



# Medium Term Plan

## Heart and Lungs



The content of these plans is ©PSTT 2019 but may be freely reproduced by teachers in schools for educational purposes.

### **P levels**

Performance attainment targets (P scales) and performance descriptors are used for pupils aged 5 to 16 with special educational needs (SEN) who are working below the standard of the national curriculum tests and assessments. PSTT recognises that the national curriculum levels used in this document are no longer current. We have had so many requests to return these materials to the website that they remain in the documents as a guide for those who have used them in the past. The written statements may be useful to others as an indication of children's development. For further information about P levels see:

<https://www.gov.uk/government/publications/p-scales-attainment-targets-for-pupils-with-sen>

### **Disclaimer**

PSTT is not liable for the actions or activities of any reader or anyone else who uses the information in this document or the associated classroom materials. PSTT assumes no liability with regard to injuries or damage to property that may occur as a result of using the information contained in these plans.

Primary Science Teaching Trust recommends that a full risk assessment is carried out before undertaking in the classroom any of the practical investigations contained in the plans.

### **Safety Note**

PSTT advises teachers to refer to either CLEAPSS website or SSERC website for up to date health and safety information when planning practical activities for children.

## Big Questions

- What are the heart and lungs like?
- What do the heart and lungs do?
- How can we keep our heart and lungs healthy?
- Are lungs like balloons?
- Is smoking really bad for you?
- Do all animals have the same sort of hearts?

## Learning Objectives

Pupils will have opportunities:

- To explore the how the heart and lungs work
- To explore the circulatory system and its health

## Answers

- The heart is a muscular organ. The lungs (there are two) contain many tubes and air sacs.
- The heart pumps blood around the body. The lungs are responsible for breathing and the exchange of gases between the lungs and the blood.
- We can keep our heart and lungs healthy by eating a balanced diet, exercising and avoiding smoking.
- The millions of tiny tubes inside the lungs branch off and end in small, thin air sacs (alveoli) that are arranged in clusters like bunches of balloons.
- Smoking is the biggest cause of preventable deaths in England, accounting for nearly 80,000 deaths each year.
- Some animals have no hearts, some have more than one: an octopus has three hearts.

## Quick review activities

- Show model heart and model lungs, where are they located in the body?
- Point to where their lungs and heart are on their bodies- can they feel their heart beat? Can they feel their chest rise and fall when they breathe in and out?
- Pupils select body parts from photos or a symbol list.
- Draw heart on white boards- what are our hearts like?
- T shirt with organs drawn on....point to the organ?
- Match name to organ;
- Match job to organ.
- Body jigsaw- put the parts in the right place
- Apron- draw on body parts- size and location- post it for position

## Vocabulary relevant to this topic

- Parts of body
- Heart - part of the body that pumps blood
- Oxygenated blood - blood that is carrying oxygen. Bright red colour.
- Deoxygenated blood - blood that has less oxygen and more carbon dioxide. It is carrying waste gases. Dark red/ mauve colour.
- Arteries - carry blood away from the heart ( except pulmonary)
- Veins – carry blood to the heart ( except pulmonary)
- Capillary – small blood vessel where gases can exchange
- Blood – liquid made of red and white cells
- Lungs - part of the body where gas exchange happens
- Gas exchange - movement of gases in and out
- Wind pipe - main entrance to the lungs
- Cartilage - hard substance that keeps the air passages open
- Diaphragm - band of muscle below the lungs in the rib cage
- Air sacs- small part of lungs where gases move in and out
- Oxygen - gas needed for respiration ( to release energy from food)
- Carbon dioxide - waste gases
- Dissolve - form a solution
- Breathe
- Passage
- Moist
- Pump, Beat, Pulse, Rate
- Ribbed
- Squashy, Spongy
- Healthy, Unhealthy, Fitness

## Background information about this topic

- The lungs and breathing – air enters the body through the mouth or nose (this warms and filters the air) and travels down the wind pipe where it branches into each of the lungs. These tubes continue to branch inside the lungs – a bit like the branches of a tree- and finally end in small air sacs. These sacs are very thin and it is here where gases move in and out. The surface of the respiratory system is moist so that the oxygen and carbon dioxide dissolve so that they can be moved in and out of the capillaries that cover the air sacs. Oxygen in air breathed in moves into the blood and carbon dioxide moves in the reverse direction and will be breathed out. Carbon dioxide is a waste gas from respiration which occurs in all the cells of the body. The surface area of the air sacs is equivalent to a full sized tennis court.
- When we inspire/ inhale our ribs move up and out and the diaphragm contracts flat so that more space is created in the chest cavity and air flows into the lungs to fill the space. Muscles move the ribs. The movement is automatic. When we breathe out/ exhale our ribs move down and in and the diaphragm muscle relaxes and moves up: this reduces the space in the chest and air is pushed out of our lungs.
- The lungs - your left and right lungs aren't exactly the same. The lung on the left side of your body is divided into two lobes while the lung on your right side is divided into three. The left lung is also slightly smaller, allowing room for your heart. The amount of air lungs hold depends on age, fitness and sex of a person, e.g. a 12-15 year old should hold 3-5 litres of air.

