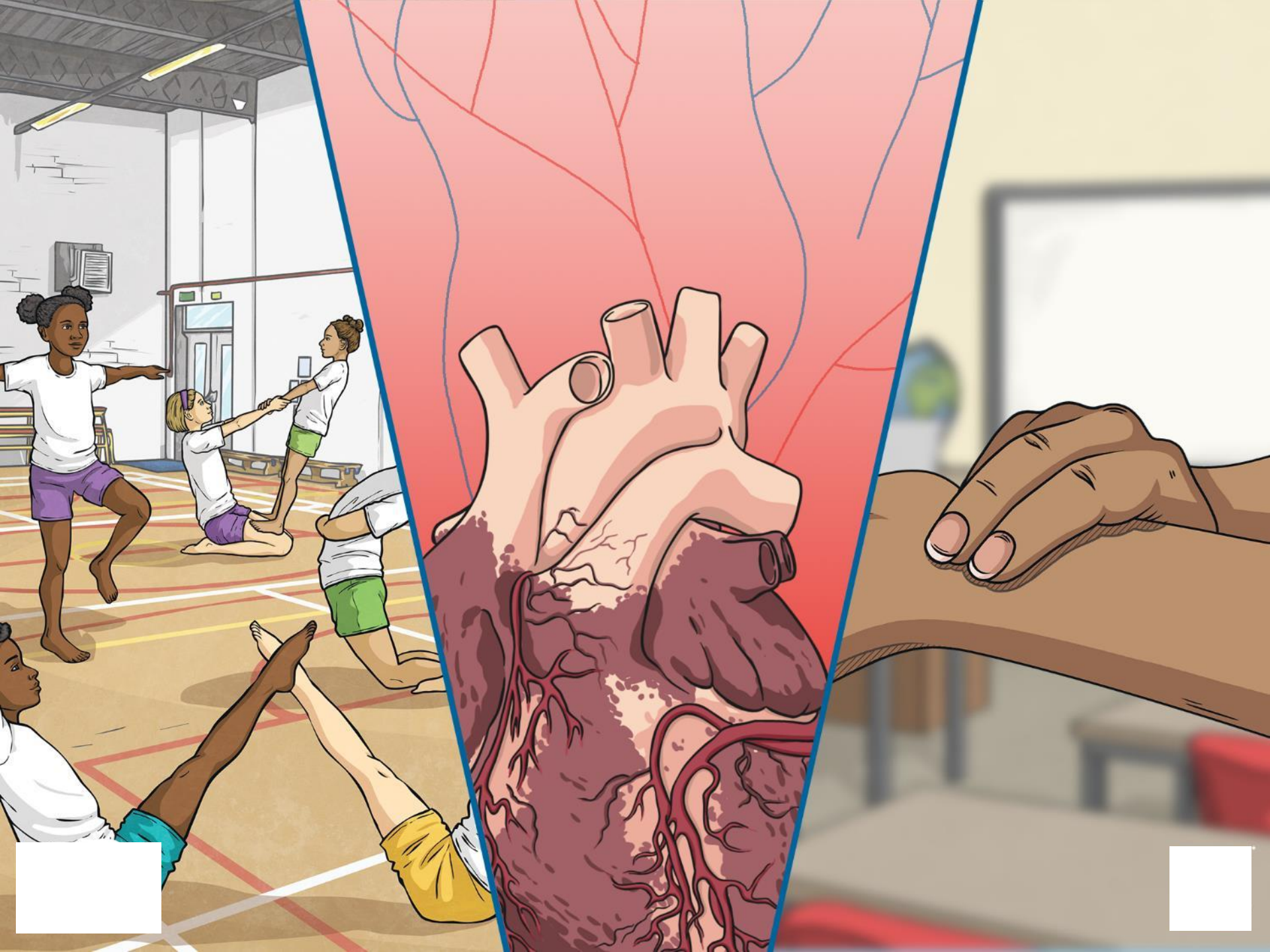

Animals Including Humans: Investigating Heart Rate

Aim

Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function.

