

## Audit feedback: the body

### Task 1-a

Child	Accurate idea	Inaccurate idea
A	Ribs protect the heart, pelvis protects the bladder.	Intestines are protected by bones.
B	Bones are for movement. The two bones in the forearm enable this.	No inaccurate ideas.
C	The spine and finger bones are involved in movement.	Bones are soft and bendy.
D	The skull is able to move, allowing us to turn, raise or lower our heads.	The skull's most important job is to move.

### Task 1-b

The heart, lungs, most of the liver and part of the stomach are protected by the ribs.

#### *Commentary on Task 1*

The pelvis is largely protective, although also used in the movement of legs. However, it does not protect the stomach which is higher in the body cavity near the base of the rib cage. It does protect the bladder and the reproductive organs.

The ribs protect the heart and lungs but not the intestines, which are lower in the body cavity.

Bones are not soft and bendy. The backbone is not one bone but is made up of many vertebrae which can articulate. Fingers move because they are jointed.

The skull is positioned on the vertebrae of the neck and this allows movement. The lower jaw has a hinged joint that also allows movement. However, the most important function of the skull is to protect the brain.

## The body (continued)

## Task 2-a

## Heart and circulation

Lungs	A Oxygen is taken up by the blood and carbon dioxide is given up.
Heart	C Blood returns here from the lungs. D Oxygen-rich blood is pumped to the organs and tissues from here. H Blood from the body containing carbon dioxide is received here. I Blood is pumped from here to the lungs.
Organs and tissues	B Blood collects waste products including carbon dioxide. E Cells here use oxygen to break down glucose in order to release energy. J Blood circulates through capillaries carrying oxygen and nutrients.
Veins	F These vessels carry blood to the heart.
Arteries	G These vessels carry blood from the heart.

## Task 2-b

Blood does many important things in the body. It carries nutrients and oxygen, and carries away waste products, such as carbon dioxide. All parts of our body need oxygen and nutrients to work properly.

In order to circulate to every single part of the body, the blood has to be pumped under pressure by the heart.

The body (continued)

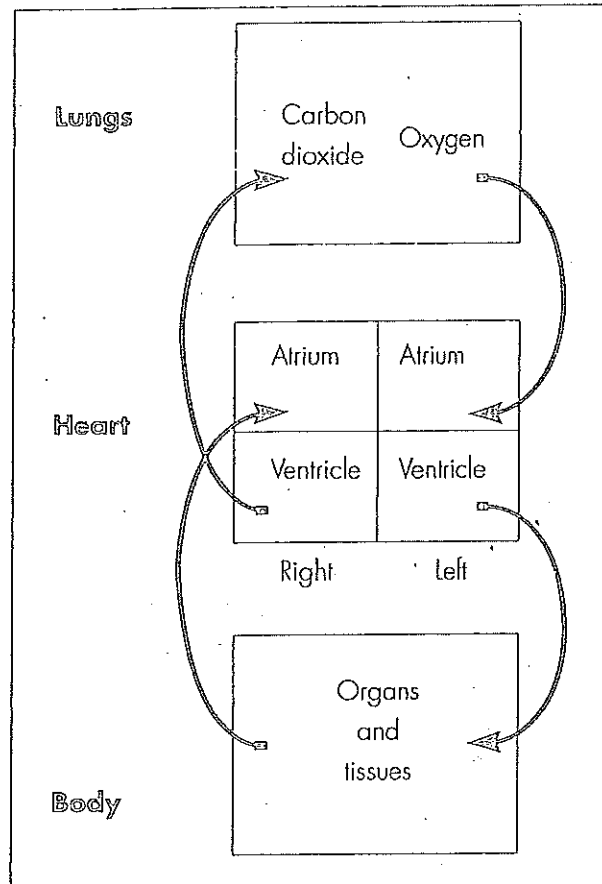
*Commentary on Task 2*

Oxygen is taken into the lungs and passes through the thin membranes into tiny blood vessels.

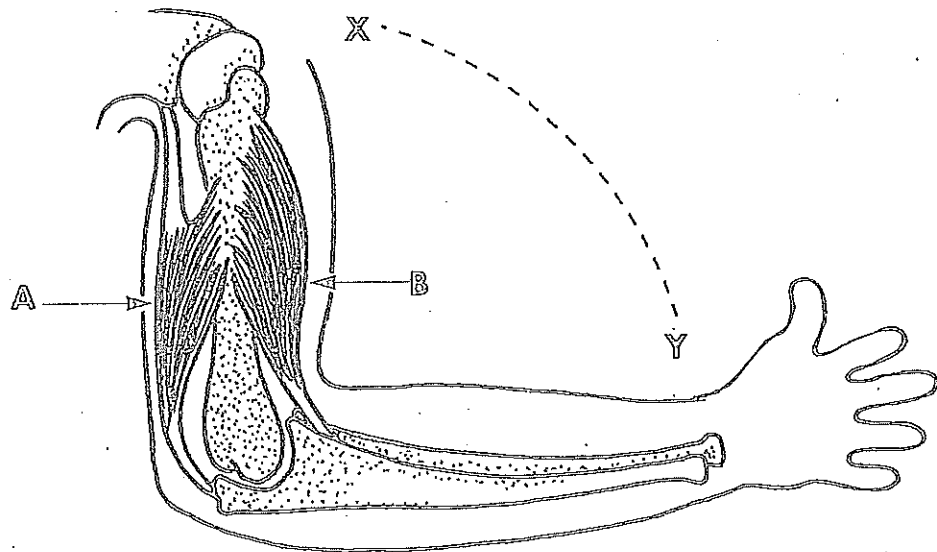
Oxygenated blood now travels to the heart through the pulmonary vein and enters the left atrium. It collects here until the pressure opens a valve and allows the oxygenated blood to enter the left ventricle. This part of the heart is very muscular and pumps the blood around the body through the arteries.

