Cell Biology part 17 AQA Combined Science

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Name: _____

Class: _____

Date: _____

Time: **65 minutes**

Marks: **55 marks**

Comments:

Q1.

The photograph shows a red blood cell in part of a blood clot. The fibres labelled **X** are produced in the early stages of the clotting process.

(a) Suggest how the fibres labelled **X** help in blood clot formation.

_____

(1)

(b) The average diameter of a real red blood cell is 0.008 millimetres.
On the photograph, the diameter of the red blood cell is 100 millimetres.

Use the formula to calculate the magnification of the photograph.

Diameter on photograph = Real diameter × Magnification

_____

_____

_____

Magnification = _____

(2)

(c) Some blood capillaries have an internal diameter of approximately 0.01 millimetres.

(i) Use information given in part (b) to explain why only one red blood cell at a time can pass through a capillary.

_____

(1)

(ii) Explain the advantages of red blood cells passing through a capillary one at a time.

_____

_____

_____

_____

_____

_____

(3)

(Total 7 marks)

Q2.

Complete the table by writing the correct process next to its description.

Choose your answers from the list in the box

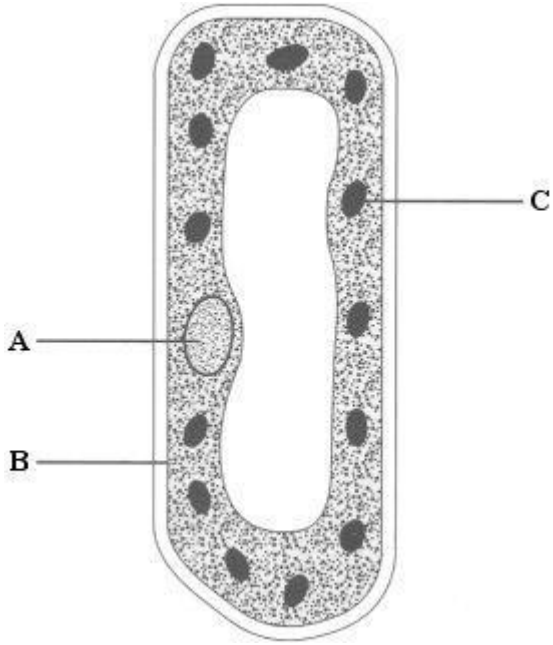
breathing	**diffusion**	**digestion**	**osmosis**	**respiration**

Description	Process
Moving air in and out of the lungs	
The movement of particles of a substance from high to low concentration	
The release of energy from glucose	

(Total 3 marks)

Q3.

The diagram shows a cell from a plant leaf.



(a) Name structures **A** and **B**.

A _____

B _____

(2)

(b) Structure **C** is a chloroplast. What is the function of a chloroplast?

_____

(1)

(c) The table gives one difference between a plant cell and an animal cell.

Complete the table to give **two** more differences.

Plant cell	Animal cell
1. Has chloroplasts	1. No chloroplasts
2.	2.
3.	3.

(2)

(Total 5 marks)

Q4.

(a) (i) Name the red pigment found in red blood cells.

_____

(1)

(ii) Describe, in detail, the function of this red pigment.

_____

_____

_____

(2)

(b) Describe **one** other way in which the structure of a red blood cell is different from the structure of a white blood cell.

_____

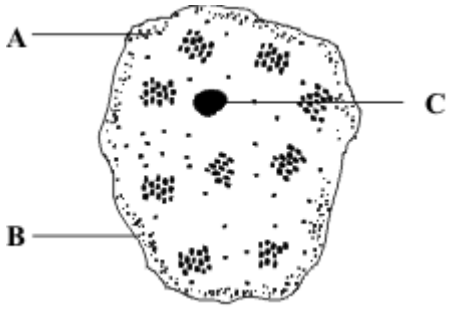
_____

(1)

(Total 4 marks

Q5.

The diagram shows an animal cell.



(a) Name **each** labelled part and give its function.