To be able to describe the importance of exercise and how it affects the heart.

To plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary; record data and results of increasing complexity using classification keys, tables, scatter graphs, bar and line graphs; report findings from enquiries, including conclusions and degree of trust in results, in written forms by reporting and presenting the findings of their enquiry in the context of creating an enquiry about exercise and by taking accurate pulse measurements to gather data.

To be able to plan a scientific enquiry.

To be able to record, report and present results appropriately.

Lesson Duration

All timings are approximate.

75 mins

Success Criteria

I can make a prediction about the effect of exercise on heart rate.

I can carry out an investigation to look at how exercise affects heart rate.

I can draw a conclusion from my results.

Standard School Equipment

PE kit

Resources That May Need Purchasing

Stopwatches

Preparation

Differentiated **Investigating Heart Rate Activity Sheet** – per child

Knowledge Organiser – per child

Key Vocabulary

Heart, blood vessels, blood, pump, **nutrients**, waste products, veins, arteries, capillaries, plasma, platelets, red blood cells, white blood cells, **circulatory system**.

Prior Learning: In previous lessons, children will have learnt what the heart does. From previous units, children will be familiar with carrying out an investigation.

Learning Sequence

	**Remember It:** Follow prompts on the **Lesson Presentation**. Give children two minutes to talk to their partner about the four components of blood and see if they can discuss the roles of each component. Remind children to use the **Knowledge Organiser** to help them.	5 mins
	**Finding Your Pulse:** Use the **Lesson Presentation** to explain what your heart rate/pulse is. Then use the lesson prompts and ask children to find their pulse in their neck and/or wrist. Discuss that it can be difficult to find the pulse but it is definitely there. Advise them to use their fingers rather than their thumb, as the thumb has its own pulse.	5 mins
	**Heart Rate Investigation:** Use the **Lesson Presentation** prompts to get the children to discuss the concept picture and decide which character they agree with and give reasons. Discuss how the children could test their ideas by setting up an investigation - How does exercise affect the heart rate? Children use their discussion ideas to prompt writing their Prediction on the differentiated **Investigating Heart Rate Activity Sheet**. On the next slides, children discuss the investigation, matching up the pieces of equipment with what they are used for which then leads into introducing the idea of measuring the resting pulse rate to compare with the pulse rate following exercise. Children should follow the steps on the **Lesson Presentation** and take their resting pulse rate (normally between 60-100bpm), recording it on the differentiated **Investigating Heart Rate Activity Sheet**. Discuss the method for their investigation, checking that children understand the steps. Children then carry out the investigation, recording their work on the differentiated **Investigating Heart Rate Activity Sheet**. (Children do not need to fill in their Conclusion section at this point.) Can children carry out an investigation to find out how exercise affects heart rate?  Children complete the **Investigating Heart Rate Activity Sheet**. Children are provided with prompts and word banks. Headings and titles are filled in on the table and line graph templates.  Children complete the **Investigating Heart Rate Activity Sheet**. Children are provided with some sentence starters and prompts. Some headings and labels are filled in on the table and line graph templates.  Children write up the investigation on the **Investigating Heart Rate Activity Sheet**. Children produce their own line graph with greater independence and they are also asked to evaluate the investigation.	25 mins

	**What Did We Discover?** Use the **Lesson Presentation** to recap on the concept picture and whether children still agree with their initial response now that they have completed the investigation. Children discuss the questions on the next slide and then write their Conclusion on their **Investigating Heart Rate Activity Sheet**. Draw the lesson to a close by discussing the questions - Why is it important to exercise? What are the long term effects/benefits of regular exercise? Use these questions to focus children's attention on the importance of exercise and how it affects the heart. (For example - A healthy heart pushes out more blood with each beat, enabling it to function more efficiently. Less stress on the heart which can reduce blood pressure. Improved blood flow which can help to prevent heart attacks. Lower cholesterol. Decreased risk of heart disease, stroke and diabetes.)	

