

Q1.

- (a) diffusion 1
- (b) A 1
- (c) B 1
- (d) (earthworm) can absorb more oxygen (in a given time)
or
 increases / more gas exchange
allow get / obtain / take in more oxygen
ignore easier absorption of oxygen
ignore references to food 1
- (e) lipase 1
- (f) more oxygen (in soil with earthworms)
allow earthworms bring oxygen to soil 1
- (for) more (aerobic) respiration
*do **not** accept anaerobic respiration* 1
- (of) bacteria / fungi / microorganisms / microbes / decomposers
reference to more is only needed once for the first two marking points 1
- (g) fertilisation
ignore sexual reproduction 1
- (h) asexual (reproduction)
allow cloning 1
- [10]**

Q2.

- (a) (yes, because) the mass change (of egg 4) is much lower than the others
allow because it / egg 4 has gained (over) 50% less mass than the others
allow it / egg 4 has gained 1.5 g and the others have all gained more than 3 g (unit required) 1
- (b) $\frac{75.7 - 72.4}{72.4} \times 100$



- or equivalent 1
- 4.6 (%)
allow 4.558 / 4.56 (%)
allow any correct rounding of 4.558011049723757 1
an answer of 4.6 / 4.56 / 4.558 scores 2 marks
- (c) (mass increased because) water entered by osmosis 1
- from a dilute solution in the beaker to a more concentrated solution in the egg (cell)
allow from an area of high water concentration in the beaker to an area of low water concentration in the egg (cell)
allow ref to water potential
allow ref to 'strong' and 'weak' solutions
ignore along / across concentration gradient
do not accept 'amount' in place of concentration
- through a partially permeable membrane
allow semi-permeable / selectively permeable membrane 1
- (d) use five (or more) different concentrations of salt / sugar solution (in beakers)
allow any number of concentrations provided it is more than four 1
- (by) plotting percentage change (in mass / volume) on / using a graph 1
- determine the concentration where the curve / line crosses the zero percentage change (in mass / volume) 1
- (e) (ions are moved) from an area of low concentration to high concentration
allow against the concentration gradient
allow in terms of solution
do not accept molecules 1
- (by) active transport 1
- (which) requires using energy
do not accept idea of energy being created 1

[12]

Q3.



- (a) (surface area \Rightarrow 24 (cm²) 1
- (b) (volume \Rightarrow) 8 (cm³) 1
- (c) 3 (:1)
allow ecf from (a) and (b) 1
- (d) to keep the volume (of the cubes) the same in both sets
allow to compare with the 2 x 2 x 2 cube
or
so both sets of cubes are 8 cm³
ignore to keep it fair 1
- (e) so that excess water does not contribute to the mass of the cubes 1
- (f) 0.8 (g)
if no answer given, check for answer in the table 1
- (g) (because) water moved into the cubes (by osmosis)
allow water moves in by diffusion 1
- because the solution outside the cubes was more dilute than inside the cells
allow converse
allow because the concentration of water was higher outside the cubes / in the beaker / solution than inside the cells 1
- (h) because the samples of cubes were different masses at the start of the investigation 1
- (i) more water was taken in
allow ecf for answer to (d) 1
- because they had a larger surface area to volume ratio
allow more / faster osmosis happened 1

[11]

Q4.

- (a) movement of particles from (an area of) high concentration to (an area of) low concentration
allow movement of particles down a concentration gradient
*do **not** accept along / across a concentration gradient* 1
- (b) oxygen
allow O₂

- carbon dioxide
allow CO₂
in this order only
both needed for 1 mark 1
- (c) less diffusion
allow less gas will enter / leave the blood
allow ecf from (b) 1
- (because of the) reduced / smaller surface area 1
- (d) **(B)** very low birth mass 1
- (C)** extremely low birth mass 1
- (e) any **one** from:
 • men would be included in the study (can't be pregnant)
 • children / older (post-menopausal) women would be included in the study
ignore reference to cost 1
- (f) any **three** from:
 • higher percentage of pregnant women have never smoked (compared with non-pregnant women)
 • higher percentage of pregnant women are ex-smokers (compared with non-pregnant women)
 • lower percentage of pregnant women currently smoke (compared with non-pregnant women)
 • in both pregnant and non-pregnant women, the highest percentage of women have never smoked
allow converse throughout
allow appropriate use of correct figures throughout 3
- (g) scatter graph 1
- (h) **B** 1
- (i) there is no correlation (between the variables)
allow (all) the points are widely scattered
allow idea that the person with the longest birth time does not have the highest risk 1

[13]

Q5.