- Blood moves round the body in three types of blood vessels – arteries, capillaries and veins. As blood is pumped by the heart into the arteries the thick, muscular artery walls expand and contract which is felt as a pulse. The blood then enters the capillaries which are a network of thin-walled blood vessels which allow substances in the blood to move into the cells and waste to move from the cells into the blood. Finally the blood goes into the veins, where valves stop it flowing backwards, and back to the heart. The heart pumps the blood to the lungs to be re-oxygenated . Humans and some other animals have a ‘double circulation’ where the blood goes through the heart twice in one full circuit of the body. Blood entering the right side of the heart comes from the body and contains a lot of carbon dioxide: it is pumped to the lungs to gain more oxygen and then returns to the left side of the heart where it is pumped round the whole body taking fresh oxygen and food for respiration.
- The heart has 4 chambers and two sides which work like two separate pumps. The top chambers (atria) receive blood from the body and lungs, and the bottom chambers (ventricles) pump blood to the lungs or to the body. The heart is made of specialcardiac muscle that can work continuously without tiring. Valves between the chambers stop blood flowing the wrong way. A lot of ill health in later life is caused by diseases that reduce the efficiency of the circulatory system often linked with obesity, smoking, lack of exercise and rich diets.

# Hearts and lungs P1-3

**Objective 1: To explore the how the heart and lungs work**

## Descriptions of intended outcomes at different levels of attainment

- Encounters a range of sensory activities linked to the heart and lungs (P1i)
- Gives intermittent reactions during experiences (P1ii)
- Gathers sensory evidence by observing for short but sustained periods (P2i)
- Performs actions often by trial and improvement e.g. feeling ribs or trying to use a pump (P2ii)
- Remembers learned responses over more extended periods of time e.g. moving to heart beat music (P3i)
- Requests stimulus through gesture e.g. ‘pointing’ at microphone to listen to heartbeat (P3ii)

Possible Activities:	Resources:
<p>In the light room – use red lighting to make an ‘inside body’ effect, play music and sound of a beating heart. Pupils are helped to move an appropriate part of the body in time to the music</p> <p><a href="http://www.youtube.com/watch?v=0NmWOHuy-o8">http://www.youtube.com/watch?v=0NmWOHuy-o8</a>.</p> <p>Experience touching ribs when breathing and feeling air on hand. Listen to sounds of breathing</p>	<p>Light room, Heart beat sound recording or video, or drum beat, IWB, speakers, internet access</p>

# Hearts and lungs P1-3

**Objective 1: To explore the how the heart and lungs work**

Optional activities you might like to try include:	Resources:
<p>Experience listening to own and other’s heartbeats with a microphone to amplify sounds</p> <p>Experience air being blown or made to move e.g. blow out candles, flap newspaper, use fan etc</p>	<p>Microphone, speakers, amplifier, fan, hairdryer, card or newspaper to flap, balloons to blow up and let go</p>
<p>Experience listening to a different heartbeat clip  <a href="http://www.youtube.com/watch?v=v7jbwb1NnJc">http://www.youtube.com/watch?v=v7jbwb1NnJc</a> and try making own noise of heart beat</p> <p>Experience some different pumps</p>	

## Points to Note:

Be aware of any pupils with heart or lung problems.



# Hearts and lungs P1-3

**Objective 2: To explore the circulatory system and its health**

## Descriptions of intended outcomes at different levels of attainment

- Allows themselves to be involved in the experiences (P1i)
- Shows an emerging awareness of the experience e.g. touching fake blood (P1ii)
- Changes body language in a more sustained way during experiences (P2i)
- Begins to be proactive in interactions (P2ii)
- Engages in an activity and observes a change e.g. when pumping 'blood' (P3i)
- Actively explores objects for more extended periods (P3ii)

