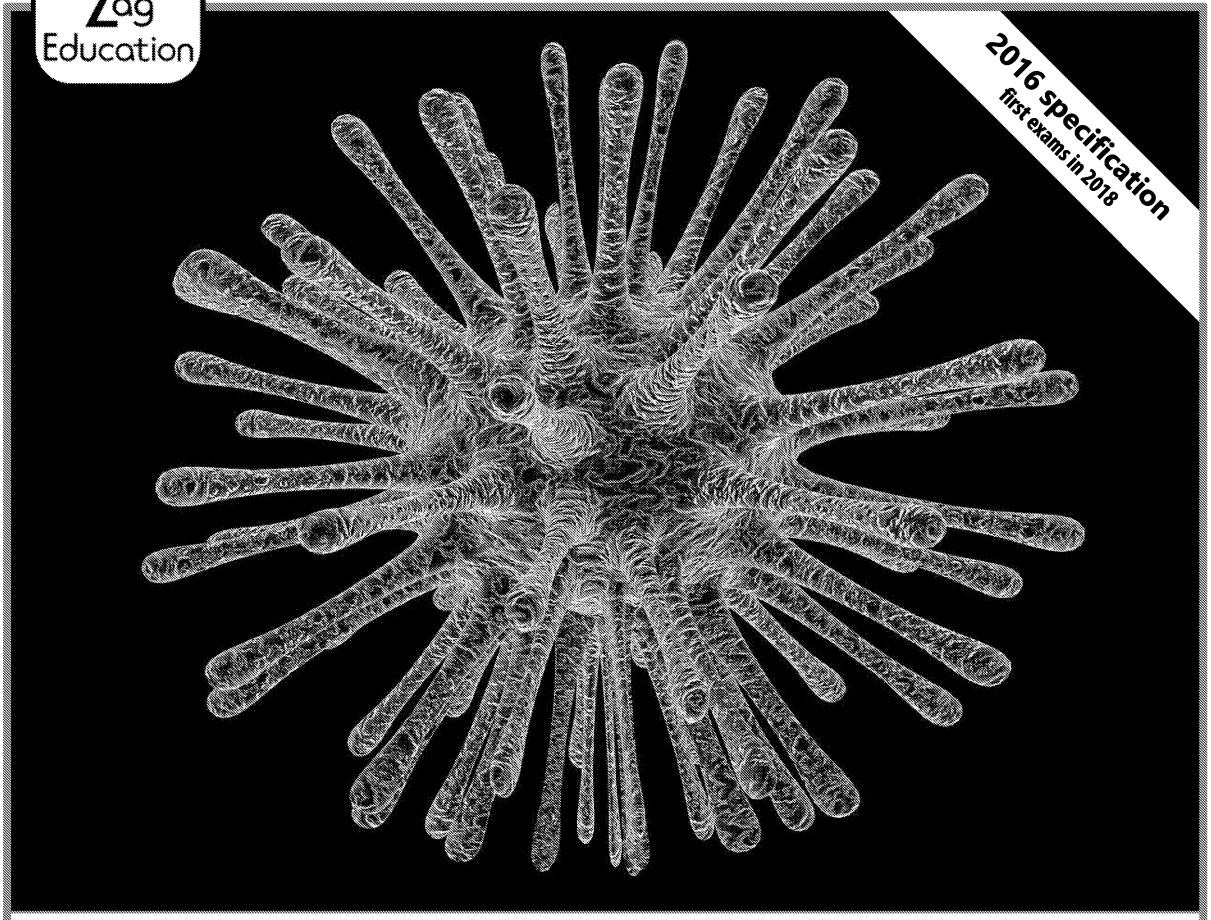
Zig Zag Education

Combined Science GCSE (9–1) | AQA | 8464



End-of-Topic A4 Quick-Mark Homeworks

for GCSE AQA Combined Science

Biology Topics 1–4

zigzageducation.co.uk **POD 12915**

Contents

Teacher's Introduction

These End-of-Topic Quick-Mark Homeworks are designed to test and consolidate students' knowledge of the **AQA GCSE (9–1) Combined Science** course, **Biology Topics 1–4**.

The first half of the Biology course is split into 12 topics, each covered by at least 40 questions, for a total of over 570 questions.

Remember!
Always check the exam board website for new information, including changes to the specification and sample assessment material.

The questions increase in difficulty across each homework, with an extension section at the bottom of each homework. The **Fundamentals** section on each homework is targeted at students aiming for grade 4–5. The **Challenge** section is targeted at students aiming for grade 6. The **Extension** section is targeted at students aiming for grade 7 and above. All Higher-tier-only content is in the extension section, so the main body of the homework is suitable for students completing Foundation-tier exams.

All of the topics are in the same order as in the specification.

Maths questions and some shorter-answer questions may contain working or explanation that is not required in the answer so that students can more easily understand and follow difficult answers.

The homeworks are intended to be used at the end of each topic, but they can also be used at the end of the course to aid revision. Alternatively, you may choose to use them as tests in class or for students to work through by themselves or in pairs to test their understanding of the course material.

The first set of fundamentals questions for each homework are presented at the back of the pack for use with weaker students who may struggle with the full homework. These can be cut down the middle to use one test at a time or test two topics at a time.

Answers are presented at the back of the resource, enabling students to check their answers, or teachers to mark students' work, quickly and easily.

I hope you find this resource useful in your teaching.

April 2025

Specification Reference Table

Homework	Title	Specification Reference
1	Cell Structure	4.1.1
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4	Digestion and Enzymes	4.2.1–4.2.2.1
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8	Infectious Disease	4.3.1.1–4.3.1.5
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11	Photosynthesis	4.4.1
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Topic 1 — Cell Structure

Fundamentals

1. Which organisms contain chloroplasts?
2. Inside which cell structure does aerobic respiration take place?
3. Name the structure that contains the genetic material in plant and animal cells.
4. Name the structure which controls what enters and leaves the cell.
5. Where does photosynthesis take place in plant cells?
6. Which cells do not have a nucleus but have a ring of DNA instead?
7. Name a structure in plant cells which contains cellulose.
8. Which cell types have a complex cell structure including a nucleus?
9. Name the structures inside bacteria which contain DNA, apart from the main ring of DNA.
10. Which cell types do not have mitochondria?
11. What do the ribosomes make?
12. Which cell types have ribosomes?
13. Explain how a plant cell differs from an animal cell.
14. Why is cellulose important for plant cells?
15. How are root hair cells adapted for absorption?
16. How is a sperm cell adapted for fertilising an egg?

Extension

1. Name the structures in plants which are responsible for the translocation of sugars.
2. A specimen is 5 µm wide; calculate the image width in mm if the magnification is ×200
3. What is the real width of an onion cell at ×100, in µm, if the image is 6.9 mm wide?
4. A chloroplast is 0.0022 mm long. Write this in standard form.
5. What is 0.005 mm in micrometres (µm)?
6. Name the structures which can transfer DNA from one bacterial cell to another.
7. Where in a muscle cell would energy be transferred from for contraction?
8. Where in a pancreatic cell would the hormone insulin be made?
9. What type of energy beam is used in powerful modern microscopes?

Topic 2 — Cell Division

Fundamentals

1. Name the X-shaped structures which contain DNA.
2. What is one complete cell division called?
3. Starting with one cell, how many cells would there be after two cell cycles?
4. What is the name for cell division where body cells divide to produce new cells?
5. Name the location where stem cells are found in humans.
6. Name the cells found in bone marrow which produce blood cells.
7. Where are stem cells found in plants?
8. Name the part of plants where growth occurs.
9. Name one advantage of using stem cells from yourself to repair part of your body.
10. Where are genes found?
11. What is the name for a large group of bacteria which came from one cell?
12. What is differentiation?
13. What is a clone?
14. Explain what happens before a cell can divide by mitosis.