Exploreit

Designit: Children could redesign the experiment to increase accuracy by using heart rate monitors or other similar devices such as a smart watch and seeing how that makes the experimental data more accurate.

Evaluateit: Children use what they know about heart rate to discuss why three different animals have such different resting heart rates.

Reasonit

Children discuss **Reasoning Card 3: Heart Rate**. Children apply their knowledge of heart rate to help them reason about how an athlete's heart rate might change after exercise compared to an office worker's.

Assessment

Scientific Knowledge	
Working Towards the Expected Level With scaffolding and/or support, children can discuss how heart rate is affected by exercise.	Children:
Working At the Expected Level Children can discuss how heart rate is affected by exercise.	Children:
Working At Greater Depth Children can confidently discuss how heart rate is affected by exercise.	Children:
Working Scientifically	
Working Towards the Expected Level With scaffolding and external support, children can plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary; record data and results of increasing complexity using classification keys, tables, scatter graphs, bar and line graphs; report findings from enquiries, including conclusions and degree of trust in results, in written forms by reporting and presenting the findings of their enquiry.	Children:
Working At the Expected Level Children can plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary; record data and results of increasing complexity using classification keys, tables, scatter graphs, bar and line graphs; report findings from enquiries, including conclusions and degree of trust in results, in written forms by reporting and presenting the findings of their enquiry.	Children:
Working At Greater Depth Children can confidently and independently plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary; record data and results of increasing complexity using classification keys, tables, scatter graphs, bar and line graphs; report findings from enquiries, including conclusions and degree of trust in results, in written forms by reporting and presenting the findings of their enquiry.	Children:

Aim: To be able to describe the importance of exercise and how it affects the heart. **To be able to plan a scientific enquiry.** **To be able to record, report and present results appropriately.**				**Date:**					
				Delivered By:			**Support:**		
Success Criteria	**Me**	**Friend**	**Teacher**	**T**	**PPA**	**S**	**I**	**AL**	**GP**
I can make a prediction about the effect of exercise on heart rate.				**Notes/Evidence**					
I can carry out an investigation to look at how exercise affects heart rate.									
I can draw a conclusion from my results.									

Next Steps

- _____
- _____

T	Teacher	**I**	Independent
PPA	Planning, Preparation and Assessment	**AL**	Adult Led
S	Supply	**GP**	Guided Practice

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Next Steps

- _____
- _____

T	Teacher	**I**	Independent
PPA	Planning, Preparation and Assessment	**AL**	Adult Led
S	Supply	**GP**	Guided Practice

Investigating Heart Rate

To plan a scientific enquiry.
To record, report and present results appropriately.

Question: How does exercise affect the heart rate?

Prediction:

(please delete as appropriate)

I predict that the heart rate will increase/decrease/stay the same after exercise because

_____

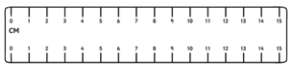
_____.

Equipment: Tick which piece of equipment you need.

What will you be measuring? _____

☐

☐



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Method:

Complete the sentences below by selecting the correct word from the word bank.

1. Sit on your chair and measure your _____ heart rate (in bpm). Record it in the results table.
2. Stand up and make sure you have enough space. Do some energetic _____ for 2 minutes.
3. Restart your timer and keep it running. Then, straight away, measure your pulse for 30 seconds and work out your heart rate in _____ per minute (bpm). _____ it in the results table.
4. Using the timer, take your pulse rate every minute until you have _____ your heart rate another 5 times (so 7 times in total).