- (a) 86



allow this answer only

*do **not** accept 85.7*

if no answer given, check for answer in the table

1

- (b) as salt concentration increases, percentage of open stomata (in field of view) decreases (above 0.1 mol / dm³)
or
 allow percentage of open stomata stays the same between 0.0 and 0.1 (mol / dm³ then decreases as salt concentration increases)

ignore references to number of open stomata

allow converse

allow idea that mean concentration (of salt) in guard cells is between 0.3 and 0.4 mol per dm³

1

- (c) use concentrations between 0.3 (mol / dm³) and 0.4 (mol / dm³)
or
 draw a graph of the data and read off the value at 50% (open stomata)
allow a list of appropriate concentrations i.e. 0.32 mol / dm³, 0.34 (mol / dm³), 0.36 (mol / dm³) etc.

1

- (d) $(\pi \times 0.1875^2) = 0.11$ (mm²)
an answer of 36 scores 3 marks

1

$$\frac{4}{0.11}$$

1

36 (per mm²)

*allow 36.22 / 36.23 **or** 36.2*

if answer is incorrect allow for 2 marks for sight of number of open stomata = 9 per mm² (diameter used instead of radius)

*if no other marks awarded allow for 1 mark any **one** from:*

- *sight of area = 0.44(mm²) (diameter used instead of radius)*
- *sight of number of open stomata = 9.1 / 9.05 / 9.06 per mm² (diameter used instead of radius and no rounding)*

1

- (e) (potassium) ions increase the concentration of the solution (inside guard cells)

or

(potassium) ions make cell more concentrated / less dilute

allow (potassium) ions decrease concentration of water / water potential (of guard cells)

1

water moves into the (guard) cell by osmosis

1

cell swells unevenly (so stoma opens)

1

as inner wall is less flexible than outer wall **or** thick part of the wall is less flexible than the thin part (of the wall)

1

[10]

Q6.

(a) vena cava

1

(b) 0.5 mm = 0.05 cm

1

$$\text{time} = \frac{10.00 - 0.05}{0.4}$$

allow alternative correct substitution

1

24.875

1

25 (s)

*an answer of 25 (s) scores 4 marks**allow 24 for 3 marks (no conversion of mm to cm)**allow 23.8 / 23.75 for 2 marks (no conversion of mm to cm and incorrect sf)*

1

(c) (blood) travels through (the) pulmonary vein

1

(blood) enters left atrium

1

(blood) enters (the) left ventricle

1

(blood) leaves the heart via / through (the) aorta

*allow blood travels through arterioles**allow blood (travels round the body and) reaches the cells / tissues via / in capillaries*

1

ignore ref to valves / systole / diastole throughout(d) **Level 3 (5-6 marks):**

Relevant points (reasons / causes) are identified, given in detail and logically linked to form a clear account.

Level 2 (3-4 marks):

Relevant points (reasons/causes) are identified, and there are attempts at logical linking. The resulting account is not fully clear.

Level 1 (1-2 marks):

Points are identified and stated simply, but their relevance is not clear and there is no attempt at logical linking.

No relevant content (0 marks)

Indicative content

For more help, please visit our website www.exampaperspractice.co.uk

S = structural F = functional

- (S) both have a large surface area
- (S) villi have many microvilli
- (S) alveolar walls are not flat / are folded

- (F) to maximise diffusion (of gases) / absorption of (food) molecules
- (S) both have many capillaries / good blood supply / capillaries near the surface
- (F) to maintain concentration / diffusion gradient

- (S) both have thin walls / walls that are one cell thick / one cell thick surface
- (F) to provide a short diffusion distance (for molecules to travel)

- (S) villi have many mitochondria
- (F) to provide energy for active transport (of food molecules)

- (S) cells of the villi have microvilli / more projections
- (F) to further increase the surface area / increase the number of proteins in the membrane / to allow more active transport to take place

[15]**Q7.**

- | | | |
|-----|--|---|
| (a) | 300 | 1 |
| (b) | suitable scale on y-axis | 1 |
| | label y-axis | 1 |
| | 4 bars drawn correctly
<i>allow 1 mark for 3 correct bars</i> | 2 |
| (c) | increases from 50 to 500 | 1 |
| | then decreases from 500 to 0 | 1 |
| (d) | carbohydrates broken down / digested into sugars | 1 |
| | broken down by carbohydrase or amylase | 1 |
| (e) | absorption of glucose | 1 |
| | into blood | 1 |
| | by active transport | |



allow diffusion

1

[12]

Q8.