C

1. What are the two of mitosis?
2. Which important a cell divides?
3. Which stem cells
4. Body cells have h each chromoson
5. Where would you in plants?
6. Which type of st
7. What is the name which can form a
8. Name the undiffe can form many c
9. Name the drugs
10. Why are chromo process of mitosis
11. What is the mean
12. What happens to lined up at the ce
13. How are chromo during mitosis?

Extension

1. What does DNA look like in a non-dividing cell?
2. What does DNA look like in a cell undergoing mitosis?
3. Genetically, how do the daughter cells produced during mitosis compare to the parent cell?
4. By which process would a damaged human liver repair itself?
5. How many chromosomes are present in a human gamete?
6. Why is it important for DNA to replicate during the cell cycle?
7. How could scientists produce insulin-producing cells for treating diabetes?
8. Which type genetically
9. Name a cell adult bone
10. What happe
11. Name two st the growth
12. What are th plants from
13. Give an appl from meriste

Topic 3 — Transport

Fundamentals

1. Name the process by which a plant cell gains water from the soil.
2. Which process causes perfume molecules to spread through the air?
3. By which process do we absorb s[illegible] across the walls of the sm[illegible]?
4. Name the structu[illegible] in plant roots which abso[illegible]ra[illegible].
5. Name[illegible]s which enters the blood in the lungs.
6. If the surface area increases, what happens to the rate of diffusion?
7. Name the only molecule which can move by osmosis.
8. Name the waste product which is removed from the blood by the kidneys.
9. Which process requires energy to move substances from low to high concentration?
10. Name the structures found in fish gills which increase the surface area of the gills.
11. If the temperature is increased, what happens to the rate of diffusion?
12. Where in the human body are the alveoli found?
13. What is diffusion?
14. What is active transport?
15. How are plant roots adapted f[illegible]al [illegible]rption of water?
16. Explain h[illegible]y th[illegible]e[illegible] are adapted for gas e[illegible]e.
17. What [illegible]ens to a red blood cell if it is placed into pure water?
18. How is the villus adapted for efficient absorption?

[illegible]

1. Name the proc[illegible] mineral ions fr[illegible]
2. Name the proc[illegible] when the cell i[illegible]
3. Name the proc[illegible] moves from th[illegible]
4. Calculate the s[illegible] cell with a surfa[illegible] of 2 cm^3.
5. Which cell stru[illegible] active transpor[illegible]
6. Name the proc[illegible] from the soil.
7. What is the eff[illegible] the rate of diff[illegible]
8. Name one feat[illegible] rate of diffusio[illegible]
9. Name the struc[illegible] gases to diffuse[illegible]
10. Which phrase d[illegible] some substanc[illegible]
11. How are fish gi[illegible] of diffusion?
12. What is a coun[illegible]
13. Why does a thi[illegible] absorption tha[illegible]
14. Why do fish gil[illegible] countercurrent[illegible]
15. Why does a vil[illegible]
16. Explain how a r[illegible]

Extension

1. What happens to plant cells when they are placed into pure water?
2. Calculate the surface area to volume ratio of a cell with a surface area of 10 cm^2 and a volume of 1.5 cm^3.
3. Name the process whereby water molecules move from a higher to a lower water potential.
4. What is the percentage increase if the starting mass is 25 g and the mass at the end is 45 g?
5. Name the independent variable for [illegible]ato chip osmosis experiment.
6. Name the process t[illegible] when a drop of ink is place[illegible] the ink particles spread out.
7. Whic[illegible] defines an organism consisting of many c[illegible]?
8. Name the process whereby amino acids are absorbed into the blood from the small intestine.
9. Why can a single-celled organism obtain all of its oxygen through its surface?
10. Which calculation f[illegible] potato chip osmosis
11. Where does gas ex[illegible] leaf's surface?
12. Name the process [illegible] across the villi.
13. How is the alveolus
14. Why can't root hai[illegible] the soil by diffusion[illegible]
15. In a fish gill, blood f[illegible] flows in the opposit[illegible] increase the rate of[illegible]
16. Explain the differen[illegible] and osmosis.
17. Why would an inhib[illegible] from taking up min[illegible]
18. Explain why unicell[illegible] or lungs.

Topic 4 — Digestion and Enzy

Fundamentals

1. What is the name for a group of cells which are working together to do the same job?
2. What is the name for a group of tissues working together to do the same job?
3. Name the organ system responsible for the breakdown and absorption of food.
4. Name the enzyme which breaks down lipids.
5. Name the enzyme which breaks down proteins.
6. Which organ releases hydrochloric acid?
7. Which organ produces bile?
8. Name a gland which produces amylase.
9. Name the reagent used to test for sugars.
10. Name the product formed when proteins are broken down by protease.
11. Which piece of laboratory equipment is used to control temperature?
12. What is the pH inside the stomach?
13. What is the name for the best pH an enzyme works at?
14. Describe how you would test for protein in a sample.
15. Describe the test for starch.
16. Describe the function of the villi tissues.
17. What are the two main functions of the small intestine?
18. What are enzymes?

Extension

1. Name the type of tissue found in the gut which secretes enzymes and hormones.
2. Name the organ which produces both amylase and protease.
3. A food gives positive results for both Benedict's and biuret reagents. Which food groups are present?
4. Name the enzyme which breaks down hydrogen peroxide.
5. What is the name given to a solution which maintains pH at the same level?
6. Where would glycerol and fatty acids be found in high concentration in the digestive system?
7. Where would amino acids be found in high concentration in the human digestive system?
8. Calculate the rate if time taken for amylase to break down all the starch is 60 seconds.
9. What term is used to describe the change in shape of an active site due to bonds breaking?

1. Name the type
2. Name the type helps to move
3. Name the subst which breaks d
4. Name the enzy
5. Name the orga
6. Name the orga
7. What is the na which an enzym
8. Which organ in reabsorbs wate
9. Calculate the ra cm^3 of oxygen
10. Enzymes give a reagent. Which
11. Bread gives a po iodine; therefo definitely prese
12. Name two orga
13. Name two orga
14. Explain the loc
15. Explain why en group and not
16. How does bile
17. How does a ve shape of an en

Topic 5 — Heart, Blood Vessels

Fundamentals

1. Which type of cell carries oxygen around the body?
2. Name the microscopic air sacs found in the lungs.
3. Name the organ system responsible for pumping blood around the body.
4. Which are the smaller chambers of the heart?
5. Name the type of blood vessel which carries blood away from the heart.
6. Name the artery which, if blocked, can cause a heart attack.
7. Which type of blood vessels carry blood back to the heart?
8. Which vein sends blood from the body back to the heart?
9. Which artery sends blood to the body from the heart?
10. How many chambers does the heart have?
11. How many ventricles does the human heart have?
12. Which drugs can lower levels of cholesterol in the blood?
13. Why would some people not want to take statins?
14. How do valves work?
15. How are red blood cells adapted for their function?
16. How are alveoli adapted for their function?
17. How do heart valves become damaged?
18. What causes the coronary artery to become narrow?