Eventually the blood arrives in the cells of organs and tissues in the body. In the cells, the oxygen in the blood is given up in the process of respiration, where glucose from food is broken down. During this process carbon dioxide is released. This is absorbed into the blood which returns to the heart through veins. It enters the right atrium and passes through a valve into the right ventricle.

The muscles in this chamber contract, and pump the blood to the lungs. Here the carbon dioxide is able to leave the blood through the lung membranes and is exhaled into the air while oxygen is absorbed.



## The body (continued)

**Task 3-a**

To raise the hand to point X, which muscle would shorten or contract? **B**.

**Task 3-b**

What happens to muscle A during this action? **It relaxes.**

**Task 3-c**

Describe how the muscles help to return the hand to the original position Y.

**Muscle A shortens and contracts. Muscle B relaxes.**

**Commentary on Task 3****Task 3-a**

The biceps muscle **B** is attached to the stationary bone at the shoulder and to the radius in the lower arm. Contraction of the muscle cells pulls on the radius, raising the hand.

**Task 3-b**

Muscles cannot lengthen or expand actively; they are either active (shortened) or relaxed. The triceps **A** will relax if **B** contracts.

**Task 3-c**

The bones of the skeleton are moved by the action of antagonistic pairs of muscles – in this case **A** and **B** (triceps and biceps). So they work in a co-ordinated way to move and return bones – **A** is attached to the ulna in the forearm and to a stationary bone in the shoulder.

The body (continued)

Task 4

Fill in the missing details **A** to **F** about the health effects of a range of legal and illegal drugs.

Drug	Organ	Effect
Tobacco	Lungs	Destroys cilia which move mucus, leading to a dry cough.
		Tar collects on lung cells and leads to <b>cancer (A)</b> .
	Heart	Carbon monoxide damages <b>red blood cells (B)</b> .
Alcohol	<b>Brain (C)</b>	Nicotine stimulates the heart rhythm, damaging artery walls and raising blood pressure.
	Liver	Depresses the function of this organ and short-term effects are marked.
Solvents	<b>Tissue becomes scarred and normal cells are replaced by fibrous or adipose tissue (D)</b> .	
	Heart	Rhythm interrupted.
Cannabis (in any form)	Brain	<b>Hallucinations (E)</b> .
	<b>Brain (F)</b>	Sedation, irritability, apathy, mild pleasure, disorientation.

## The body (continued)

### Commentary on Task 4

Tobacco introduces a cocktail of potentially lethal chemicals into the body, including:

- Nicotine, an addictive stimulant which hardens arteries, clots blood, increases blood pressure and restricts blood flow;
- Tar, which disables the hair-like cilia that clean the lungs;
- Carbon monoxide, which replaces oxygen on the receiving sites on haemoglobin, reducing its oxygen-carrying capacity.

Alcohol depresses brain function, causing loss of memory, depression, reduced thinking and reasoning power, reduced muscular control and violent swings of mood. The effect on the liver is described on the previous page.

The liver breaks down toxins in the body, including alcohol. This is broken down at a rate of approximately one unit per hour. Alcohol causes fat to build up in the liver, enlarging it. The toxic effects of the alcohol damage the liver tissues, causing cirrhosis, which destroys the cells.

Solvent effects depend largely on the chemical make-up of the solvent involved. Aerosols sprayed directly into the mouth can cool the throat to such an extent that swelling and suffocation can result. The heart rhythm is reduced, and the heart becomes sensitive to exertion. Excitement can cause heart failure.

The brain is affected by the reduced oxygen intake and "pseudo hallucinations" commonly occur.

Cannabis has disorienting effects on the brain, producing irritability, sedation and apathy, as well as mild pleasure and stimulation.

## The body (continued)

### Task 5-a

Ashley appears to understand that he needs more oxygen during exercise and has noticed the link between faster breathing and the increased heart rate. A further question is needed to ascertain whether Ashley thinks that:

- the heart is pumping oxygen gas; or
- the heart is delivering oxygen-carrying blood to the muscles.