(a) active transport

1

(b) by transpiration stream / pull

1

in xylem

1

(c) any **three** in the correct order from:

- mount epidermis on a slide
- count stomata in one area
- repeat in four more areas
- repeat method on other surface of leaf
- calculate mean

allow nail varnish film

3

(d) 1

allow numbers written out in a line with middle number circled

1

(e) $(44 + 41 + 40 + 42 + 39) / 5 = 41.2$

1

41

allow 41 with no working shown for 2 marks

1

allow 41.2 for 1 mark

(f) less water lost

1

so it does not wilt

1

[11]

Q9.

(a) glucose is absorbed by diffusion into the bloodstream

1

then blood delivers glucose to muscles in capillaries

1

(b) to stop air getting in

1

(c) yellow

1



- (d) collect the CO₂ / gas with a measuring cylinder / gas syringe 1
(volume collected) in a certain time using a timer / watch 1
- (e) yeast produces ethanol but muscles produce lactic acid
marks can be awarded from correct word or balanced symbol equations 1
- yeast produces CO₂ but muscles do not
answers must be comparative 1
- both release small amounts of energy
ignore both occur without oxygen 1

[9]**Q10.**

- (a) $(0.15 / 1.35) \times 100$ 1
11.1 (%)
allow 11.1 (%) with no working shown for 2 marks 1
- (b) to allow results to be compared
or
they had different masses at the start 1
- (c) axis correct scale and labelled 1
5 points correctly plotted
allow ecf from 05.1
allow 1 mark for 4 points correctly plotted 2
line of best fit 1
- (d) 0.5
allow 0.45–0.55 1
- (e) (0.0 to 0.4) water moves into cells 1
(0.6 to 0.8) water leaves cells 1
by osmosis 1

- (f) any **two** from:
- concentration of solutions
 - drying of chips
 - accuracy of balance
 - evaporation from tubes

2

[13]

Q11.**Level 3 (5–6 marks):**

A detailed and coherent explanation is provided with most of the relevant content, which demonstrates a comprehensive understanding of the human circulatory system. The response makes logical links between content points.

Level 2 (3–4 marks):

The response is mostly relevant and with some logical explanation. Gives a broad understanding of the human circulatory system. The response makes some logical links between the content points.

Level 1 (1–2 marks):

Simple descriptions are made of the roles of some of the following: heart function, gas exchange, named blood vessels, named blood cells. The response demonstrates limited logical linking of points.

0 marks:

No relevant content.

Indicative content

- dual / double circulatory system which means that it has higher blood pressure and a greater flow of blood to the tissues
- heart made of specialised (cardiac) muscle cells which have long protein filaments that can slide past each other to shorten the cell to bring about contraction for pumping blood
- heart pumps blood to lungs in pulmonary artery so that oxygen can diffuse into blood from air in alveoli
- blood returns to heart via pulmonary vein where muscles pump blood to the body via aorta
- oxygen carried by specialised cells / RBCs which contain haemoglobin to bind oxygen and have no nucleus so there is more space available to carry oxygen
- arteries carry oxygenated blood to tissues where capillaries deliver oxygen to cells for respiration and energy release
- thin walls allow for easy diffusion to cells
- large surface area of capillaries to maximise exchange
- waste products removed eg CO₂ diffuse from cells into the blood plasma
- blood goes back to the heart in veins which have valves to prevent backflow
- cardiac output can vary according to demand / is affected by adrenaline

accept annotated diagrams

[6]

Q12.

- (a) (i) large intestine = **E**

1



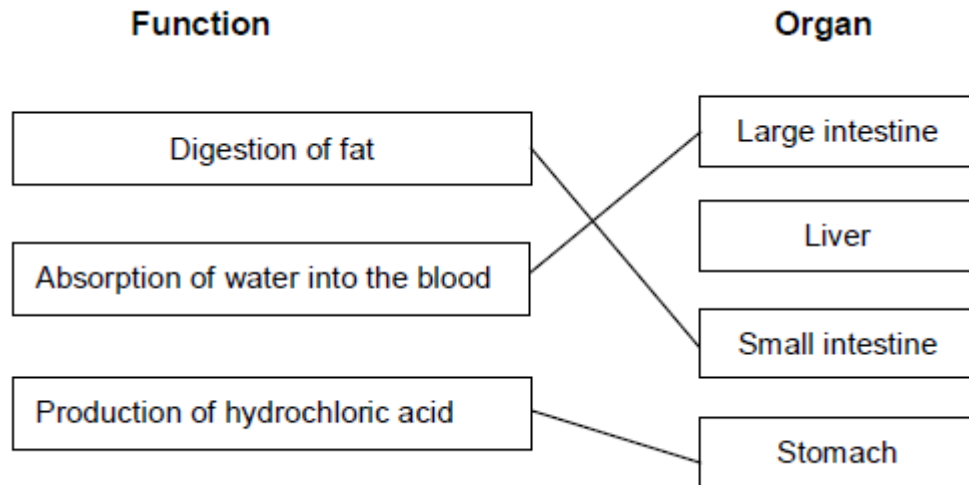
small

intestine = D

1

stomach = B

1



extra lines cancel

3

(b) The concentration in the blood is lower.