[illegible]

1. Name the cell fr… blood clotting.
2. Which vein retu… the lungs?
3. Which artery ta…
4. Name the blood… within the walls.
5. Name the cells w…
6. If the resting he… after exercise it … percentage incre…
7. Which chambe…
8. What sort of tiss… made from?
9. If 1200 ml of blo… 30 seconds, wha…
10. Which gas is at … than in arteries?
11. Which blood ves…
12. Name the proce… the blood.
13. Why does the h…
14. How do stents …
15. Why is the blood…
16. How are capilla… diffusion rates?
17. Explain why an … better than a hu…

Extension

1. Name the artery which supplies oxygen to the heart muscle.
2. Name the only vein which carries oxygenated blood.
3. If the heartbeat is irregular and changes from minute to minute, which part of the heart is not functioning properly?
4. Where is the natural heart pacemaker located?
5. Which blood vessels have thick muscular walls?
6. What is the rate of blood flow if 105 cm³ of blood flows through an artery in 45 minutes?
7. Give a risk factor for coronary heart disease.
8. Name the liquid part of blood.
9. If the heart rate is 105 bpm, and after resting it is 85 bpm, what is the percentage decrease (to 2 sf)?
10. Name the p… engulfed an…
11. Name the a… deoxygenate…
12. HIV infects c… released by t… HIV infection…
13. Explain what…
14. Why is bloo…
15. Explain why s…
16. Explain how …
17. How are lun… gas exchang…
18. What is the … double circu…

Topic 6 — Non-communicable Diseases a

Fundamentals

1. Name a factor which could contribute to an unhealthy lifestyle.
2. What is a tumour?
3. Name an example of a non-communicable disease.
4. Name an organ affected by cardiovascular disease.
5. Name an organ damaged by drinking too much alcohol.
6. Which blood vessel can become blocked, leading to a heart attack?
7. Name a substance found in food which may lead to the narrowing of arteries.
8. Name a treatment for heart failure.
9. Name a drug used to help prevent heart attacks.
10. Name a disease linked to the use of sunbeds.
11. Cancer is the uncontrolled growth of what?
12. Explain how a stent works.
13. Explain what is meant by the phrase 'non-communicable disease'.
14. Explain what is meant by a risk factor.
15. Explain an advantage of using a mechanical heart.
16. What is a communicable disease?
17. Explain a disadvantage of a stent operation.

C

1. What is meant by
2. What is cancer?
3. Which type of ce
4. Name a drug wh
5. Name a side effe
6. Which blood ves heart disease?
7. Which substance by statins?
8. Name the good f
9. Which importan rays, leading to m
10. Name a risk facto
11. Name a risk facto
12. What is the diffe valve and a biolo
13. Explain a risk invo
14. Why would a hea
15. Explain why using skin cancer.
16. Why have cance
17. Explain how can

Extension

1. Which non-communicable disease causes symptoms including excessive thirst, hunger and fatigue?
2. Which type of tumour is localised and contained within a membrane?
3. Which type of cholesterol is bad for you?
4. Name two substances delivered to heart muscle by the coronary arteries.
5. Name an effect of chronic alcoholism on the body.
6. Name two risk factors for type 2 diabetes.
7. Name the process leading to a blood clot.
8. Name an example of a carcinogen.
9. Name an effect o
10. By which organ s to other parts of t
11. Name a virus wh
12. How do diabetes
13. Explain the adva
14. Explain why the artery is blocked
15. How do coronary
16. Explain why mal dangerous than

Topic 7 — Plant Tissues, Organs a

Fundamentals

1. Name the plant tissue which transports water and ions.
2. Name the plant tissue which transports sugars.
3. Name the plant organ where photosynthesis take
4. Where tr ation take place?
5. Name nt organ which absorbs nitrate ions.
6. From which plant organ does evaporation of water take place?
7. Where are sugars translocated from?
8. Name the small pores in a leaf where gas exchange takes place.
9. Name a mineral ion needed for making proteins in plants.
10. What effect does increased temperature have on the rate of transpiration?
11. What is transpiration?
12. Describe the structure of xylem.
13. What is the job of guard cells in leaves?
14. Why do plants close their stomata at night?
15. What is translocation?
16. How do plants a eaten by ar

Cl

1. Name the plant tissue
2. me the plant tissue most chloroplasts.
3. Name the cells which
4. What is the name for the plant and out of t
5. Guard cells are found plant leaf?
6. Name the plant virus the leaves.
7. What effect does incr of transpiration?
8. Name the mineral ion
9. Name the tissue foun
10. Name the outer cove prevent water loss.
11. Which tissue consists
12. Why don't plants grow of chlorophyll?
13. How could you measu
14. w are palisade cell
15. Why do plants which slower rate than plan
16. How are guard cells a of stomata?
17. Describe the structure

Extension

1. Name the plant tissue which transports sucrose.
2. Name the plant organ where potassium ions are absorbed.
3. Name a mineral ion found in plant fertiliser.
4. Name the waterproof substance found on the upper surface of leaves.
5. Which plant cells have a thicker cell wall on one side of the cell?
6. Which tissue type is found on the surface of organs in both plants and animals?
7. How does increased airflow affect th of transpiration?
8. What colour do pl turn if magnesium ions a en the soil?
9. How does increase of transpiration?
10. Name the plant tis where cells under
11. Explain how increa the rate of transpi
12. Explain why decre of transpiration.
13. How do guard cells
14. Why do plants infe chlorophyll have s
15. How is xylem adap
16. Explain why plants underside of their

Topic 8 — Infectious Disea

Fundamentals

1. What is the name for a microorganism which can cause a disease?
2. How can the influenza virus spread from one person to another?
3. Which virus can cause AIDS?
4. Name a bacterium that can cause food poisoning.
5. How has disease measles been controlled in the U
6. What is the name of a dead or weakened form of a pathogen used to protect us?
7. Which of these pathogens has the smallest size – bacterium, virus or fungus?
8. Name one symptom of malaria.
9. Name one symptom of measles.
10. What is damaged by HIV, leading to infections?
11. Explain how an infectious disease could be spread.
12. Explain how mosquitoes spread malaria.
13. Explain how mosquito nets prevent malaria.
14. Why is hand-washing important for our health?
15. Why is vaccination important?

Extension

1. Name ga of plants.
2. Whic ment would be given for a plant fungal disease?
3. Name the disease which is sexually transmitted and can be treated with antibiotics.
4. Name a disease of tomatoes which is caused by a virus.
5. Which system of the body is attacked by HIV?
6. Name a fungal disease of humans caused by direct contact.
7. How can someone become infected with salmonella?
8. Name the vector for malaria.
9. What is a (disease)
10. Which kingdom d
11. Which sexually tra individuals more li other infections?
12. Explain how the sp
13. How do viruses da
14. Why is it becomin treat gonorrhoea?
15. Explain how vacci can prevent food p
16. Explain how bacte

Topic 9 — Human Defence and Va

Fundamentals

1. Which part of the body prevents the entry of pathogens?
2. Name the substance in the trachea which traps pathogens.
3. Which system of the body d[illegible] against pathogens?
4. Which [illegible] protect against pathogens?
5. Name [illegible] proteins released by the body which combine with antigens.
6. Name the marker found on pathogens which stimulates an immune response.
7. MMR protects people against measles, mumps and which other disease?
8. What does a vaccine consist of?
9. Which type of blood cell release antibodies?
10. Which word is used to describe an outbreak of a disease?
11. What do we call a programme that immunises people against diseases?
12. What is immunity?
13. Explain how the stomach protects the body from disease.
14. Apart from being a barrier, how do[illegible] skin provide protection against pathogens?
15. How does the nose prevent the entry of pathogens?
16. What [illegible] possible problem with vaccination?

C

1. Name the substance [illegible] kills bacteria.
2. Name a structure w[illegible] defend the body.
3. What do white bloo[illegible] with antigens?
4. Name the substance [illegible] pathogen which stim[illegible]
5. What is the process [illegible] engulf bacteria?
6. Which cells of the im[illegible] remember a pathoge[illegible]
7. Name an illness whi[illegible] vomiting and diarrho[illegible]
8. Name a disease whi[illegible] by vaccination.
9. Which plant disease [illegible] develop on the leave[illegible]
10. Which type of molec[illegible]
11. What do vaccination[illegible]
12. Explain how skin pro[illegible]
13. Explain an advantage[illegible]
14. Explain how white b[illegible]
15. Explain what happen[illegible] blood cells.
16. Explain what it mean[illegible] particular disease.
17. How do antitoxins w[illegible]

Extension

1. What happens to bacteria which have been brought up by cilia and mucus?
2. Name the organ of the digestive system which protects against pathogens.
3. Which hostile environmental condition can destroy pathogens?
4. Which type of white blood cell synthesises antibodies?
5. Which cells are left in the body after a first en[illegible] with an antigen?
6. How are most vaccines admi[illegible]?
7. Name for a large ou[illegible] of influenza across several [illegible]
8. Which [illegible] destroys a pathogen during phagocytosis?
9. Which word des[illegible] allergic reaction[illegible]
10. Which word des[illegible] antigen will bind[illegible]
11. Explain how a va[illegible] immune respons[illegible]
12. How does the se[illegible] differ from the [illegible]
13. Explain how vac[illegible] protects the un[illegible]
14. Why are most va[illegible]
15. Why do antibod[illegible]
16. Why do antibod[illegible] biuret test?