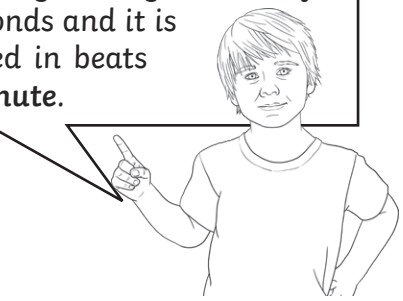
measured	record	resting	exercise	beats

Results:

Resting heart rate _____ (bpm)

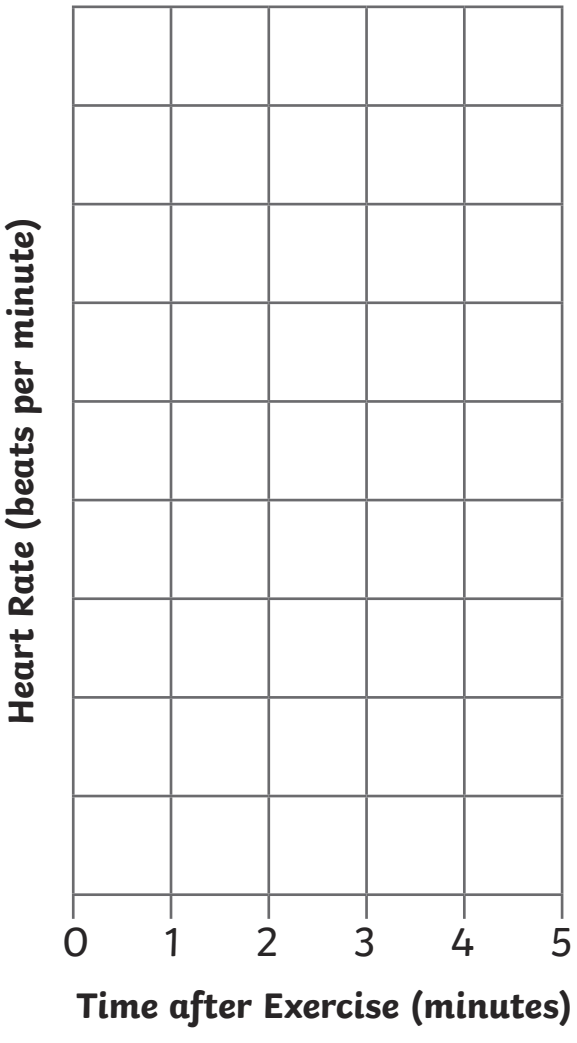
Time after exercise (minutes)	Number of heart beats per minute
0 - straight after exercise	
1	
2	
3	
4	

Don't forget to multiply how many heart beats you counted by 2, as you only timed it for 30 seconds and it is recorded in beats per **minute**.



Line Graph:

A line graph to show how exercise affects heart rate.



Conclusion:

Is heart rate affected by exercise?

Yes/No (please delete as appropriate)

If so, how?

My heart rate _____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Word Bank

pump	blood	heart rate	exercise	affected
oxygen	body	faster/slower	increase/decrease/stay the same	

Investigating Heart Rate

To plan a scientific enquiry.
To record, report and present results appropriately.

Question: How does exercise affect the heart rate?

Prediction:

I predict that _____

_____

_____

Equipment:

What are you going to measure? _____

Which piece of measuring equipment will you use in this investigation? _____

Method:
Complete the sentences below.

1. Sit on your chair and _____

   _____.

2. Stand up and make sure you have enough space. _____

   _____.

3. Restart your timer and keep it running. Then, straight away, measure your pulse for

   _____.

4. Using the timer, take your pulse rate every _____

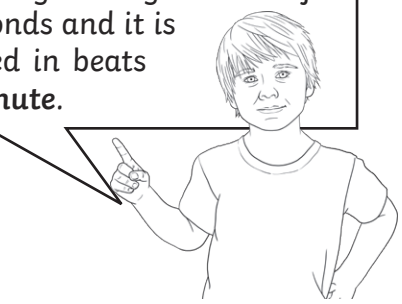
   _____.

