

GRADE 5

TEACHER BACKGROUND INFORMATION

GROWTH AND DEVELOPMENT

THE RESPIRATORY SYSTEM

Respiration can be defined as the process of supplying oxygen to the body cells and removing carbon dioxide.

Inhaled air passes through the nose and mouth. In the nasal cavities, the air is cleaned, warmed and moistened by the lining of sticky mucus and tiny hair-like cilia.

Air travels from the nose and mouth to the pharynx or the throat. The pharynx has two openings the windpipe, leading to the lungs, and the esophagus, leading to the stomach. A protective flap of skin, called the epiglottis, seals the windpipe when food is swallowed preventing food from entering the wrong tube. The larynx, or voice box, is located below the pharynx and at the entrance to the windpipe. The vocal cords are made up of two folds of tissue which produce sound as air is expelled from the lungs. Laryngitis is an infection of the lining of the larynx which often affects the ability to speak.

The windpipe, or trachea, is the air passage to the lungs. It is held open by strong bands of cartilage. The trachea divides into two branches called the bronchi. Each branch goes to a lung and subdivides into many smaller branches. The smallest twigs of the tree-like structure are called the bronchioles. At the end of each bronchiole is a tiny air sac called an alveolus. It is in the alveoli that oxygen and carbon dioxide are exchanged.

The alveoli are lined with tiny blood vessels which absorb oxygen and release carbon dioxide to be eliminated from the lungs.

The respiratory tract is lined with a thin film of mucus which traps inhaled germs, dust and foreign particles. The mucus is moved upwards toward the throat by tiny hair-like cilia.

Respiration or breathing usually occurs at a rate of 12-14 times per minute and may be both a voluntary and involuntary action. Breathing occurs without conscious control and is described as an involuntary action. However, we are able to control our rate of breathing or exert voluntary control when we hold our breath.

The lungs are enclosed in the protective structure of the rib cage. The act of breathing occurs through the contraction and expansion of the rib cage. As the rib cage expands, so do the lungs. The diaphragm is a large thick muscle beneath the lungs which also facilitates inhalation and exhalation. The breathing centre in the brain regulates the contraction of the diaphragm which causes the lung cavity to lengthen. At the same time, the muscles between the ribs, called the intercostals, contract making the rib cage expand. The lungs expand and air is inhaled. Air is forced out of the lungs or exhaled as the diaphragm and intercostals relax and the rib cage and lung cavity decrease in size.

Adapted from: Harvey, D. and White, D. (ed.)
Body Systems and Physical Fitness.
Health Education Methods Project for Elementary
School Teachers. Ottawa, Ont: Health Promotion
Directorate. Health and Welfare Canada, 1983.

COMMON PROBLEM CONDITIONS OF THE RESPIRATORY SYSTEM

Problem	Cause	Brief Description
pneumonia	- bacteria, viruses - communicable	- an infection of the lung tissue often accompanied by fluid; - signals: breathing difficulty, fever and coughing
bronchitis	- bacteria, viruses or irritants - some forms are communicable	- an inflammation of the mucous membrane of the bronchi with fluid and thick mucus accumulation; - signals cold, hoarseness, coughing
common cold	- viruses - communicable	- upper respiratory infection, especially of nose and throat; - signals headache, runny/stuffed nose, watery eyes, fever, cough
tuberculosis	- bacteria - communicable	- mainly a disease of the lungs with development of lesions; - signals fever, weight loss, cough, sputum, blood, pain, difficult to breathe
asthma (allergy)	over-sensitivity to common triggers (pet hair, dust, feathers, pollen) or stress	- lower respiratory reaction with mucus build-up in bronchioles; - signals: shortness of breath, wheezing, coughing, gasping
hay fever (allergy)	over-sensitivity to common triggers (pet hair, dust, feathers, pollen)	- upper respiratory reaction; - signals: redness in eyes, nose and throat, mucus production, sneezing

WAYS TO CARE FOR THE RESPIRATORY SYSTEM

Positive health habits related to the respiratory system include:

- playing in clean air daily
- exercising daily (running, biking, swimming, skipping)
- participating in smoke-free program
- getting plenty of rest, sleep and relaxation
- avoiding harmful substances (inhalants, hazardous household products, smoke-filled rooms)
- being careful around poisons, alcohol, medicines and drugs
- selecting nutritious foods from all of the four food groups
- drinking plenty of fluids (milk, juice, water)
- having regular medical check-ups

THE CIRCULATORY SYSTEM

The circulatory system is the body's transport and delivery system. The heart is the pump, the blood is the medium; and the blood vessels form the pathways.