Topic 10 — Drugs and Drug Disc

Fundamentals

1. Name the drugs which give pain relief.
2. What type of drug is penicillin?
3. Which word describes bacteria that cannot be killed by an antibiotic?
4. Which drugs can kill bacteria?
5. Name the serious [illegible] infection which cannot be treated by an antibiotic.
6. Name [illegible] used to reduce a fever.
7. Name the type of pathogen which causes a sore throat which cannot be treated with antibiotics.
8. What is the name given to the sugar pill given to the control group in a drug trial?
9. What do we call the testing carried out on a drug to determine its safety and efficacy?
10. What would drugs be tested on before they are used for animal testing?
11. What does 'double-blind' mean?
12. Explain why painkillers do not cure diseases.
13. Explain why antibiotics will not treat viral illnesses.
14. What does efficacy mean?
15. What is a clinical trial used for?
16. What is meant by drug dosage?

1. What are th known as?
2. Name the ty makes antib
3. Name a com
4. Which hear foxglove pla
5. Name an an product of m Alexander F
6. From which made from?
7. Which type by antibiotic
8. Explain wha
9. What is mea
10. Why must r peer review?
11. Why are ant so dangerou
12. Why would on animals?

Extension

1. Name the process whereby the DNA base sequence is altered.
2. Which phrase describes a patient feeling better although they were given a sugar pill?
3. What are drugs tested on before they are administered to animals or people?
4. State two types of people that would be used at the clinical stage of drug testing.
5. When bacteria mutate and they cannot be killed by an antibiotic, they have developed this.
6. Which process involves other scientists checking your results and conclusions, prior to publication?
7. State two fa attempting t drug trials.
8. Under what clinical trial
9. How does th
10. How can do strains of ba
11. How do resi
12. Why are vir antiviral dru

Topic 11 — Photosynthesis

Fundamentals

1. Which green pigment found in plants can trap light energy?
2. Which sugar is produced in photosynthesis?
3. Name the gas given off during photosynthesis.
4. Name a reactant of photosynthesis which is a gas.
5. What does low light intensity have on the rate of photosynthesis?
6. What effect does increasing the temperature have on the rate of photosynthesis?
7. Name the large molecule which is the stored form of energy in plants.
8. Name the large molecule found in plant cell walls.
9. Where does most of the photosynthesis take place in a plant?
10. In which cells does photosynthesis take place?
11. Which cell parts contain chlorophyll?
12. How would you measure the gas given off in photosynthesis?
13. How would you test for starch formed in photosynthesis?
14. Fruits contain sugars. How would you test for the presence of sugars in fruit?
15. Explain why sugars formed in photosynthesis are moved to the roots.
16. What would sugars be needed for in the roots of a plant?

[illegible]

1. What is the name
photosynthesis
2. What is the role
3. Which aquatic
photosynthesis
4. What is the test
as glucose?
5. Where do plants
6. Through which
plants obtain
7. What colour do
tested with iod
8. Which part of th
energy storage?
9. Where does the
come from?
10. Limiting factors
intensity and w
11. Photosynthesis
type of energy?
12. How would you
investigation?
13. How can temper
14. Explain why hig
rate of photosy
15. Why is plant gro
16. Explain why sta
storage molecu
17. How does a pla

Extension

1. What type of chemical reaction is photosynthesis?
2. How many carbon atoms does a glucose molecule have?
3. Which energy-releasing process uses the glucose formed in photosynthesis?
4. In the pondweed photosynthesis experiment, which substance provides carbon dioxide?
5. Cellulose is made from which important sugar?
6. How is the heat from the lamp [illegible] photosynthesis experiment?
7. When calculating the rate of photosynthesis, which two parameters would you measure?
8. Which molecules are denatured at high temperatures, limiting plant growth?
9. If light intensity is the independent variable, name two control variables.
10. Calculate the light lamp from the
11. Plants convert mineral ion?
12. Plants deprived leaves due to
13. How would you to determine
14. Explain how a crop yield.
15. Explain how you dioxide and
16. Explain how you photosynthesis
17. How are distance inverse square

Topic 12 — Respiration

Fundamentals

1. Which cells carry out respiration?
2. Name the life process which releases energy.
3. Name the gas given off during respiration.
4. Which gas is needed for respiration?
5. What does anaerobic me
6. What does aer
7. Whic ct anaerobic respiration cause e fatigue?
8. Respiration involves the breakdown of which substance?
9. What does respiration release apart from carbon dioxide and water?
10. Which animals need energy to maintain a constant body temperature?
11. Explain why breathing rate needs to go up during exercise.
12. Explain what is meant by breathing rate.
13. Explain why muscles need respiration.
14. Explain what is meant by metabolism.
15. Explain why the rate of respiration increases during exercise.
16. Explain why aerobic respiration is better than anaerobic respiration.

C

1. Which organ store
2. In which form do m
3. Name a product of
4. What is broken do
5. Name the molecul aerobic respiration
6. Which commercial respiration for its m
7. Energy is released
8. During exercise, bl the body?
9. Name the organ w blood flow.
10. Which chemical re carbon dioxide?
11. Which gas is at a h
12. Why is respiration
13. Why is the rate of temperature is too
14. Why does the puls
15. What happens to m
16. Explain why the ox after exercise.

Extension

1. Which type of chemical reaction is respiration?
2. What is released in an exothermic reaction?
3. Name the storage molecule which is broken down to release glucose in the liver.
4. Why is a layer of liquid paraffin used in yeast fermentation experiments?
5. Cells involved in active transport contain large numbers of which cell structures?
6. If one reactant in respiration is oxygen, name the other.
7. Which small molecules are built into proteins using energy from respiration?
8. How would the rate of respiration be measured in a yeast fermentation experiment?
9. What gas causes bread to rise?
10. What is the ch
11. Name the ana and beer.
12. Plant roots gro glucose → carb
13. How would yo taking pulse ra
14. Why does ana much energy
15. Explain how th after exercise
16. Why do birds
17. Why does the change, even

Fundamentals Tests

Topic 1 — Cell Structure

1	Which organisms contain chloroplasts?
2	Inside which cell structure does aerobic respiration take place?
3	Name the structure that contains genetic material in plant and animal
4	Name the structure that controls what enters and leaves a cell.
5	Where does photosynthesis take place in plant cells?
6	Which cells do not have a nucleus but have a ring of DNA instead?
7	Name a structure in plant cells which contains cellulose.
8	Which cell types have a complex cell structure including a nucleus?
9	Name the structures inside bacteria which contain DNA, apart from the n
10	Which cell types do not have mitochondria?
11	What do the ribosomes make?
12	Which cell types have ribosomes?
13	Explain how a plant cell differs from an animal cell.
14	Why is cellulose important for plant cells?
15	How are root hair cells adapted for absorption?
16	How is a sperm cell adapted for fertilising an egg?