A Name

_____

Function _____

B Name

_____

Function _____

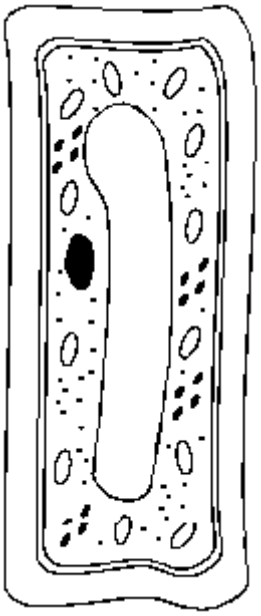
C Name

_____

Function _____

(6)

(b) (i) This plant cell also contains chloroplasts, a cell wall and a vacuole. Label **each** of these parts on the diagram.



(3)

(ii) Give the function of these parts of a plant cell.

Chloroplast function _____

_____

Cell wall function _____

_____

Vacuole function _____

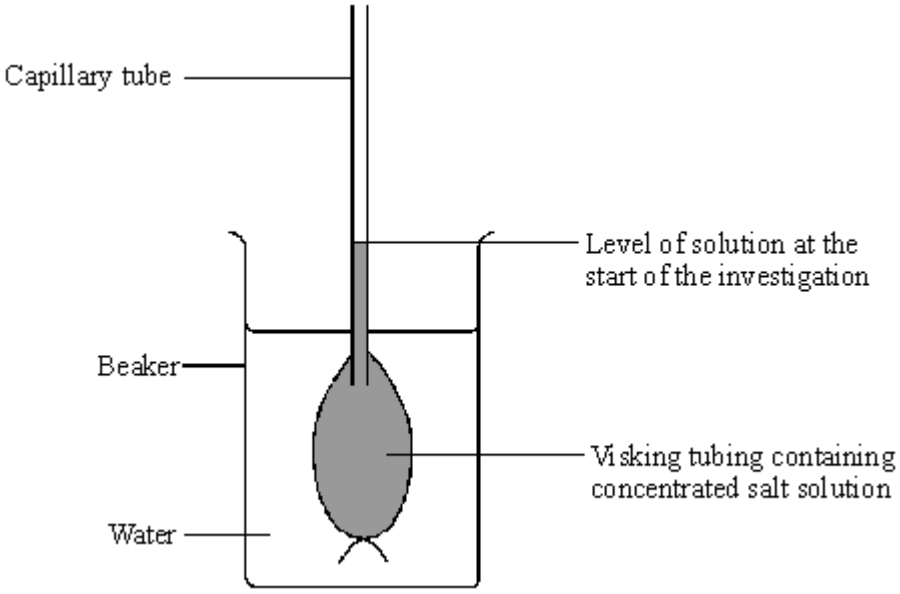
_____

(3)

(Total 12 marks)

Q6.

Some students set up the equipment below to investigate osmosis.



(a) What is osmosis?

_____

_____

_____

(3)

(b) (i) What will happen to the water level in the capillary tube during the investigation because of osmosis?

_____

(1)

(ii) Use your knowledge of osmosis to explain why this happens.

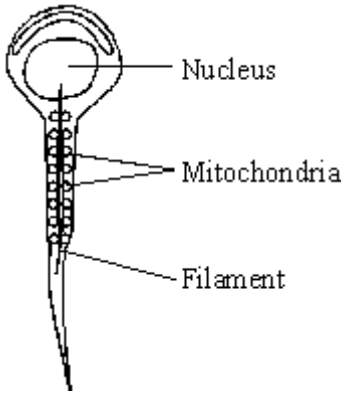
_____

(2)

(Total 6 marks)

Q7.

The diagram shows a human sperm. Inside the tail of the sperm is a filament mechanism that causes the side to side movement of the tail, which moves the sperm.



(a) Describe the function of the mitochondria and suggest a reason why they are arranged around the filament near the tail of the sperm.