1

[7]

Q13.

(a) diffusion

1

active transport

1

this order only

(b) (i) concentration (of sugar) in the bag was higher (than in the drink)

allow concentration (of sugar) in the drink was lower (than in the bag)

or

higher concentration of water outside the bag **or** in the drink / boiling tube

*allow higher water potential outside the bag **or** lower water potential inside the bag*

1

(so) water moved in (to the tubing)

*allow water moves down **its** concentration gradient
do **not** allow sugar moving*

1

by osmosis

allow diffusion (of water)

*do **not** allow sugar moving by osmosis **or** water moving by active transport*

1

- (ii) **B** 1
- (iii) close(st) to the concentration in the bag **or** to 5%
*allow small(est) diffusion gradient **or** close(st) to an equilibrium* 1
- (so rate of) diffusion / osmosis is slow
allow (so) less water moves in (to the bag)
ignore ref. to sugar 1

[8]

Q14.

Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) as well as the standard of the scientific response.

Level 3 (5–6 marks):

Processes used for obtaining specified materials are given.

and

correctly linked to the vessels that the materials are transported in

or

correctly linked to a description of the direction of movement of the materials.

For full credit, in addition to the above descriptors at least **one** of the processes must be linked to the vessel that the material is transported in **and** the direction of the movement of the material.

Level 2 (3–4 marks):

At least **one** process for obtaining a specified material is given

and

is correctly linked to the vessel that the material is transported in

or

correctly linked to a description of the direction of movement of the material

Level 1 (1–2 marks):

At least **one** process (P) for obtaining a material is given

or

at least **one** vessel (V) and the material it carries is given

or

there is a description of the direction of movement (M) for at least **one** material

0 marks:

No relevant points are made

examples of points made in the response ions:

(P) taken up by diffusion or active transport

- from an area of high to low concentration (diffusion) **or** an area of low to high concentration (active transport)

(V) travels in the xylem

(M) to the leaves **or** from the roots / soil

Water:

(P) taken up by osmosis



- from an area of low to high concentration
allow high concentration of water to low concentration of water
allow from high water potential to low water potential
ignore along a concentration gradient
 (V) travels in the xylem
 (M) to the leaves **or** from the roots / soil
 (P) transpiration stream
- movement replaces water as it evaporates from leaves
 (V) in the xylem

Sugar:

- (P) made during photosynthesis
- (V) travels in the phloem
- (M) to other parts of the plant **or** to storage organs **or** travels up and down

[6]

Q15.

- (a) (i) nucleus 1
- (ii) diffusion 1
- (b) increases / larger surface area (for diffusion)
ignore large surface area to volume ratio 1
- (c) (i) sugar / glucose
accept amino acids / other named monosaccharides 1
- (ii) against a concentration gradient
or
 from low to high concentration 1
- (iii) (active transport requires) energy 1

 (from) respiration 1
- (d) minerals / ions
accept named ion ignore nutrients
do not accept water 1

[8]

Q16.

(a)

Structure	Organ	Organ system	Tissue
------------------	--------------	---------------------	---------------



Stomach	✓		
Cells lining the stomach			✓
Mouth, oesophagus, stomach, liver, pancreas, small and large intestine		✓	

all 3 correct = 2 marks
 2 correct = 1 mark
 1 or 0 correct = 0 marks

- (b) (i) diffusion
allow phonetic spelling 2
- (ii) glucose 1
- (iii) mitochondria 1

[5]**Q17.**

- (a) (i) alveoli / alveolus
allow air sacs
allow phonetic spelling 1
- (ii) any **one** from:
 • protection (of lungs / heart)
 • help you breathe / inflate lungs. 1

- (b) (i) diffusion 1
- (ii) capillaries 1

- (iii) any **two** from:
 • (have many) alveoli
allow air sacs
 • large surface / area
 • thin (exchange) surface **or** short diffusion pathway
accept only one / two cell(s) thick
 • good blood supply / many capillaries
allow (kept) ventilated or maintained concentration gradient. 2

[6]

Q18.