### Task 5-b

Mae has a misunderstanding that there is a causal link between faster breathing and getting hot and sweaty. Both are features of exercising; however, the main link is not between these two externally visible effects, but with internal organs. She also appears to think that respiration takes place in the lungs. This may be simply that she interprets respiration as breathing. In fact respiration is the process in which, in the cells, oxygenated blood from the lungs is used to enable the process of releasing energy from glucose (provided by food). The action of the lungs inhaling and exhaling is referred to as ventilation to define its difference from respiration.

### Task 5-c

Blood carries the oxygen from the lungs in the haemoglobin within the red blood cells. Oxygen is carried to the muscle cells where it is used to release energy. As we exercise, more energy is needed and thus more oxygen is needed to break down the glucose and release that energy.

### *Commentary on Task 5*

The heart receives oxygenated blood from the lungs and pumps it around the body. Lungs ventilate faster to speed up gaseous exchange and the heart beats faster to deliver oxygenated blood to the organs and tissues.

Faster breathing and being hot and sweaty are both features of exercising but the link is in the internal organs; muscle gives off heat and this is carried to the body surface by the blood. The hot blood triggers the brain to "switch on" sweating mechanisms. As muscles work faster, they demand more oxygen, so the brain stimulates faster breathing.

The oxygen is carried by the haemoglobin in the red blood cells, and flows out of the blood with the tissue fluid (plasma) as it bathes the cells.

Air enters the lungs, and oxygen from it passes through the lung membrane into the blood, as carbon dioxide is passed from the blood into the lung space to be breathed out. The oxygenated blood is pumped to the organs by the heart. Within the organs, in the cells, oxygen-rich plasma from the blood bathes the tissues. This contains glucose from digestion processes.

### The body (continued)

Respiration is the process by which oxygen is used to break up glucose to release energy (see Commentary on Task 2). Enzymes are used in this process. Aerobic respiration releases energy, used to contract muscle fibres. If little oxygen is available, then anaerobic respiration takes place, producing lactic acid as an intermediate product. This then needs to be broken down. When oxygen again becomes available this lactic acid reacts with the oxygen and is broken down into carbon dioxide and water, releasing further energy.

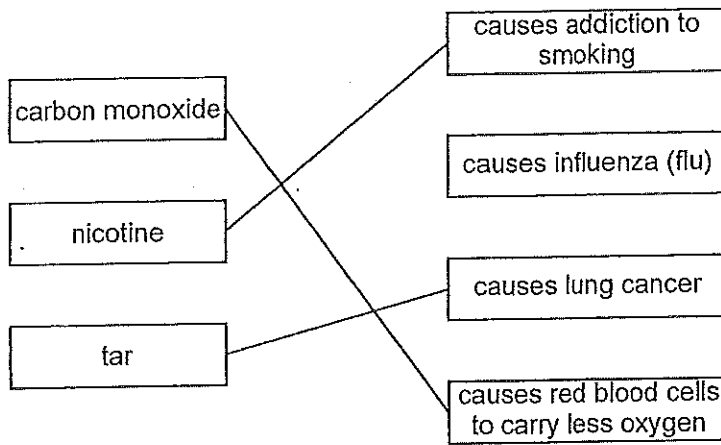


1. (a) **answers should show an understanding that the bricklayer does physical work**  
 more active *accept 'uses up more energy' or 'lifts bricks all day' or 'does more work'* 1 (L5)  
*do not accept 'works harder' or 'has a tougher job' or 'does hard work'*
- (b) **answers should refer to bones and their growth**  
 calcium is needed for bone *accept 'it is needed for teeth'* 1 (L5)  
 the 15-year olds are still growing *accept 'the adults have stopped growing'* 1 (L5)
- (c) **any one from** 1 (L5)  
 • girls menstruate *accept 'girls have periods'*  
 • to replace blood lost by menstruation  
*do not accept 'iron is needed to produce red blood cells'*  
*do not accept 'growth spurts'*
- (d) carrot 1 (L5)  
 milk 1 (L5)  
 chicken 1 (L5)

[7]

1. (a)

3 (L5)



*if more than one line is drawn from any substance, award no mark for that substance*

(b) (i) any one from

1 (L5)

- fat has been deposited *accept 'fat'*
- the artery has become narrower *accept 'it is blocked'*

(ii) any two from

2 (L6)

- less oxygen to the cells or heart muscle  
*accept 'no oxygen'*  
*do not accept 'less air to the cells'*
- less glucose to the cells or heart muscle  
*accept 'no glucose'*
- less blood to the cells or heart muscle  
*accept 'it stops the circulation of blood'*  
*accept 'blood cannot flow through'*  
*accept 'it stops blood getting to the heart'*  
*'nothing can get through' is insufficient*  
*accept 'there is a build-up of carbon dioxide'*  
*accept for two marks 'they get less oxygenated blood'*

[6]