Results:

Resting heart rate _____ (bpm)

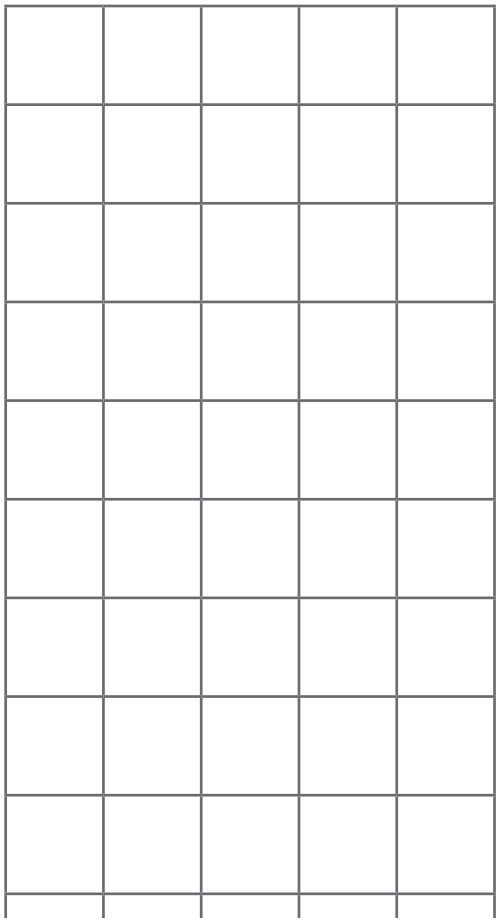
Time after exercise (minutes)	Number of heart beats per minute
0 - straight after exercise	
1	
2	
3	
4	

Don't forget to multiply how many heart beats you counted by 2, as you only timed it for 30 seconds and it is recorded in beats per **minute**.



Line Graph:

A line graph to show how exercise affects heart rate.



Time after Exercise (minutes)

Conclusion:

Is heart rate affected by exercise?

_____

If so, how?

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Investigating Heart Rate

To plan a scientific enquiry.
To record, report and present results appropriately.

Question: _____

My Prediction:

_____

_____

_____

Equipment:

_____

_____

Method:

1. _____

   _____.

2. _____

   _____.

3. _____

   _____.

4. _____

   _____.

Results:

Resting heart rate _____ (bpm)

Time after exercise (minutes)	Number of heart beats per minute
0 - straight after exercise	

Line Graph:

A line graph to show _____

_____

Conclusion:

Is heart rate affected by exercise?

_____

If so, how?

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Evaluation:

What could you do to improve this experiment? How reliable are your results?

What could you have done differently?

Reasoning Cards

3

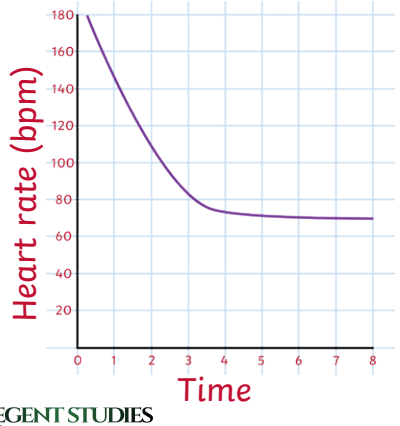
Olympic Swimmer, Georgia Davies

Office Worker

The better your heart fitness, the more quickly your heart rate returns to normal after exercise. These two women are the same age, have a similar build and both have healthy diets.

Useful information:

- The Olympic swimmer swims every day and enjoys being very active. Her resting heart rate is around 59 beats per minute.
- The office worker sits down for a lot of her working day. She enjoys going to the gym twice a week. Her resting heart rate is around 70 beats per minute.



This graph shows how the office worker's heart rate changes after 5 minutes of vigorous exercise.

If the Olympic swimmer also did 5 minutes of vigorous exercise, how would their heart rate compare? Discuss where their line might be on the graph and why.