- (a) (i) water / H₂O
accept oxygen
allow H₂O
*do **not** allow H²O or H2O* 1
- (ii) the mineral ions are absorbed by active transport 1

the absorption of mineral ions needs energy 1
- (iii) have (many root) hairs 1

(which) give a large surface area (for absorption) 1
- (b) carbon dioxide in
or
oxygen out
or
control water loss

accept gas exchange
ignore gases in and out
ignore gain / lose water 1
- (c) (i) guard cells 1
- (ii) (stomata are) closed
allow there is no gap / space 1
- (iii) plant will wilt / droop
ignore die 1
- [9]**

Q19.

- (a) (i) has the least amount of glucose
*allow least amount of fat **or** no fat* 1
- (to) transfer energy (for the run)
allow (to) release energy (for the run)
*do **not** allow produces energy*
*do **not** allow 'energy for respiration'* 1

(ii) any **one** from:

- cells will work inefficiently
- absorb too much water / swell / overhydrate
- lose too much water / shrink / dehydrate

ignore turgid / flaccid

cells burst is insufficient

allow cramp in muscle.

1

(b) any **three** from:

- thermoregulatory centre
- (has temperature) receptors
- (which) monitor blood temperature (as it flows through the brain)
- (temperature) receptors in the skin
- (receptors) send impulses to the brain

ignore vasoconstriction / vasodilation / sweating

allow hypothalamus

impulses sent to the thermoregulatory centre = 2 marks.

3

(c) (i) (sports drinks) contain a lot of glucose

1

(a person with diabetes) does not produce insulin **or** does not produce enough insulin

allow (person with diabetes) has cells which do not respond to insulin

*do **not** allow insulin produced by liver*

1

so blood glucose / sugar levels will rise too high **or** to a dangerous level

1

(ii) inject insulin

or

have an insulin pump (fitted)

*do **not** allow swallow insulin*

accept exercise

accept inhale insulin

*accept take metformin **or** other correctly named drug*

allow pancreatic transplant

1

[10]

Q20.

(a) (i) diaphragm

accept phonetic spelling

1

(ii) (because) the volume (inside the jar) increases

*maximum **two** marks if no reference to correct part of model*

1

- (causing) the pressure to decrease 1
- (and) air enters the balloon
allow oxygen 1
- (b) (i) (so it moves by) diffusion
*do **not** allow osmosis or active transport* 1
- from a high concentration (of oxygen) to a low concentration
*allow down its / oxygen concentration gradient from the air
or to the blood*
or
 (because) there is a high(er) concentration (of oxygen) in the air **or** there
 is a low(er) concentration of oxygen in the blood
ignore reference to amount of oxygen 1
- (ii) many gill filaments
must be in the correct pairs to gain 2 marks 1
- (give a) large surface / area
*do **not** allow surface area to volume ratio*
or
 thin
 (so) short diffusion pathway
or
 good blood supply
 (to) maintain the concentration gradient
or
 water continually flows over them / continually ventilated
 (to) maintain the concentration gradient 1

[8]

Q21.

- (a) (i) diffusion 1
- (ii) carbon dioxide
accept CO₂ / CO₂
*do **not** accept CO²* 1
- (iii) red blood cells 1
- (b) 70
if no / incorrect answer then
70 000 000



or

*280 x 0.25 gains 1 mark
ignore doubling the answer*

2

- (c) allows more gas / oxygen / CO₂
(exchange)

*do **not** accept air*

1

[6]**Q22.**

- (a) more concentrated

must be a comparison

1

than the cell / cytoplasm

accept more salty / solutes / ions

accept cell is less concentrated than solution for 2 marks

1

- (b) (i) turgid

1

- (ii) plasmolysed

accept flaccid

1

- (c) any **four** from:

- water left the cell (in A)
- by osmosis
- from dilute to more concentrated solution
accept high to low water potential or from high to low water concentration
- via partially permeable membrane
- so cell membrane shrank away from cell wall

4

- (d) water enters the cells (by osmosis)

allow 1 mark for:

1

they burst / lyse / lysis occurs

water leaves and cell shrinks (if they think it is hypertonic solution)

1

animal cells have no cell wall **or** plant cells have a cell wall

1

cell wall prevents lysis / bursting / allows turgidity

allow correct description

1

[12]

Q23.

- (a) (i) chloroplast 1
- (ii) cell wall 1
- (b) (i) osmosis
accept diffusion 1
- (ii) cell wall (prevents bursting) 1
- (c) (i) carbon dioxide
allow correct formula 1
- glucose
allow sugar / starch 1
- (ii) any **two** from:
 - light sensitive spot detects light
 - tells flagellum to move towards light
 - more light = more photosynthesis
 2
- (d) (cell has) larger SA:volume ratio 1
- short (diffusion) distance
allow correct description 1
- (diffusion) via cell membrane is sufficient / good enough
- or**
- flow of water maintains concentration gradient 1

[11]

Q24.