The circulatory system has five main functions:

1. It transports oxygen to the muscles so they can work.
2. It carries nutrients such as glucose, fats, proteins, carbohydrates, vitamins and minerals to body cells.
3. It removes metabolic wastes such as carbon dioxide, lactic acid, urea and heat.
4. It functions as a temperature regulator.
5. Finally, it serves as a communication system by transporting hormones and antibodies to their receptor sites.

THE HEART

The heart is an important organ located inside the chest and between the lungs. The heart is the size of a man's fist. It is a powerful muscle that works night and day. The heart works like two pumps sending blood to all parts of the body.

There are four chambers inside the heart. The upper atrium on the right side receives dark coloured blood from all over the body. This blood has waste carbon dioxide in it. One heart-pump squeezes blood into the right ventricle and out through a tube to the lungs.

The blood is cleaned up in the lungs. When you breathe in, oxygen is brought into the lungs. Carbon dioxide from the blood is traded for oxygen. Carbon dioxide is breathed out of the lungs. Oxygen moves into the blood and turns the blood a bright red colour in the lungs.

Bright red blood is sent to the left atrium of the heart. The second heart-pump squeezes blood into the left ventricle and out through a tube to all parts of the body. Blood with lots of oxygen helps provide the body with energy.

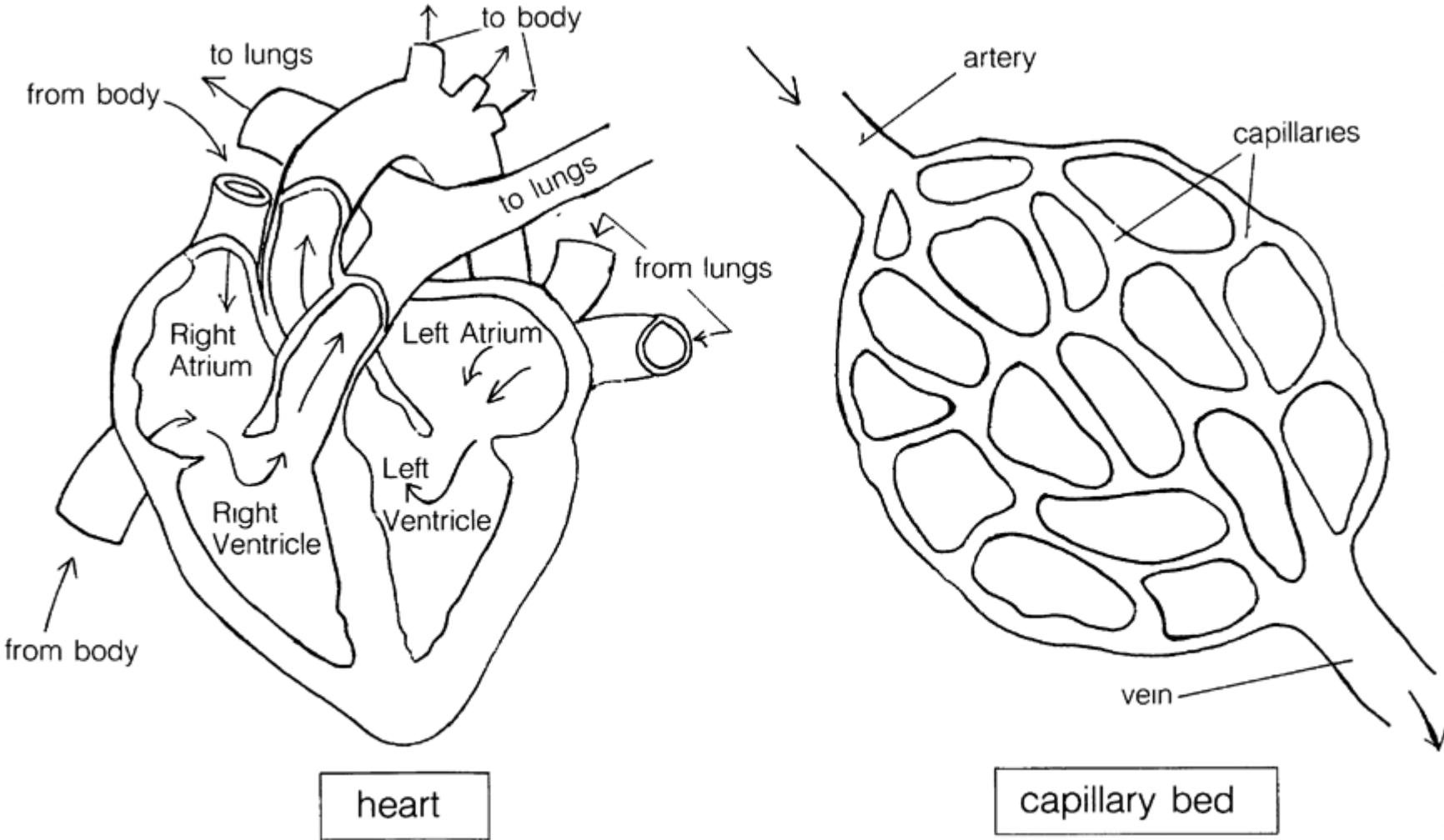
Capillaries have two functions. They move nutrients and oxygen from the blood into the body cells and move wastes from the body cells into the blood. The capillary beds are where oxygen and energy are exchanged for carbon dioxide and wastes in the blood.