Reasoning Cards

3

Olympic Swimmer, Georgia Davies

Office Worker

The better your heart fitness, the more quickly your heart rate returns to normal after exercise. These two women are the same age, have a similar build and both have healthy diets.

Useful information:

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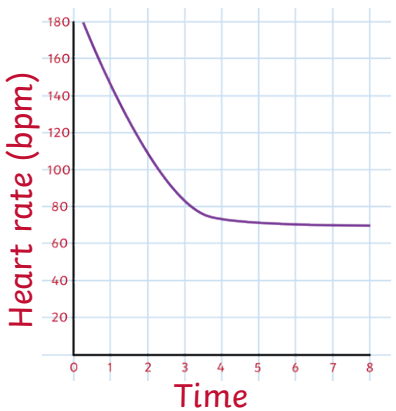


This graph shows how the office worker's heart rate changes after 5 minutes of vigorous exercise.

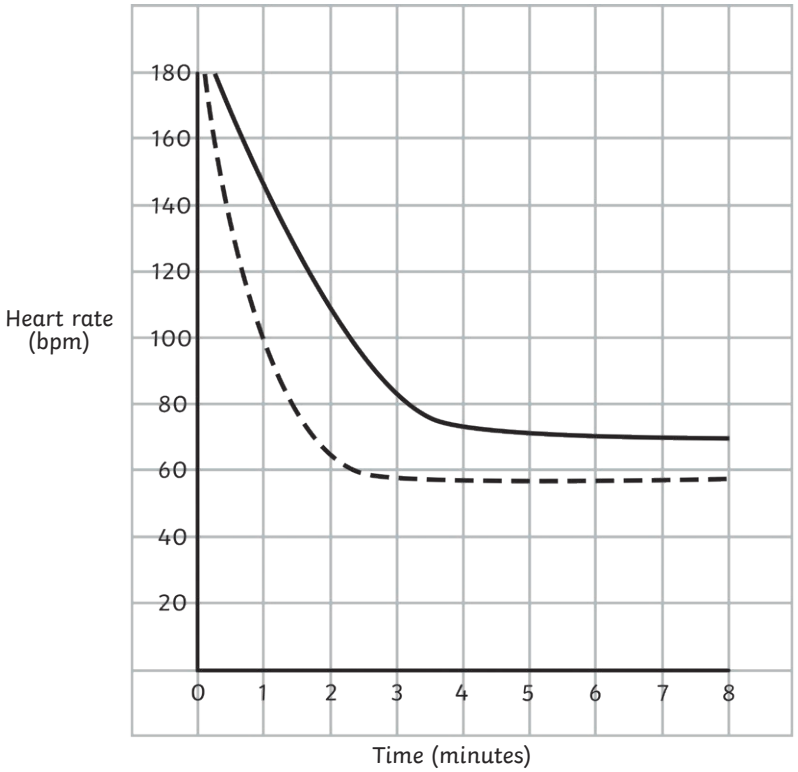
If the Olympic swimmer also did 5 minutes of vigorous exercise, how would their heart rate compare? Discuss where their line might be on the graph and why.

Reasoning Card 3

This graph shows how the office worker's heart rate changes after 5 minutes of vigorous exercise.

If the Olympic swimmer also did 5 minutes of vigorous exercise, how would their heart rate compare? Discuss where their line might be on the graph and why.

Example answer:



The answer should show that the athlete's heart rate drops down to her resting heart rate, which as we know from the information, is 59bpm. The athlete's heart rate should return to this resting rate more quickly than the office worker, as the healthier a person is, the quicker their heart rate will return to normal.

Animals Including Humans | Investigating Heart Rate

To be able to describe the importance of exercise and how it affects the heart.		
To be able to plan a scientific enquiry.		
To be able to record, report and present results appropriately.		
I can make a prediction about the effect of exercise on heart rate.		
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