- (a) (i) xylem 1
- (ii) water 1
- minerals / ions / named example(s)
ignore nutrients 1



- (b) (i) movement of (dissolved) sugar
allow additional substances, eg amino acids / correct named sugar (allow sucrose / glucose)
allow nutrients / substances / food molecules if sufficiently qualified
ignore food alone 1
- (ii) sugars are made in the leaves 1
- so they need to be moved to other parts of the plant for respiration / growth / storage 1
- (c) (i) mitochondria 1
- (ii) for movement of minerals / ions
Do not accept 'water' 1
- against their concentration gradient 1
- [9]
- Q25.**
- (a) (i) variation in masses / more representative / more typical / more reliable / average / mean / reference to anomalies
- or**
- one worm to light to measure change
do not allow more accurate / more precise
ignore fair test / valid / repeatable / reproducible 1
- (ii) remove solution / liquid (on outside of worm)
allow 'water' 1
- (iii) variable amounts removed from each worm
ignore reference to length of timing 1
- (iv) equal sizes of worm / more worms (in each group) / wash off all the sand / repeats / use more accurate balance / use smaller concentration intervals
allow reference to improve blotting technique eg blot before / blot more thoroughly 1
- (b) (i) different (starting) masses / sizes / weights (at different concentrations) 1

- allows comparisons / shows pattern / shows trend 1
- (ii) (+)20
correct answer = 2 marks, with or without working
or

$$\frac{7.5 \times 100}{37.5} \quad / \quad \frac{7.5}{37.5} \quad / \quad \frac{(45.0 - 1) \times 100}{37.5}$$
for 1 mark 2
- (c) (i) graph:
- points correct
allow ± 1 mm
-1 mark per error
allow ecf from part b(ii) 2
- label on x-axis including units – ie Concentration of salt in arbitrary units 1
- line of best fit = smooth curve / ruled straight line
anomaly (4.0, -52) either plotted and ignored re. line
or not plotted
do not allow point to point
allow best fit for ecf from 2bii 1
- (ii) on graph:
- ring drawn around point at (4.0, -52)
allow (5.0, -50) if cand. line indicates this 1
- (iii) sensible suggestion – eg used wrong solution / used 5.0% instead of 4.0% / different length of time in solutions / ref to error in blotting / balance not zeroed / error in weighing
allow some lugworms died
allow error in calculation 1
- (d) (i) 2.9 to 3.0 / correct for candidate's graph ± 0.1 1
- value of no change in mass / worms in equilibrium with soln / described
allow small(est) mass change 1
- (ii) water loss 1
- by osmosis / diffusion 1

from dilute region in the worm to more concentrated solution outside
*allow correct description in terms of high to low water
 concentration / high to low water potential
 salt solution is hypertonic
 concentration unqualified = salt concentration*

1

[19]

Q26.

(a) motor

*allow efferent / postsynaptic
 allow **another** relay (neurone)*

1

(b) release of chemical (from relay neurone)

*allow ecf for 'motor' neurone from (a)
 allow release of neurotransmitter / named example*

1

chemical crosses gap / junction / synapse

*allow diffuses across
 allow chemical moves to X*

1

chemical attaches to X / motor / next neurone (causing impulse)

1

(c) (curare) decrease / no contraction

accept (muscle) relaxes

1

(strychnine) increase / more contraction

*if no other mark awarded allow 1 mark for (curare) decrease
 / no response **and** (strychnine) increase / more response*

1

[6]

Q27.

Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) as well as the standard of the scientific response. Examiners should also apply a 'best-fit' approach to the marking.

0 marks

No relevant content.

Level 1 (1 – 2 marks)

An example is given of a named substance

or

a process

or

there is an idea of why diffusion is important eg definition.

Level 2 (3 – 4 marks)

At least one example of a substance is given

and

correctly linked to a process in either animals or plants.

Level 3 (5 – 6 marks)

There is a description of a process occurring in either animals or plants that is correctly linked to a substance

and

a process occurring in the other type of organism that is correctly linked to a substance.

examples of points made in the response**Importance of diffusion:**

- to take in substances for use in cell processes
- products from cell processes removed

Examples of processes and substances:

- for gas exchange / respiration: O₂ in / CO₂ out
- for gas exchange / photosynthesis: CO₂ in / O₂ out
- food molecules absorbed: glucose, amino acids, etc
- water absorption in the large intestine
- water lost from leaves / transpiration
- water absorption by roots
- mineral ions absorbed by roots

extra information**Description of processes might include:**

- *movement of particles / molecules / ions*
- *through a partially permeable membrane*
- *(movement of substance) down a concentration gradient*
- *osmosis: turgor / support / stomatal movements*

[6]

Q28.