Topic 2 — Cell Division

1	Name the X-shaped structures which contain DNA.
2	What is the complete cell division called?
3	Starting with one cell, how many cells will there be after two cell cycles?
4	What is the name for cell division where body cells divide to produce new
5	Name a location where stem cells are found in humans.
6	Name the cells found in bone marrow which produce blood cells.
7	Where are stem cells found in plants?
8	Name the part of plants where growth occurs.
9	Name one advantage of using stem cells from yourself to repair part of yo
10	Where are genes found?
11	What is the name for a large group of bacteria which came from one cell?
12	What is differentiation?
13	What is a clone?
14	Explain what happens after a cell can divide by mitosis.

Topic 3 — Transport

1	Name the process by which a plant cell gains water from the soil.
2	Which process causes perfume molecules to spread through the air?
3	By which process do we absorb sugar (glucose) across the walls of the sm
4	Name the structures found in plant roots which a[illegible] mineral ions.
5	Name the gas which enters the blood in t[illegible].
6	If the surface area increas[illegible] happens to the rate of diffusion?
7	Name the only m[illegible] which can move by osmosis.
8	Nam[illegible] waste product which is removed from the blood by the kidneys
9	Whi[illegible]ocess requires energy to move substances from low to high conc
10	Name the structures found in fish gills which increase the surface area of t
11	If the temperature is increased, what happens to the rate of diffusion?
12	Where in the human body are the alveoli found?
13	What is diffusion?
14	What is active transport?
15	How are plant roots adapted for the absorption of water?
16	Explain how the alveoli are adapted for gas exchange.
17	What happens to a red blood cell if it is placed into pure water?
18	How is the villus adapted for efficient absorption?

Topic [illegible] — Digestion and Enzymes

1	What is the n[illegible] a group of cells which are working together to do th
2	Wh[illegible]e name for a group of tissues working together to do the same j
3	Name the organ system responsible for the breakdown and absorption of
4	Name the enzyme which breaks down lipids (fats).
5	Name the enzyme which breaks down proteins.
6	Which organ releases hydrochloric acid?
7	Which organ produces bile?
8	Name a gland which produces amylase.
9	Name the reagent used to test for sugars.
10	Name the product formed when proteins are broken down by protease.
11	Which piece of laboratory equipment is used to control temperature?
12	What is the pH inside the stomach?
13	What is the name for the best pH an enzyme works at?
14	Describe how you would test for protein in a sample.
15	Describe the test for starch.
16	Describe the function of glandular tissues.
17	What are the two main functions of the small intestine?
18	What are enzymes?

Topic 5 — Heart, blood vessels, CH

1	Which type of cell carries oxygen around the body?
2	Name the microscopic air sacs found in the lungs.
3	Name the organ system responsible for pumping blood around the body.
4	Which are the smaller chambers of the heart?
5	Name the type of blood vessel which carries blood away from the heart.
6	Name the artery which if blocked can cause a heart attack.
7	Which type of blood vessels carry blood back to the heart?
8	Which organ sends blood from the body back to the heart?
9	Which artery sends blood to the body from the heart?
10	How many chambers does the heart have?
11	How many ventricles does the human heart have?
12	Which drugs can lower levels of cholesterol in the blood?
13	Why would some people not want to take statins?
14	How do valves work?
15	How are red blood cells adapted for their function?
16	How are alveoli adapted to their function?
17	How can heart valves become damaged?
18	What causes the coronary artery to become narrow?

Topic 6 — Non-communicable Diseases and H

1	Name a factor that could contribute to an unhealthy lifestyle.
2	What is a tumour?
3	Name an example of a non-communicable disease.
4	Name an organ affected by cardiovascular disease.
5	Name an organ damaged by drinking too much alcohol.
6	Which artery can become blocked, leading to a heart attack?
7	Name a substance found in food which may lead to the narrowing of arteries.
8	Name a treatment for heart failure.
9	Name a drug used to help prevent heart attacks.
10	Name a disease linked to the use of sunbeds.
11	Cancer is the uncontrolled growth of what?
12	Explain how a stent works.
13	Explain what is meant by the phrase 'non-communicable disease'.
14	Explain what is meant by a risk factor.
15	Explain a disadvantage of using a mechanical heart.
16	What is a non-communicable disease?
17	Explain a disadvantage of a stent operation.

Topic 7 — Plant Tissues, Organs and D

1	Name the plant tissue which transports water and ions.
2	Name the plant tissue which transports sugars.
3	Name the plant organ where photosynthesis takes place.
4	Where does translocation take place?
5	Name the plant organ which absorb[s] [nitrate] ions.
6	From which plant organ [does] [transpi]ration of water take place?
7	Where are sug[ars] [trans]ported from?
8	Nam[e] [the] pores in a leaf where gas exchange takes place.
9	Nam[e a] mineral ion needed for making proteins in plants.
10	What effect does increased temperature have on the rate of transpiratio
11	What is transpiration?
12	Describe the structure of xylem.
13	What is the job of guard cells in leaves?
14	Why do plants close their stomata at night?
15	What is translocation?
16	How do plants avoid being eaten by animals?

Topic 8 — In[fe]ctious Disease

1	What is the name for a microorg[anism] [that] can cause a disease?
2	How can the influenza [vir]us [be] spread from one person to another?
3	Which [v]irus [can] cause AIDS?
4	Nam[e a] bacterium that can cause food poisoning.
5	How has the disease measles been controlled in the UK?
6	What is the name of a dead or weakened form of a pathogen used to pro
7	Which of these pathogens has the smallest size – bacterium, virus or fung
8	Name one symptom of malaria.
9	Name one symptom of measles.
10	What is damaged by HIV, leading to infections?
11	Explain how an infectious disease could be spread.
12	Explain how mosquitoes spread malaria.
13	Explain how mosquito nets prevent malaria.
14	Why is hand-washing important for our health?
15	Why is vaccination important?

Topic 9 — Human Defence and Vaccin

1	Which part of the body prevents the entry of pathogens?
2	Name the substance in the trachea which traps pathogens.
3	Which system of the body defends against pathogens?
4	Which blood cells protect against pathogens?
5	Name the proteins released by the b[illegible] which combine with antigens.
6	Name the marker found o[illegible] which stimulates an immune resp
7	MMR protects [illegible] against measles, mumps and which other disease?
8	Wh[illegible] a vaccine consist of?
9	Whic[illegible]ype of blood cell release antibodies?
10	Which word is used to describe an outbreak of a disease?
11	What do we call a programme that immunises people against diseases?
12	What is immunity?
13	Explain how the stomach protects the body from disease.
14	Apart from being a barrier, how does the skin provide protection against
15	How does the nose prevent the entry of pathogens?
16	What is a possible problem with vaccination?

Topic 10 — Dru[illegible] Drug Discov

1	Name the drugs which give pain r[illegible]
2	What type of drug is p[illegible]illin?
3	Which word [illegible]s bacteria that cannot be killed by an antibiotic?
4	Wh[illegible]gs can kill bacteria?
5	Name the serious bacterial infection which cannot be treated by any anti
6	Name a drug used to reduce a fever.
7	Name the type of pathogen which causes a sore throat which cannot be t
8	What is the name given to the sugar pill given to the control group in a dr
9	What do we call the testing carried out on a drug to determine its safety a
10	What would drugs be tested on before they are used for animal testing?
11	What does 'double-blind' mean?
12	Explain why painkillers do not cure diseases.
13	Explain why antibiotics will not treat viral illnesses.
14	What does efficacy mean?
15	What is a clinical trial used for?
16	What is meant by drug d[illegible]sage?

Topic 11 — Photosynthesis

1	Which green pigment found in plants can trap light energy?
2	Which sugar is produced in photosynthesis?
3	Name the gas given off during photosynthesis.
4	Name a reactant of photosynthesis which is a gas.
5	What effect does low light intensity have on the rate of photosynthesis?
6	What effect does increasing the temperature have on the rate of photosy
7	Name the large molecule which is the stored form of energy in plants.
8	Name the large molecule found in plant cell walls.
9	Where does most of the photosynthesis take place in a plant?
10	In which cells does photosynthesis take place?
11	Which cell parts contain chlorophyll?
12	How would you measure the gas given off in photosynthesis?
13	How would you test for starch formed in photosynthesis?
14	Fruits contain sugars. How would you test for the presence of sugars in fr
15	Explain how sugars formed in photosynthesis are moved to the roots.
16	What would sugars be needed for in the roots of a plant?