_____

_____

_____

_____

(3)

(b) Explain the significance of the nucleus in determining the characteristics of the offspring.

_____

_____

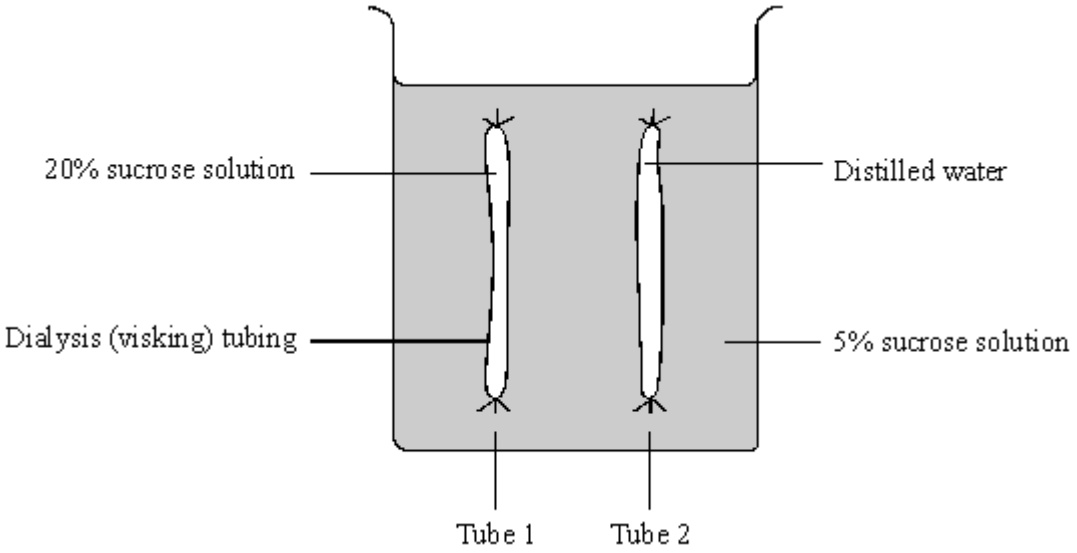
_____

(2)

(Total 5 marks)

Q8.

Some students set up this experiment to investigate osmosis. They filled two pieces of dialysis [visking] tubing with different liquids and left them both in a beaker of *5%* sucrose solution for an hour.



(a) Describe and explain the likely results after one hour.

(6)

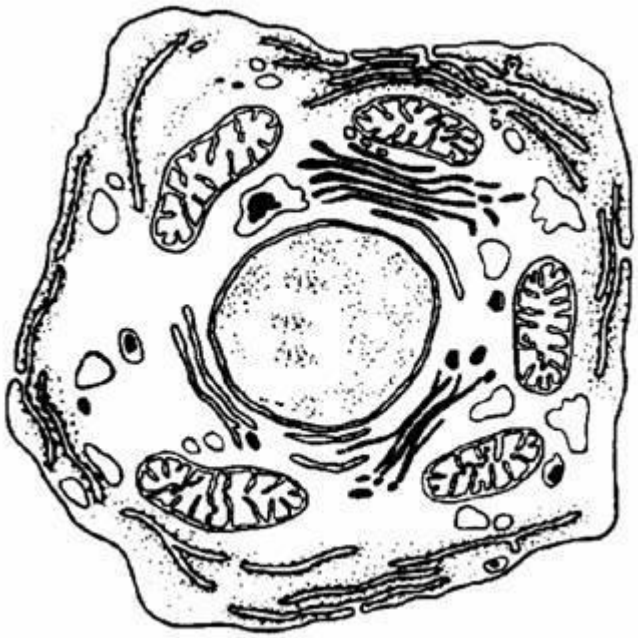
(b) Describe **two** examples where osmosis is used in living things.

(2)

(Total 8 marks)

Q9.

The drawing shows an animal cell, seen at a very high magnification using an electron microscope.



(a) (i) Label a mitochondrion [plural = mitochondria].

