Investigate how exercise affects breathing and heart rate

Method

1. In your group, choose somebody to be the exerciser, someone to measure heart rate and someone to measure breathing rate. The exerciser could measure one of these.
2. Measure the exerciser's pulse at rest (sitting down) for 15 seconds. Multiply the number of beats by 4 to get the heart rate (beats per minute). Record this in the table below.
3. Measure the exerciser's breathing rate at rest for 15 seconds. Multiply the number of breaths by 4 to get the breathing rate (breaths per minute). Record this in the table below.
4. The person exercising should now begin to exercise for 4 minutes.
5. After exercise, immediately, measure and record the heart rate and breathing rate as before.
6. Take the heart rate and breathing rate again at 2 minutes after exercise and 4 minutes after exercise. (If you have a pulse meter, you may be able to record pulse rate during exercise too, e.g. after 2 minutes, adding this to your table).

Name of exercise: _____

	At rest	Immediately after exercise	2 minutes after exercise	4 minutes after exercise
Heart rate beats per minute				
Breathing rate breaths per minute				

1. Describe the exerciser's level of fitness based on how regularly they exercise.

_____

_____

2. Explain how someone's level of fitness would affect the breathing and heart rate after exercise.

_____

_____

3. Explain why breathing and heart rate changes during exercise.

_____

_____

_____

Smoking and asthma

1. Identify three substances that are found in cigarettes which are harmful.

2. Describe what cilia are, and what they do. You may draw a diagram in the space opposite to help you.

3. Explain how smoking (tar) affects the cilia.

4. Explain why we need mucus in the respiratory system.

5. Describe how pathogens are removed from healthy lungs.

6. Explain why cigarettes are very addictive.

7. Describe the symptoms of asthma.

8. Suggest what might “trigger” an asthma attack.

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Name of exercise: _____

	At rest	Immediately after exercise	2 minutes after exercise	4 minutes after exercise
Heart rate beats per minute				
Breathing rate breaths per minute				

1. Describe the exerciser's level of fitness based on how regularly they exercise.

2. Explain how someone's level of fitness would affect the breathing and heart rate after exercise.
   A fitter person would recover quicker.

3. Explain why breathing and heart rate changes during exercise.
   Muscles are contracting more and more oxygen is required to allow respiration to happen releasing energy from glucose. Heart beat increases to pump blood around body quicker.

Smoking and asthma

1. Identify three substances that are found in cigarettes which are harmful.
Tar, nicotine, formaldehyde.

2. Describe what cilia are, and what they do. You may draw a diagram in the space opposite to help you.
A specialised animal cell with hair-like projections. Their role is to waft mucus and trapped particles out of the airway.

3. Explain how smoking (tar) affects the cilia.
Tar flattens the cilia and makes them less effective at protecting the airway.

4. Explain why we need mucus in the respiratory system.
The mucus traps pathogens and any foreign body allowing it to be removed from the respiratory system.

5. Describe how pathogens are removed from healthy lungs.
Pathogens that are inhaled into the lungs are trapped in the mucus produced by goblet cells. The cilia then waft the mucus and trapped pathogen up the airway to be swallowed.

6. Explain why cigarettes are very addictive.
Cigarettes (like vapes) are addictive because they contain nicotine. Nicotine causes an effect in the brain, which becomes dependent upon it.

7. Describe the symptoms of asthma.
A person with asthma experiences a tightness in their chest caused by air not being able to pass through the narrowed airways.

8. Suggest what might "trigger" an asthma attack.
Exercise and breathing in polluted air.