It should be noted that arteries always carry oxygenated blood except from the heart to the lungs. Veins always carry oxygen poor blood except from the lungs back to the heart.

The heart beats about 90 times every minute of the day. The heart is a very hard-working muscle and must be kept in good working order. When the heart is strong, it delivers blood through the body more easily and keeps it healthy and strong.

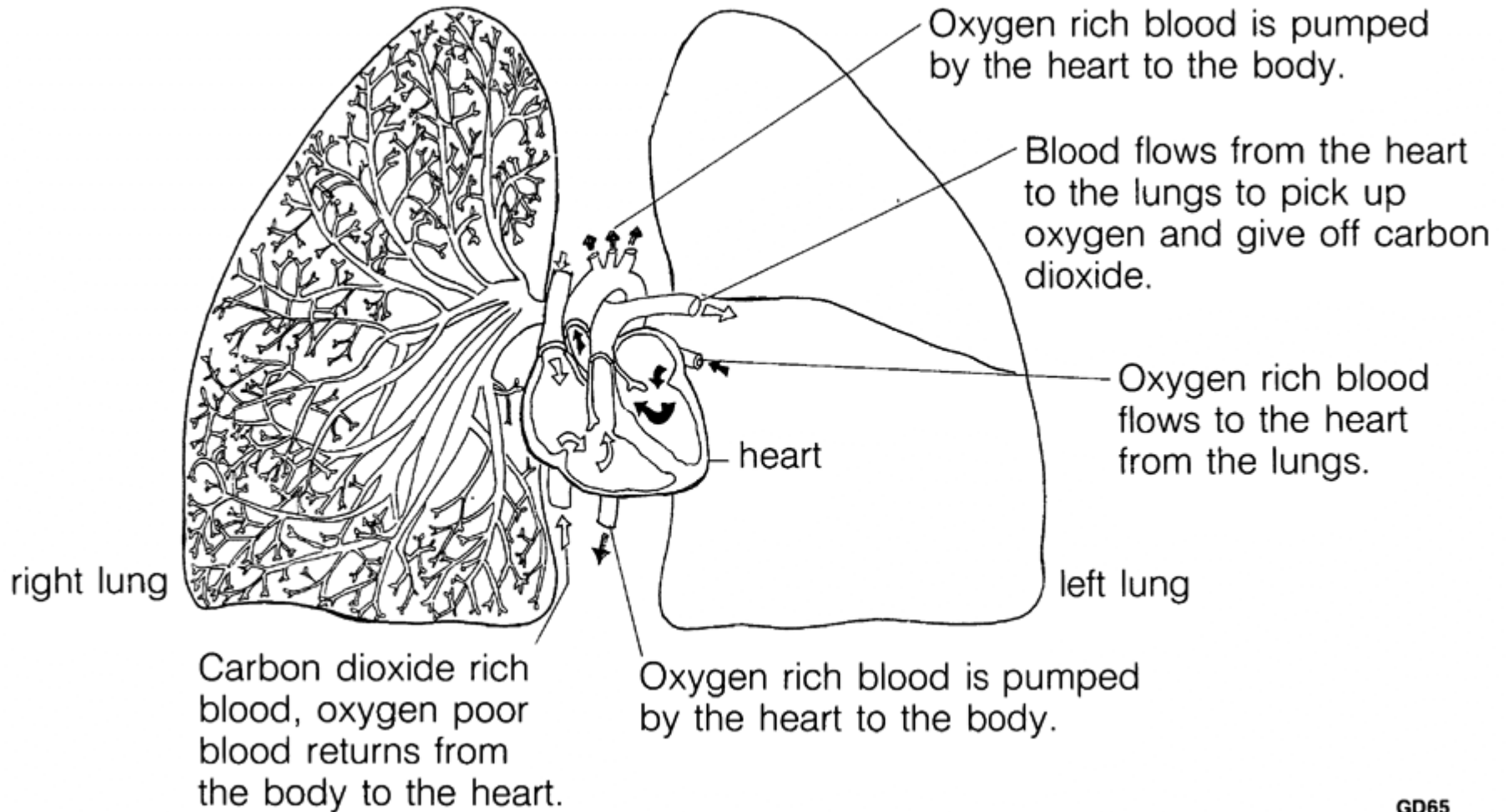
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BLOOD CIRCULATION