Topic 12 — Respiration

1	Which cells carry out respiration?
2	Name the life process which releases energy.
3	Name the gas given off during respiration.
4	What is needed for respiration?
5	What does anaerobic mean?
6	What does aerobic mean?
7	Which product of anaerobic respiration causes muscle fatigue?
8	Respiration involves the breakdown of which substance?
9	What does respiration release apart from carbon dioxide and water?
10	Which animals need energy to maintain a constant body temperature?
11	Explain why breathing rate needs to go up during exercise.
12	Explain what is meant by breathing rate.
13	Explain why muscles need respiration.
14	Explain what is meant by metabolism.
15	Explain why the rate of respiration increases during exercise.
16	Explain why aerobic respiration is better than anaerobic respiration.

Answers

Topic 1 — Cell Structure

Fundamentals

1. Plants
2. Mitochondrion/mitochondria
3. Nucleus
4. Cell membrane
5. Chlorop
6. Bacteri ryotes
7. Cell wall
8. Eukaryotes
9. Plasmids
10. Prokaryotes/bacteria
11. Protein
12. Eukaryotes and prokaryotes
13. A plant cell has a cell wall / a permanent vacuole / chloroplasts for photosynthesis – an animal cell does not
14. Cellulose is very strong, forms cell walls and provides support for the cell
15. They have a large surface area / many mitochondria
16. A sperm cell has a tail for swimming / mitochondria for energy / contains digestive enzymes to break down the outer layer of the egg

Challenge

1. Mitochondrion/mitochondria
2. Chlorophyll
3. Circle/ring of DNA / [illegible]d
4. Prokar ac a
5. Eukaryo
6. Eukaryotes
7. Image size divided by real size
8. Ribosome
9. Root hair (cells)
10. Increased magnification / increased resolution
11. 2×10^{-3}
12. An electron microscope uses electrons, which have a shorter wavelength
13. Nerve cells have long processes with many connections to other cells
14. Muscle cells have many mitochondria to supply energy
15. Xylem cells are hollow to allow fluids/water and ions to flow through them
16. So there is more space for oxygen inside the cell

Extension

1. Phloem
2. 5 × 200 = 1,000
3. 6.9 mm divided
4. 2.2×10^{-3} mm
5. 0.005 × 1000 = 5
6. Plasmids
7. Mitochondrion/
8. Ribosome / end
9. Electron beam
10. Resolution / res
11. Active transport
12. Osmosis
13. So that light ray the eye
14. Many structures light energy, as Electrons have a higher, meaning
15. DNA is invisible/ see it
16. Phloem are long cytoplasm. Suga through the cyto to the next for t provide energy
17. Resolution is lim
18. Onion cell struct nucleus and oth can be distingui

Topic 2 — Cell Division

Fundamentals

1. Chromosomes
2. Cell cycle
3. 4
4. Mitosis
5. Embryo, bone marrow
6. Stem cells
7. Meristem, shoot tip, root tip
8. Meristem
9. No rejection / they are genetically identical to you
10. On chromosomes
11. Colony
12. Process by which a cell changes and becomes specialised for its job
13. A cell / an organism which is genetically identical to another
14. Chromosomes must copy themselves / DNA must be replicated / chromosomes become visible and cell structures are copied

Challenge

1. Daughter cells
2. DNA
3. Bone marrow
4. Two
5. Meristem, shoot tip, root tip
6. Embryonic stem cells
7. Meristem
8. Stem cells
9. Antibiotics
10. Identical chromatids / one of an arm on the X shape
11. Average time taken for one cell to divide into two cells
12. Chromosomes (chromatids) separate and move to opposite ends of the cell
13. They are attached to (spindle) fibres which pull the chromosomes (chromatids) to opposite ends of the cell

Extension

1. Spread out throughout in chromosomes
2. Coiled up / condensed
3. They are identical
4. Mitosis
5. 23
6. So that when cells divide the correct number of
7. Use embryonic stem
8. Therapeutic clon
9. Blood cell
10. Chromosomes must replication / cell structures (such as
11. Ribosomes, mitoch
12. Clones can be produced used to preserve rare select clones which
13. To protect rare species disease-resistant

Topic 3 — Transport

Fundamentals

1. Osmosis
2. Diffusion
3. Active transport / facilitated diffusion
4. Root hair cells
5. Oxygen
6. Increases
7. Water
8. Urea
9. Active tr[illegible]rt
10. Gill fila[illegible]amellae
11. Increase[illegible]oes faster / speeds up
12. Lungs
13. The spreading out of particles in a solution or a gas, which results in a net movement from an area of higher concentration to an area of lower concentration
14. The movement of substances against the concentration gradient / from an area of low concentration to an area of high concentration using energy/ATP
15. The roots have root hairs to increase the surface area for osmosis
16. Alveoli have thin walls, a large surface area and an efficient blood supply
17. It takes up water by osmosis and will burst
18. It has a thin surface, a large surface area, and an efficient blood supply

Challenge

1. Active transport
2. Osmosis
3. Diffusion
4. 6/2 = 3, so the surface area to volume ratio = 3:1
5. Mitochondrion/mitochondria
6. Osmosis
7. Rate of diffusion increases
8. They are thin/flat
9. Stoma/stomata
10. Partially permeable
11. Gills have a large surface area / thin surface / rich blood supply
12. A current in which one liquid flows in the opposite direction to another
13. A thin surface has a short diffusion distance/pathway
14. To maintain a concentration gradient for oxygen along the length of the gill
15. A dense capillary network means th[illegible]s a steeper concentration gradient, so [illegible]ptio[illegible]s faster
16. Active transport usi[illegible]gy/ATP from respiration

Extension

1. They take in / ab[illegible]
2. 10/1.5 = 6.67, so [illegible] = 6.67:1 or 1:0.1[illegible]
3. Osmosis
4. 45 – 25 = 20; per[illegible] = 80 % increase
5. Concentration o[illegible]
6. Diffusion
7. Multicellular
8. Active transport
9. It has a large sur[illegible]
10. Percentage char[illegible]
11. Stomata
12. Respiration
13. Thin walls so a sh[illegible] a rich blood supp[illegible] concentration g[illegible]
14. Because the con[illegible] than in the root h[illegible]
15. Blood flowing in t[illegible] maintains the co[illegible]
16. Diffusion does no[illegible] membrane; in os[illegible] are involved
17. The inhibitor wo[illegible] and active transp[illegible]
18. Unicellular organi[illegible] area to volume r[illegible] requirements by [illegible]

Topic 4 — Digestion and Enzymes

Fundamentals

1. Tissue
2. Organ
3. Digestive system
4. Lipase
5. Protease
6. Stomach
7. Liver
8. Salivary gland / panc
9. Benedict
10. Amino
11. Water b electric heater
12. 2
13. Optimum
14. Add biuret reagent – if colour changes from blue to purple, protein is present
15. Add iodine solution – if the colour changes from brown to blue-black, starch is present
16. Glandular tissues secrete enzymes and hormones
17. Produces/releases enzymes, and absorbs digested food
18. Enzymes speed up chemical reactions in the body and remain unchanged

Challenge

1. Epithelial/epithelium
2. Muscular tissue / smooth muscle
3. Pepsin/protease
4. Amylase/carbohydrase
5. Gall bladder
6. Small intestine
7. Optimu per
8. Large in
9. Rate = amount changed ÷ time; 20/40, so rate is 0.5 cm^3 per second or 0.5 cm^3/s
10. Proteins
11. Starch
12. Stomach / pancreas / small intestine
13. Salivary glands, pancreas
14. Enzymes have an active site which only the correct shape of substrate will fit
15. An enzyme has an active site whose shape will only fit one substrate / food group
16. Bile emulsifies lipids, thereby increasing the surface area for lipase to work
17. A high temperature increases kinetic energy, causing the bonds holding the shape to break