# Hearts and lungs P1-3

## Objective 2: To explore the circulatory system and its health

<p><b>Possible Activities:</b></p>	<p><b>Resources:</b></p>
<p>Draw a large circulatory system on the playground or hall floor. Display a large heart and large lungs in the right places. Pupils experience being moved round the circulatory system 'holding' red or blue balls, balloons or similar at different points to represent the oxygenated or deoxygenated blood.</p>	<p>Chalk or tape to make circulatory system, large diagrams/ symbols of heart and lungs, red and blue balls or balloon etc</p>
<p><b>Optional activities you might like to try include:</b></p>	<p><b>Resources:</b></p>
<p>Experience pumping 'blood' from one large container to another using a simple hand pump. Play heart beat music at the same time</p>	<p>Large containers, 4 litres of red coloured water, simple pump, plastic tubing, music and sound of a beating heart, speakers,</p>
<p>Experience a big bowl of false blood</p> <p>Make up a sensory story about the blood and its journey and getting blockages by not being healthy. Use associated props and read in the light room with red light.</p>	

### Points to Note:

Take care that pupils don't try to eat the false blood.

# Hearts and lungs P4-6

**Objective 1: To explore the how the heart and lungs work**

## Descriptions of intended outcomes at different levels of attainment

- Communicates awareness of changes in breathing or heartbeat (P4i)
- Follows simple step by step procedure to gather evidence about heart and lungs (P4ii)
- Participates and takes turns in the activities (P5i)
- Responds to simple scientific questions e.g. can you make a heart beat noise? (P5ii)
- Makes sensory based comparisons with support e.g. different heartbeats, rib movement (P6i)
- Responds to simple scientific questions that require a more detailed response e.g. can you tell me how your heart beat has changed (P6ii)

# Hearts and lungs P4-6

## Objective 1: To explore the how the heart and lungs work

Possible Activities:	Resources:
<p>Watch and take part in the ‘belly breathe’ song from Sesame Street.  <a href="http://www.youtube.com/watch?v=_mZbzDOpylA">http://www.youtube.com/watch?v=_mZbzDOpylA</a></p> <p>In the light room – use red lighting to make an ‘inside body’ effect, play music and sound of a beating heart. Pupils move body in time to the music and imitating heart.  <a href="http://www.youtube.com/watch?v=0NmWOHuy-o8">http://www.youtube.com/watch?v=0NmWOHuy-o8</a>.</p> <p>Try using a stethoscope to listen to different parts of the body and also try on other objects, e.g. table.</p> <p>Use a simple body model to show where the heart and lungs are. Make each pupil an organ apron and let them stick on the heart and lungs.  <a href="http://www.educationalinsights.com/text/EI/downloads/guides/2534_webguide.pdf">http://www.educationalinsights.com/text/EI/downloads/guides/2534_webguide.pdf</a></p> <p>Put a strap of material (such as elastic) around the ribs of the pupils and ask them to describe how the material changes as they breathe in and out.</p>	<p>IWB, speakers, internet access, light room,</p> <p>stethoscopes or tubes, tape and paper,</p> <p>body model or resuscitation model, plastic or material aprons, heart and lung cut outs, Velcro or tape to attach to apron, elastic material</p>

# Hearts and lungs P4-6

## Objective 1: To explore the how the heart and lungs work

Optional activities you might like to try include:	Resources:
<p>Cover ears with cups and listen to sounds of heart and breathing            Listen to a different heartbeat clip  <a href="http://www.youtube.com/watch?v=v7jbwb1NnJc">http://www.youtube.com/watch?v=v7jbwb1NnJc</a> and then use parts of body to mimic heart beat noise</p> <p>Feel rib cage moving as they breathe and then repeat after exercise</p>	<p>Plastic cops to cover ears, card, IWB, speaker, internet access</p>
<p>Listen to own and each other's heartbeats with a microphone to amplify sounds.            Listen to the heart beat whilst sitting still and then after running about.</p> <p>Listen to a dog breathing <a href="http://www.youtube.com/watch?v=H4rWjNjrj7I">http://www.youtube.com/watch?v=H4rWjNjrj7I</a>            And talk about why it might be breathing like this</p> <p>Feel air being blown from their mouth and then explore making air move by flapping card or paper, blowing out candles, using a hairdryer, blowing up a balloon and letting go</p> <p>Tell pupils that the heart is a pump. What does this mean?            Where have you heard of a pump before?            Pass around a bicycle pump and use it. What does it do?            How is this like our heart?            What is pumped? Where is it pumped to?            Work with an adult to try out some different pumps</p>	

### Points to Note:

A simple stethoscope can be made from a tube <http://hearthealthkids.weebly.com/simple-stethoscopes.html>