HEART-LUNG CIRCULATION

Black arrows represent oxygen rich blood. White arrows represent oxygen poor blood.



CARDIOVASCULAR DISEASES

Disease	Cause	Brief Description
hypertension	<ul style="list-style-type: none">- overweight- too much salt in diet- smoking- family history- lifestyle	<ul style="list-style-type: none">- blood vessels narrow causing the heart to beat harder and pump blood faster- over time the extra pressure can cause heart and blood vessel damage
arteriosclerosis	<ul style="list-style-type: none">- diet very high in saturated fats, e.g., dairy products, fatty meats	<ul style="list-style-type: none">- calcium build-up inside arteries causes hardening and thickening of walls of the arteries; decreased blood-flow due to narrowing of the passageways- poor circulation to legs and brain
atherosclerosis	<ul style="list-style-type: none">- overweight- smoking- diet- lifestyle	<ul style="list-style-type: none">- a form of arteriosclerosis caused by a build-up of fatty material called cholesterol- blood flow is reduced due to narrowing of arteries- deposits may occur in childhood
heart attack	<ul style="list-style-type: none">- vessel blockage	<ul style="list-style-type: none">- a sudden life-threatening condition caused by a blockage of one or more arteries supplying blood and oxygen to the heart causing death to the blocked heart muscle- the site of the blockage determines the seriousness, i.e., if a major artery becomes blocked death may occur
angina pectoris	<ul style="list-style-type: none">- stress, some blockage in vessels	<ul style="list-style-type: none">- a temporary decrease in oxygen supply to heart- chest pains and a feeling of suffocation may occur due to heavy physical or emotional stress

Disease	Cause	Brief Description
heart failure	<ul style="list-style-type: none"> - cardiovascular problems - salt 	<ul style="list-style-type: none"> - the heart is weakened from years of hypertension and other cardiovascular problems - it is unable to pump a normal amount of blood - blood backs up in the veins - swelling may occur in legs
stroke	<ul style="list-style-type: none"> - hypertension - atherosclerosis 	<ul style="list-style-type: none"> - drop in blood supply and oxygen to an area of the brain due to blockage of a vessel by a blood clot or rupture of a vessel - the part of the brain affected dies and death or damage may occur, i.e., speech problems, paralysis, loss of memory
rheumatic fever	<ul style="list-style-type: none"> - linked to acute streptococcus (i.e. a strep throat) 	<ul style="list-style-type: none"> - inflammation of heart valves and muscle tissue - this swelling can damage and scar heart valves - this damage may disturb blood flow through heart (i.e., rheumatic heart disease) in later years