Extension

1. Glandular tissue
2. Pancreas
3. Reducing sugar a
4. Catalase
5. A buffer / buffe
6. Small intestine
7. Stomach / small
8. Rate = amount c
   we say that rate
   = 0.017 s^{-1}.
9. Denaturation/de
10. Amino acids
11. Glycerol and fat
12. Induced fit is wh
    shape slightly du
    substrate can ha
13. The active site o
    fits starch but no
14. Products of dige
    build up larger m
    to release energy
15. Bonds are broke
    all bonds have t
    broken at lower t
16. Because an enzy
    without being ch
17. Bile salts are alk
    lipase action / e
    of lipids for faste

Topic 5 — Heart, Blood Vessels, CHD

Fundamentals

1. Red blood cell / erythrocyte
2. Alveoli
3. Circulatory system
4. Atria/atrium
5. Artery
6. Coronary artery
7. Veins
8. Vena cava
9. Aorta
10. 4
11. 2
12. Statins
13. Side effects / the statins might not work
14. They prevent the backflow of blood
15. They have a large surface area for absorbing oxygen; they do not contain a nucleus, which allows more space for carrying oxygen
16. Large surface area, thin walls and a rich supply of blood
17. An infection or a heart attack can weaken heart valves
18. A build-up of fatty deposits in the artery wall

Challenge

1. Platelets
2. Pulmonary vein
3. Pulmonary artery
4. Capillaries
5. White blood cells / leuko
6. Percentage increa – original/original × 100 = 95 – 70 00 = 35.7 % increase
7. Left ven
8. Muscle / cardiac muscle
9. Rate = flow/time = 1200/30 = 40 ml per second
10. Carbon dioxide
11. Capillaries
12. Diffusion
13. To make sure blood flows from atria to ventricles and not backwards
14. Widen the lumen/space inside the artery
15. The heart pumps blood at high pressure into the arteries, so blood can quickly reach the lungs / rest of the body
16. Thin walls which reduce the diffusion distance
17. The replacement heart is less likely to be rejected

Extension

1. Coronary artery
2. Pulmonary vein
3. Pacemaker
   Right atrium
5. Arteries
6. Rate = flow/time
7. Obesity / high b
   smoking
8. Plasma
9. Percentage decr
   decrease
10. Phagocytosis
11. Pulmonary arter
12. Antibody/antito
13. Two circulations
    and back, and a
    and back
14. Blood consists o
    particular jobs
15. If they have high
    lower the choles
    heart attack or s
16. Haemoglobin jo
    oxyhaemoglobin
17. Lungs have a lar
    extensive blood s
18. Can have a highe
    blood flow to the

Topic 6 — Non-communicable Diseases and H

Fundamentals

1. Stress / poor diet / lack of exercise / drugs / alcohol
2. A mass of cells showing uncontrolled cell division
3. Asthma / diabetes / coronary heart disease / cancer
4. Heart (accept artery)
5. Liver / brain
6. Coronary artery
7. Cholesterol / saturated fat / LD
8. Drugs / heart transpl
9. Statins / in / ockers
10. Skin ca
11. Tissue
12. Keeps the artery open / improves blood flow
13. A disease which cannot be spread from person to person / does not involve a pathogen
14. A lifestyle or genetic factor which increases the likelihood of developing a disease
15. Less chance of rejection by the patient as the mechanical heart is made from plastic and metal
16. A disease which can spread from person to person
17. Risk of bleeding / infection / heart attack during procedure

Challenge

1. A state of physical and mental well-being
2. Uncontrolled cell division
3. Mitosis
4. Beta blockers
5. Muscle weakness / fatigue / long-t ve kidney damage
6. Coronary arteries
7. Cholest
8. HDL / h sity lipoprotein / unsaturated
9. DNA
10. Smoking/alcohol/virus/carcinogen
11. Alcohol
12. A biological valve comes from a person or an animal; a mechanical valve does not / is made from plastic and metal
13. Rejection due to mismatched tissue type / bleeding due to surgery / infection due to bacteria entering the wound
14. Tissue type not matched / foreign antigens
15. A sunbed uses UV light which is linked to increasing mutations in the DNA of skin cells
16. Better/earlier diagnosis/screening/treatment
17. Earlier detection leads to earlier treatment and more successful outcome / less chance of the cancer spreading

Extension

1. Type 2 diabetes
2. Benign
3. LDL / low-density
4. Glucose / oxyge
5. Cirrhosis of the
6. Obesity / lack of
7. Thrombosis
8. Ionising radiatio chemical or ioni
9. Low birth weigh
10. Circulatory syste
11. HPV / human pa
12. Stimulate uptak cells; glucose is c
13. Statins reduce c thereby reducin attack / develop
14. The muscle is de are needed for r
15. Build-up of fatty of coronary arte narrower lumen
16. When cancer ce they could sprea inaccessible to t

Topic 7 — Plant Tissues, Organs and Disease

Fundamentals

1. Xylem
2. Phloem
3. Leaf
4. Phloem
5. Root
6. Leaf
7. Leaves and roots
8. Stomata/stoma
9. Nitrate/
10. Increas
11. Uptake of water via roots, transport of water up plant stem, loss of water from a plant by evaporation
12. Xylem consists of dead cells lined with lignin which forms tubes
13. Guard cells control the opening and closing of stomata and control gas exchange and water loss
14. To reduce water loss
15. Movement of dissolved sugars from leaves/roots to other parts of the plant through phloem
16. Have thorns / release poisons / mimic dangerous plants or animals

Challenge

1. Spongy mesophyll
2. Palisade mesophyll
3. Guard cells
4. Transpiration stream
5. Lower epidermis / epidermal tissue
6. TMV / tobacco mosaic virus
7. Decreases/reduces
8. Magne
9. Meriste
10. Waxy cuticle
11. Xylem
12. Chlorophyll is needed to absorb light for photosynthesis to make sugars needed for growth
13. Use a potometer to measure the rate of water uptake by a plant
14. They have large numbers of chloroplasts / are near the surface so receive lots of light
15. Magnesium is needed for chlorophyll; without chlorophyll, plants cannot photosynthesise and grow
16. Guard cells have a kidney shape / uneven cell wall thickness / thicker cell wall on the side of the stoma to allow opening and closing
17. Phloem consists of companion cells and sieve tubes; sieve tubes have pores in the end walls to allow cell sap to pass through

Extension

1. Phloem
2. Root
3. Nitrate/magnesi
4. Wax
5. Guard cells
6. Epidermis
7. Increases
8. Yellow
9. Decreases/reduc
10. Meristem
11. Increased light i so more water v
12. Decreased humid concentration g vapour will diffu
13. Guard cells beco walls causing a g
14. Chlorophyll is ne
15. Xylem consists o xylem is lined w keeps water with
16. The underside is water loss by ev surface, too muc the day

Topic 8 — Infectious Disease

Fundamentals

1. Pathogen
2. (Cough/sneeze) droplets inhaled
3. HIV
4. Salmonella/E.coli
5. Vaccination
6. Vaccine
7. Virus
8. Fever/chills
9. Red rash / fever
10. Immun[illegible] / immunity
11. By inhal[illegible] droplets in the air spread by coughs and sneezes / direct contact / contaminated food
12. By biting an infected person and transferring the pathogen by biting another person
13. Sleep under a mosquito net to prevent mosquito bites and stop the transmission of malaria
14. Removes pathogens from our hands so less likely to spread or catch a disease
15. Reduces diseases in the population / protects against infections