(1)

(ii) What happens in the mitochondria?

_____

(1)

(b) (i) Name and label the structure where you would find chromosomes.

(1)

(ii) What are chromosomes made of?

_____

(1)

(c) What controls the rate of chemical reactions in the cytoplasm?

_____

(1)

(Total 5 marks)

Q1.

(a) hold <u>cells</u> together **or** prevent flow of <u>cells</u> **or** trap <u>cells</u>

1

(b) 12500

if correct answer, ignore working / lack of working

$\frac{100}{0.008}$ *for **1** mark*

ignore any units

2

(c) (i) size RBC approximately same size capillary **or**
no room for more than one cell **or**
<u>only</u> one can fit **or**
RBC is <u>too</u> big

allow use of numbers

*do **not** accept capillaries are narrow*

1

(ii) more oxygen released (to tissues) **or**
more oxygen taken up (from lungs)

1

and any **two** from:

- slows flow **or** more time available
- shorter distance (for exchange) **or** close to cells / capillary wall
- more surface area exposed

2

[7]

Q2.

<u>in correct sequence</u>:

breathing

1

diffusion

1

respiration

1

[3]

Q3.

(a) **A** = nucleus

accept phonetic spelling only

1

B = (cell) membrane

accept plasma membrane

1

(b) any **one** from:

photosynthesis

makes sugar / starch / carbohydrate / organic material

accept 'makes food'
*do **not** accept makes chlorophyll*
ignore stores starch / food / light / chlorophyll

traps or absorbs light

1

(c) any **two** from:

Plant cell	Animal cell
• (has) vacuole **or** has cell sap	• no vacuole **or** small/temporary vacuole **or** no cell sap
• (has) wall/cellulose	• no wall/cellulose **or** only membrane
• (stores) starch **or** doesn't store glycogen	• doesn't store/have starch **or** stores glycogen

ignore reference to shape
must be clear indication in all four boxes
ignore reference to chlorophyll

2

[5]

Q4.

(a) (i) haemoglobin / oxyhaemoglobin

must be phonetic

1

(ii) carries oxygen **or** forms oxyhaemoglobin

Ignore references to CO_2 / iron
cancel if extras like food / glucose

1

from lungs to tissues

1

(b) no nucleus **or** biconcave disc (described)

ignore references to size
ignore vague references to being

'round' / 'donut' shaped etc.

1

[4]

Q5.

(a) A cytoplasm

1

where (chemical) reactions take place

*do **not** accept where cell functions take place*

1

or

carries/holds the organelles/named organelles / named chemicals (including nutrients)

*do **not** accept keeps the shape of the cell*

or

contains water

or

presses out on the membrane

allow: keeps cell turgid
allows transport through the cell

B membrane

*do **not** accept by themselves:*
protects cell
gives shape

1

controls what enters/leaves the cell

1

or

contains the cell/holds the cell together

*do **not** accept keeps harmful substances out*

or

allows movement into and out of the cell C nucleus

1

contains the genetic material/DNA/genes/chromosomes

*do **not** accept:*
brain of the cell
stores information/instructions
tells cell what to do

or

controls (the activity) of the cell

1

(b) (i) one mark for each correctly labelled part

cell wall

*do **not** accept anything inboard of the inner edge vacuole*
accept anything inboard of transplant

chloroplast: site of photosynthesis/ for photosynthesis
*accept word equation **or** balanced equation*

1

cell wall: supports the cell/keeps the shape/keeps it rigid
*do **not** accept protects the cells*

2

(ii) vacuole: acts as reservoir for water / chemicals/(cell)/sap

3

or
keeps cell turgid/pushes content to edge
or
maintains concentration gradient
or
allows cell elongation (not growth)

1

[12]

Q6.