# Hearts and lungs P4-6

**Objective 2: To explore the circulatory system and its health**

## Descriptions of intended outcomes at different levels of attainment

- Imitates actions (P4i)
- Shows interest in the objects and activities (P4ii)
- Responds to and follows instructions involving more than one step (P5i)
- Uses the resources with increasing independence (P5ii)
- Recalls the stages in a simple procedure e.g. making blood or using pumps (P6i)
- Recognises some of the distinctive features of blood and circulation (P6ii)

<b>Possible Activities:</b>	<b>Resources:</b>
<p>Draw a large circulatory system on the playground or hall floor. Display a large heart and large lungs in the right places. Pupils move round the circulatory system 'holding' red or blue balls, balloons or similar at different points to represent the oxygenated or deoxygenated blood.</p>	<p>Chalk or tape to make circulatory system, large diagrams/ symbols of heart and lungs, red and blue balls or balloon etc, materials to use to make model of blood e.g. safe wallpaper paste for plasma, lima beans for white blood cells, lentils for platelets, red sweets for red blood cells (e.g. red jelly beans)</p>

# Hearts and lungs P4-6

## Objective 2: To explore the circulatory system and its health

Optional activities you might like to try include:	Resources:
<p>Walk into large picture of heart on floor....move slowly into upper chamber and woosh! out of lower ventricles/ chambers. Say in right slow.....out right fast! Whoosh!</p> <p>Make up a sensory story about the blood and its journey and getting blockages by not being healthy. Use associated props and read in the light room with red light</p>	<p>Large heart picture on floor, Light room with red light, props for story e.g. different types of tubes ( blood vessel) pump for heart or sound effect, pillow for blockages</p>
<p>Use large 3D tunnels/ foam mats to give the structure of the heart for pupils to move through.</p> <p>Use a large cardboard box to make a one way gate, which pupils walkthrough. This can be used to explain what the jobs of the valves are.</p> <p>Experience pumping 'blood' from one large container to another using a simple hand pump. Play heart beat music at the same time</p>	

### Points to Note:

Misconception that the heart beats because we are alive;  
 The sounds made by the heart are due to movement of the blood;  
 The heart just makes a noise;  
 Blood is blown into heart

Safety awareness:  
 Bumping into each other/ body contact when moving.

# Hearts and lungs P7-8

**Objective 1: To explore the how the heart and lungs work**

## Descriptions of intended outcomes at different levels of attainment

- Actively joins in the investigations and activities (P7i)
- Makes simple records of their findings e.g. uses blocks or unifix cubes to record lung volume (P7ii)
- Shows where the lungs and heart are (P8i)
- Communicates their observations relating to lungs and heart (P8ii)



# Hearts and lungs P7-8

## Objective 1: To explore the how the heart and lungs work

<p><b>Possible Activities:</b></p>	<p><b>Resources:</b></p>
<p>Draw what they think the lungs and heart look like in their body on mini white boards or point to where they are on their body . Show simple pictures and /or animations of lungs and heart, e.g.  <a href="http://www.youtube.com/watch?v=SejXhR6kEvg">http://www.youtube.com/watch?v=SejXhR6kEvg</a> or</p> <p>Measure the amount the chest inflates when breathing in using lengths of tape.          Make a class display</p> <p>If appropriate obtain lungs and then heart from a butcher to look at. Use of a video cam/ visualiser to record and help all see,          e.g. for lungs: Where does the air flow?          Why is it moist? What can you see about the wind pipe?          e.g. for heart: where is thickest muscle? Can they see valves?</p>	<p>Mini white boards, pens, sticky tape, dissection apparatus and board, lungs, heart,          Visualiser,          Digital camera/ phone.</p>
<p><b>Optional activities you might like to try include:</b></p>	<p><b>Resources:</b></p>
<p>Feel heart beat/ pulse on their wrists. Pulse monitor can be used to gain an accurate reading of pulse if appropriate. Can they find any other pulses on their body?          Take pulse rate before and after exercise</p> <p>Lay on the floor and place a bottle of water on their ribs and as they breathe in and out they should see the bottle moving with the rib cage (also try to keep the bottle on the ribs and not let it fall off).</p>	<p>Pulse monitor, bottle of water</p>

# Hearts and lungs P7-8

## Objective 1: To explore the how the heart and lungs work

Draw a body outline and ask pupils to point out where heart and lungs are in the body

Find out different lung capacities using peak flow meter or lung volume kit or balloons. Record and display results as a class

### Points to Note:

Not understanding the 3 D structure of heart.  
Thinking the heart is shared and 2 D.

Relative position of the parts.  
Misconception that the heart beats because we are alive.

The sounds made by the heart are due to movement of the blood and pump and valves.