Challenge

1. Virus/bacterium/fungus/protist
2. Measles
3. Toxins
4. Tobacco mosaic virus / TMV
5. HIV/measles/influenza
6. Malaria
7. *Salmonella*
8. Antiretroviral drugs
9. Unprot[illegible]ex, [illegible]ed needles used in drug use, mother
10. Using condoms
11. Malaria
12. Gains entry to, and replicates inside the cell, which bursts, releasing more virus particles
13. Prevent virus from replicating
14. By inhaling droplets in the air from coughs and sneezes which contain the virus
15. Bite an infected person; take up the pathogen; transfer the pathogen when they bite another person

Extension

1. Rose black spot
2. Antifungal/fungi[illegible]
3. Gonorrhoea
4. Tobacco mosaic [illegible]
5. Immune system
6. Athlete's foot / [illegible]
7. By eating contam[illegible]
8. Mosquito
9. An organism whi[illegible]
10. Protista
11. HIV
12. Preventing the ve[illegible] and by using mos[illegible]
13. They replicate in [illegible] be damaged
14. Resistant strains [illegible] killed using antibi[illegible]
15. Vaccine will prev[illegible] there is no infec[illegible]
16. They release toxi[illegible]

Topic 9 — Human Defence and Vaccination

Fundamentals

1. Skin / mucus membranes
2. Mucus
3. Immune system
4. White blood cells / leukocytes
5. Antibodies
6. Antigen
7. Rubella
8. Weakened / dead form of pathogen/antigens
9. White blood cell / lymphocyte
10. Epidemic
11. Vaccination
12. When you can produce antibodies quickly against a particular pathogen
13. Stomach releases hydrochloric acid which kills pathogens
14. Skin releases substances which kill pathogens
15. The nasal cavity contains hairs and mucus to trap pathogens
16. Side effects / allergic reaction / ineffective vaccine

Challenge

1. Hydrochloric acid / HCl
2. Trachea/bronchus/bronchi
3. Antibodies
4. Antigen
5. Phagocytosis
6. Memory cells
7. Food poisoning
8. Smallpox
9. Rose black spot
10. Protein
11. Antibody
12. Skin is a barrier so prevents entry of pathogens / secretes antimicrobials which kill pathogens
13. Controls diseases and prevents epidemics / produces herd immunity which protects people who have not been vaccinated
14. Engulf pathogens / foreign cells and digest them using enzymes
15. They are digested by enzymes
16. Immunity means that your white blood cells know how to mass-produce a specific antibody against that pathogen
17. They counteract toxins produced by bacteria

Extension

1. They are swallow
   hydrochloric acid
2. Stomach
   Extreme pH/temp
4. B cells / B lymph
5. Memory cells
6. Injection
7. Epidemic/pande
8. Digestion (using
9. Anaphylaxis
10. Specific/specific
11. A vaccine stimula
    specific antibodie
12. More antibodies
    and more quickly
13. Unvaccinated pe
    disease because
    it on
14. Many vaccines c
    digested if given
15. Antibodies are pr
    only recognises o
16. Antibodies are pr

Topic 10 — Drugs and Drug Discovery

Fundamentals

1. Painkillers / named drug
2. Antibiotic
3. Resistant
4. Antibiotics
5. MRSA
6. Aspirin/paracetamol
7. Virus
8. Placebo
9. Clinical tri… dru…
10. Cells/ti…
11. Neither … patient nor the doctor knows which subjects have taken the drug or a placebo
12. They relieve symptoms, i.e. provide pain relief, but cannot kill pathogens or reverse disease
13. Antibiotics only kill bacteria and not viruses because viruses are inside host cells
14. How well a drug works
15. To test whether a new drug is effective and safe
16. Concentration of a drug and how often it should be given

Challenge

1. Side effects
2. B lymphocyte
3. Penicillin / other correct antibiotic
4. Digitalis
5. Penicillin
6. Willow / willow tree bark
7. Bacteria
8. Drug dose where … …ost effective with fewest side eff…
9. The ext… which a drug dosage causes harmful effects
10. Prevents bias / false claims being made about the new drug
11. No antibiotics can kill them so infections are more likely to be fatal
12. Cruelty / ethical reasons / animals are not humans / drugs may not give same result in humans

Extension

1. Mutation
2. Placebo effect
3. Cell/tissue cultu…
4. Healthy voluntee…
5. Resistance
6. Peer review
7. **Two from:** dosa…
8. Severe side effe… ineffective / ther…
9. Improves force o…
10. Avoid prescribin…
11. Mutation leads t… resistant genes w… in number
12. Viruses have a v… rapidly, leading t…

Topic 11 — Photosynthesis

Fundamentals

1. Chlorophyll
2. Glucose
3. Oxygen
4. Carbon dioxide
5. Reduces/slows
6. Increases
7. Starch
8. Cellulose
9. Leaf/lea
10. Palisad phyll
11. Chloropl
12. Count bubbles / use a gas syringe / use an inverted measuring cylinder
13. Use iodine; if colour changes from brown to blue-black, starch is present
14. Add Benedict's reagent, heat, observe colour change from blue to brick red
15. Sugars are translocated from leaves to roots by the phloem
16. Respiration / converted into starch for stored energy

Challenge

1. Limiting factor
2. Traps light energy
3. Pondweed
4. Benedict's reagent
5. Respiration/air/stomata
6. Stomata
7. Blue-black
8. Root
9. Plants/ ynt sis
10. Carbon
11. Chemical
12. Vary the distance of a lamp
13. Use a water bath and repeat using different temperatures
14. Photosynthesis needs enzymes and these are denatured by high temperatures
15. Less light for photosynthesis so fewer sugars, hence less biomass
16. Starch is insoluble so prevents osmosis from damaging the cell / a large molecule so contains lots of glucose
17. Use stored energy in starch which is broken down to release glucose for respiration

Extension

1. Endothermic/en
2. 6
3. Respiration
4. Sodium hydroge
5. Glucose
6. Piece of glass be
7. Volume of oxyge
8. Enzymes/protei
9. Temperature / C
10. $1/d^2 = 1/25 = 1/$
11. Nitrate
12. Chlorophyll
13. Heat the plant u weigh it
14. More light / incr enzyme activity
15. Use a heater wh
16. Divide product f
17. Light intensity is

Topic 12 — Respiration

Fundamentals

1. All living cells
2. Respiration
3. Carbon dioxide
4. Oxygen
5. Without oxygen
6. With oxygen
7. Lactic acid / lactate
8. Glucose
9. Energy/A
10. Mamm
11. To get ri carbon dioxide / obtain more oxygen
12. Number of breaths per minute / number of breaths divided by time
13. Energy is needed for muscle contraction
14. The sum total of all the chemical reactions taking place inside the body
15. Muscles need more energy
16. Aerobic respiration releases more energy than glucose

Challenge

1. Liver/muscle
2. Glycogen
3. Carbon dioxide / ethanol
4. Glucose
5. Glucose
6. Bread / alcoholic drinks
7. Mitochondrion/mitochondria
8. Muscles
9. Brain
10. Lime w
11. Carbon
12. Because heat energy is given off during respiration
13. High temperatures denature enzymes; enzymes are needed for respiration
14. To increase blood flow and deliver more oxygen / remove more carbon dioxide
15. They release lactic acid which causes pain/cramps
16. Oxygen is needed after exercise to remove lactic acid

Extension

1. Exothermic/exer
2. Heat energy
3. Glycogen
4. Prevent air/oxyg conditions anae
5. Mitochondria
6. Glucose
7. Amino acids
8. Use a gas syringe per unit time
9. Carbon dioxide
10. $C_6H_{12}O_6$
11. Fermentation
12. Ethanol
13. Take a large sam mean/average pu
14. Glucose is not fu with oxygen in a
15. Lactic acid is take back to glucose / dioxide and wate
16. Birds need a lot o
17. The brain needs a glucose for respi