(a) movement of water [1]

from high concentration (of water) to low concentration (of water)
or
from (an area of) dilute solution to an area of concentrated solution [1]

through a differentially **or** partially **or** selectively **or** semi permeable membrane [1]

3

(b) (i) it will rise

1

(ii) water enters visking tubing [1]

because the concentration of water outside is greater than the concentration inside
or
because the concentration of salt **or** solute is greater inside the tubing than outside [1]
or
to equalise concentration water has to enter visking tubing [2]

2

[6]

Q7.

(a) **award one mark for each key idea**

energy released **or** energy transferred **or** respiration

*allow provides **or** gives*

*do **not** allow produces **or** makes*

3

near to the site of movement **or** energy available quickly **or** more energy

accept allows more mitochondria to fit in

(mitochondria) packed (around filament) **or** efficient arrangement **or** spiral arrangement

(b) contains chromosomes **or** genes **or** DNA

***not** genetic material*

1

(which) contribute half (the genes) to the fetus **or** offspring

*23 chromosomes **or** half the genes*
***or** reference to X,Y chromosome determining sex (if the notion of halfness is there)*
nucleus contains half genes for the offspring = 2 marks

1

[5]

Q8.

(a) award **3** marks per tube for each key idea

for tube 1:

expands **or** gets firmer **or** bigger **or** inflates

it gains water

because the concentration of water is less than its surroundings

make sure answer is about water movement and not sucrose solution

3

for tube 2

gets floppy **or** flaccid **or** contracts

it loses water

because the concentration of water is greater than its surroundings

3

(b) any **2** from:

uptake of water by root (hair) **or** movement from cell to cell within plant

*do **not** credit references to diffusion unless it is clear that the candidate is referring to the diffusion of water*

guard cell function

maintain turgor

water absorption in the large intestine

reabsorption of water from the nephron **or** collecting duct or in kidney **or** osmoregulation in kidney

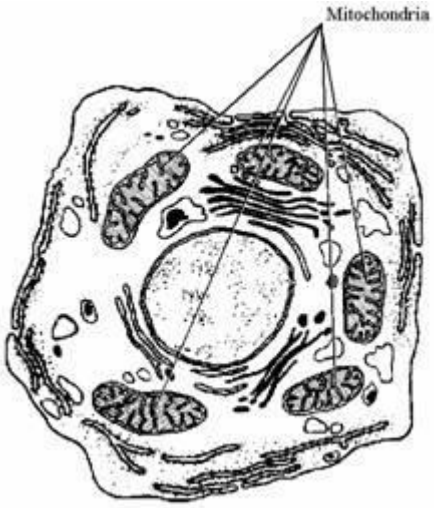
allow osmosis in other animals if some use is shown

2

[8]

Q9.

(a) (i)



award 1 mark for any of the mitochondria correctly labelled if a number are labelled and one is incorrect award 0 marks

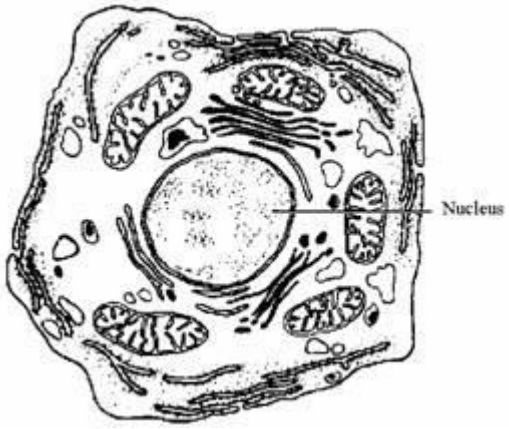
1

(ii) respiration **or** the release **or** transfer of energy **or** it contains the enzymes for respiration

*do **not** accept energy produced*

1

(b) (i) nucleus (named and correctly labelled)



*arrow **or** line must touch **or** go inside the nuclear membrane*

1

(ii) DNA **or** genes **or** nucleic acids

*accept protein **or** histones **or** nucleotides **or** ATGC*

1

(c) enzymes **or** nucleus

*do not accept factors that affect the rate rather than control it eg pH **or** temperature*

1

[5]