(a) osmosis

1

partially permeable

1

(b) (i) any **two** from:

allow correct answers in terms of A

- vacuole is small(er)
- cytoplasm has shrunk
- *allow cytoplasm is smaller*
- gap between cytoplasm and cell wall
- cell wall curves inwards

allow cell B is flaccid or cell A is turgid



- the (cell) membrane has moved away from the wall 2
- (ii) any **one** from:
 - water will move / diffuse in
 - (cells) will swell
 - (cells) will burst
 - ignore turgid* 1
- (c) villi give the small intestines a large surface area 1
- villi have many blood capillaries 1

[7]

Q29.

- (a) any **three** from:
 - (water through a) partially permeable
accept 'semi permeable' / selectively permeable
 - membrane
 - from dilute to (more) concentrated solution
allow 'from a high concentration of water to a lower concentration (of water)'
allow 'from high water potential to low water potential'
allow 'down a concentration gradient of water'
do not accept 'along a concentration gradient of water'
 - (it's a) passive (process)
allow requires no energy 3
- (b) (there are) many hairs **or** thin hairs **or** hairs are one cell thick 1
- (which gives) large / increased surface area **or** short diffusion pathway 1
- (so there is) more diffusion / osmosis (of water into the root)
ignore absorption 1

[6]

Q30.

- (a) (i) A = nucleus 1
- B = (cell) membrane 1
- (ii) any **two** from:



- ignore shape*
- no (cell) wall
 - no (large / permanent) vacuole
 - no chloroplasts / chlorophyll
- (b) because high to low oxygen / concentration **or** down gradient
allow 'more / a lot of oxygen molecules outside'
ignore along / across gradient
- (c) a tissue
- 2
1
1
[6]

Q31.

- (a) (i) mitochondrion / mitochondria
must be phonetically correct
- (ii) carbon dioxide / CO₂
- water / H₂O
- in either order*
*accept CO₂ but **not** CO²*
*accept H₂O **or** HOH but not H²O*
- (iii) diffusion
- high to low concentration
allow down a concentration gradient
- through (cell) membrane **or** through cytoplasm
*do **not** accept cell wall*
- (b) ribosomes make proteins / enzymes
- using amino acids
- part A / mitochondria provide the energy for the process
allow ATP
*do **not** accept produce or make energy*
- 1
1
1
1
1
1
1
1
1
[9]

Q32.

- (a) **A** sperm 1
- B** egg 1
- C** fertilised egg 1
- D** embryo 1
- (b) insert into mother 1
ignore fertilise / check fertilisation / check viability
- womb / uterus 1
- (c) (i) one quarter 1
- (ii) no / little chance of success over 42 1
- reference to table of only two women in the age bracket 40-42 years became pregnant
the statement 'only 2 out of 53 40-42 year old women became pregnant / had babies' gains 2 marks 1
- (iii) so fewer twins / multiple births
or
 multiple births more dangerous 1
- [10]**

Q33.

- (a) (i) diffusion 1
apply list principle
- (ii) **A** 1
apply list principle
- (b) (i) osmosis 1
apply list principle
- (ii) **R** 1
apply list principle

Q34.(a) **B**

*no mark for "B" alone, the mark is for B **and** the explanation.*

large(r) surface / area **or** large(r) membrane

accept reference to microvilli

ignore villi / hairs / cilia

accept reasonable descriptions of the surface eg folded membrane / surface

*do **not** accept wall / cell wall*

1

(b) (i) any **one** from:

- (salivary) amylase

- carbohydrase

1

(ii) many ribosomes

*do **not** mix routes. If both routes given award marks for the greater.*

1

ribosomes produce protein

accept amylase / enzyme / carbohydrase is made of protein

or

(allow)

many mitochondria (1)

mitochondria provide energy to build / make protein (1)

accept ATP instead of energy

1

[4]

Q35.(a) both parents **Aa**

*accept other upper and lower case letter without key **or** symbols with a key*

allow as gametes shown in Punnett square

1

aa in offspring correctly derived from parents**or****aa** correctly derived from the parents given

ignore other offspring / gametes

for this mark parents do not have to be correct

1

offspring **aa** identified as having cystic fibrosis

*may be the only offspring shown **or** circled / highlighted / described*

1

(b) (i) any **one** from:

accept converse if clear, eg if you (only) took one it might have cystic fibrosis / might not be fertilised