Safety awareness:  
Washing hands if touched n.b. safety in dissection.

Be aware of where the scalpel and scissors are.

Don't use Cow's lungs or heart because of risk of T.B.

# Hearts and lungs P7-8

## Objective 2: To explore the circulatory system and its health

### Descriptions of intended outcomes at different levels of attainment

- Shows an understanding of some simple scientific vocabulary by moving to particular organs (P7i)
- Demonstrates circulation with help (P7ii)
- Records passage of blood or how blood flows through blocked and unblocked vessels (P8i)
- Starts to seek information from secondary sources (P8ii)

<p><b>Possible Activities:</b></p>	<p><b>Resources:</b></p>
<p>Watch a simple video about the heart and heart disease. Find out more using simple sources.</p> <p>Have circulatory system drawn on the floor of playground or hall with main organs. Pupils walk around the circulatory system along vessels to named parts.</p>	<p>IWB, speakers, Internet access, chalk or tape to mark circulatory system out, picture of circulatory system and labels. Simple sources of information about heart disease, e.g. <a href="http://www.bhf.org.uk/heart-health/how-your-heart-works.aspx">http://www.bhf.org.uk/heart-health/how-your-heart-works.aspx</a></p>
<p><b>Optional activities you might like to try include:</b></p>	<p><b>Resources:</b></p>
<p>Draw the passage of blood through the heart or use a model with red and blue wool to show the movement of the oxygenated and deoxygenated blood through the heart.</p> <p>Make fake blood(s) and test by asking other adults in school how realistic they look. <a href="http://www.stevespanglerscience.com/lab/experiments/fake-blood-recipes">http://www.stevespanglerscience.com/lab/experiments/fake-blood-recipes</a></p>	<p>Red and blue coloured wool/ string; Paper; material; play dough etc to make heart model</p>

# Hearts and lungs P7-8

## Objective 2: To explore the circulatory system and its health

Operation heart- have an outline of a person- or perhaps a volunteer adult to lie down- and imaginary heart surgery.

Stick labels onto the 'patients' heart labelling parts simply as top space; bottom space; blood tubes; thick muscle; thin muscle

Talk about what happens to blood vessels if we have a poor diet and don't exercise. Give pupils an unblocked model artery to pour 'blood' through and then a blocked up model artery to compare pouring blood through. Ask what they think will happen as it gets more blocked and how this might cause a heart attack. Use simple secondary sources to find out more

### Points to Note:

Pupils may think that the heart is one pump

# Hearts and lungs L1-3

**Objective 1: To explore the how the heart and lungs work**

## Descriptions of intended outcomes at different levels of attainment

- Asks simple questions stimulated by the activities on the heart and lungs (L1i)
- Shows an understanding of comparative language e.g. more, less, bigger, smaller (L1ii)
- Recognises the basic features of lungs and heart (L1iii)
- Draws on their observations and ideas to offer answers to questions about the heart and lungs (L2i)
- Uses simple scientific vocabulary to describe their observations (L2ii)
- Makes comparisons between model hearts or breathed in and out air (L2iii)
- Uses scientific vocabulary when reporting their findings (L3i)
- Represents things in the real world using models (L3ii)
- Describes what they have found out in their experiments linking cause and effect e.g. caffeine and heart rate or differences in breathed in and out air to changes in the body (L3iii)

# Hearts and lungs L1-3

Objective 1: To explore the how the heart and lungs work

<b>Possible Activities:</b>	<b>Resources:</b>
<b>Optional activities you might like to try include:</b>	<b>Resources:</b>

Points to Note:

# Hearts and lungs L1-3

**Objective 2: To explore the circulatory system and its health**

## Descriptions of intended outcomes at different levels of attainment

- Experiences different ways to answer questions e.g. makes models, role play, research, exploring and investigating (L1i)
- Uses everyday words to describe the features of circulation, blood and diseased lungs and heart (L1ii)
- Identifies scientific developments that help with heart and lung disease (L1iii)
- Responds to prompts by using simple texts and electronic media to find information on heart and lung diseases (L2i)
- Expresses personal feelings or opinions about scientific or technological developments (L2ii)
- Presents their findings in an appropriate way (L2iii)
- Selects appropriate information from that provided (L3i)
- Explains the purpose of technological developments related to the circulatory system (L3ii)
- Presents their findings in more than one way (L3iii)

# Hearts and lungs L1-3

**Objective 2: To explore the circulatory system and its health**

<b>Possible Activities:</b>	<b>Resources:</b>
<b>Optional activities you might like to try include:</b>	<b>Resources:</b>

**Points to Note:**