WAYS TO CARE FOR THE CIRCULATORY SYSTEM

Positive health habits related to the circulatory system include:

- exercising each day (running, skipping, swimming, riding a bike)
- eating nutritious foods from all four food groups
- choosing snacks low in sugar, salt and fat
- participating in smoke-free programs
- playing in clean air
- drinking plenty of fluids (milk, juice, water)
- having regular medical check-ups
- reducing stress appropriately
- avoiding tobacco products and caffeine
- maintaining normal weight

OTHER DISEASES WITH WHICH STUDENTS MAY BE FAMILIAR

Problem	Communica- ble	Cause	Brief Description
AIDS	Yes	- virus - spread from person to person usually by sexual contact	- break down of the body's immune system which makes the person susceptible to many different diseases
arthritis	No	- Unknown	- swelling and inflammation of a joint or joints causing pain and stiffness
bronchitis	No/Yes	- irritants - spread from person to person by direct contact	- an inflammation of the mucous membrane of the bronchi with fluid and thick mucus accumulation; - signals: cold, hoarseness, coughing
cancer	No	- environmental, hereditary, biological factors	- normal body cells become malignant
chicken pox	Yes	- spread from person to person by direct contact, virus	- slight fever, headache, backache, loss of appetite, small red spots on the back or chest, spots enlarge and a vesicle of clear fluid appears, itchy
common cold	Yes	- spread from person to person by direct contact, virus	- upper respiratory infection, especially of nose and throat, - signals: headache, runny/stuffed nose, watery eyes, fever, cough
diabetes mellitus	No	- genetic and/or environmental predisposition, possible virus	- inability to make or utilize insulin to break down blood sugar - a controlled diet and/or insulin injections may be necessary
ear infection	Yes	- environmental predisposition; virus, bacteria, spread from person to person by direct contact	- severe pain, fever, draining of the ear
emphysema	No	- smoking, pollution	- lung disorder in which the bronchioles become plugged with mucus, onset - 40-80 years old
German Measles (Rubella)	Yes	- spread from person to person by direct contact, bacteria	- slight cold, some fever, sore throat, lymph nodes swell, rash on face and scalp, then to body and arms, spots do not run together - rash fades in 2-3 days

OTHER DISEASES WITH WHICH STUDENTS MAY BE FAMILIAR (CONTINUED)

Problem	Communi- cable	Cause	Brief Description
impetigo	Yes	- spread from person to person by direct contact, bacteria	- thin walled vesicle which ruptures and is covered by a honey-yellow crust, spreads in circles on exposed parts of the body
influenza (flu)	Yes	- spread from person to person by direct contact, virus	- fever, chills, headache, sore throat, cough, intestinal disorders, muscular pain
lice (pediculosis) (head lice)	Yes	- spread from person to person by direct contact	- visible white specks in the hairs of the back of the head, glands behind ears and back of the neck are enlarged, itching
meningitis	Yes	- spread from person to person by direct contact	- headache, vomiting, nausea, stiff neck, chills, fever, irritability, confusion and later convulsions
mumps	Yes	- spread from person to person by direct contact	- swelling of glands in the neck, pain, tenderness, fever, loss of appetite, back pains, headache
red measles	Yes	- spread from person to person by direct contact	- tired and uncomfortable, running nose, fever, pains in back and head, small white dots on the gums, rash at the hairline spreading down the body, spots may run together to form blotches
pneumonia	Yes	- virus, bacteria	- an infection of the lung tissue often accompanied by fluid, - signals breathing difficulty, fever and coughing
scabies	Yes	- spread from person to person by direct contact	- intense itching, more often at night, usually one month after initial infection
strep throat	Yes	- spread from person to person by direct contact, bacteria	- sore throat, headache, red pharynx, enlarged tonsils, flushed face
tuberculosis (TB)	Yes	- spread from person to person by direct contact	- mainly a disease of the lungs with development of lesions, - signals fever, weight loss, cough, sputum, blood, pain, difficult to breathe
tonsillitis	Yes	- spread from person to person by direct contact	- tonsils act as a defence against respiratory infections, signals include sore throat, enlarged tonsils, difficulty in swallowing