- (more) sure / greater chance of healthy / non-cystic fibrosis egg / embryo / child

accept some may have the allele

reference to 'suitable / good embryo' is insufficient

- greater chance of fertilisation

1

(ii) **advantages**

to gain 3 marks both advantage(s) and disadvantage(s) must be given

max 3

any **two** from:

ignore references to abortion unless qualified by later screening

- greater / certain chance of having child / embryo without cystic fibrosis / healthy
- child with cystic fibrosis difficult / expensive to bring up
- cystic fibrosis (gene / allele) not passed on to future generations

disadvantages

any **two** from:

- operation dangers / named eg infection
ignore risk unqualified
- ethical or religious issues linked with killing embryos
accept wrong / cruel to embryos accept right to life argument
ignore embryos are destroyed
- (high) cost of procedure
- possible damage to embryo (during testing for cystic fibrosis / operation)

plus

conclusion

a statement that implies a qualified value judgement

For more help, please visit our website www.exampaperspractice.co.uk



eg it is right because the child will
(probably) not have cystic fibrosis even though it is expensive
or
eg it is wrong because embryos are killed despite a greater chance of
having a healthy baby

***note:** the conclusion mark cannot be given unless a
reasonable attempt to give both an advantage and a
disadvantage is made*

*do **not** award the mark if the conclusion only states that
advantages outweigh the disadvantages*

1

(c) any **three** from:

- osmosis / diffusion
*do **not** accept movement of ions / solution by osmosis /
diffusion*
- more concentrated solution outside cell / in mucus
*assume concentration is concentration of solute unless
answer indicates otherwise or accept correct description of
'water concentration'*
- water moves from dilute to more concentrated solution
*allow correct references to movement of water in relation to
concentration gradient*
- partially permeable membrane (of cell)
allow semi / selectively permeable

3

[11]

Q1.

- (a) (i) capillary 1
- (ii) diffusion 1
- (b) (i) Z
ignore any names 1
- (ii) large / increased surface / area
allow all food absorbed

or to absorb more food
or improved diffusion 1
- [4]

Q2.

- (a) xylem **and** phloem
either order
allow words ringed in box
allow mis-spelling if unambiguous 1
- (b) (i) movement / spreading out of particles / molecules / ions / atoms
- For more help, please visit our website www.exampaperspractice.co.uk



ignore names of substances / 'gases'

1

from high to low concentration

accept down concentration gradient

ignore 'along' / 'across' gradient

ignore 'with' gradient

1

(ii) oxygen / water (vapour)

allow O₂ / O₂

ignore O² / O

allow H₂O / H₂O

ignore H²O

1

[4]

Q3.

(a) solution in soil is more dilute (than in root cells)

concentration of water higher in the soil (than in root cells)

1

so water moves from the dilute to the more concentrated region

*so water moves down (its) concentration gradient **or** water moves from a high concentration of water to a lower concentration*

1

concentration of ions in soil less (than that in root cells)

1

so energy needed to move ions

or

ions are moved against concentration gradient

the direction of the concentration gradient must be expressed clearly

accept correct reference to water potential or to concentrations of water

1

(b) any **three** from:

- movement of water from roots / root hairs (up stem)
- via xylem
- to the leaves
- (water) evaporates
- via stomata

3

(c) (i) 0.67/0.7

*accept 0.66, 0.666666... or $\frac{2}{3}$ or 0.6**correct answer gains 2 marks with or without working* $\frac{100}{150}$ *if answer incorrect allow evidence of $\frac{100}{150}$ for 1 mark**do **not** accept 0.6 or 0.70*

2

(ii) during the first 30 minutesany **one** from:

- it was warmer
- it was windier
- it was less humid
- there was more water (vapour) in the leaves

1

so there was more evaporation

*ignore 'water loss'***or**stomata open during first 30 minutes **or** closed after 30 minutes (1)so faster (rate of) evaporation in first 30 min **or** reducing (rate of) evaporation after 30 min (1)

1

[11]

Q4.(a) oxygen / O₂*allow O₂**do not accept O²***or**carbon dioxide / CO₂*allow CO₂**do not accept CO²*

1

(b) any **four** from:*ignore references to tail used for locomotion**ignore reference to nostrils*

- because structure X / gills has threads / filaments **or** is thin **or** tadpole has longer tail

- there is an increased surface area
- there is a shorter diffusion pathway
- therefore an increase in exchange
ignore food
- eyes (now visible in older tadpole)
- so that food / danger etc can be seen
accept reference to a good blood supply
accept increased water flow over gills / tail will increase diffusion of gases

4

[5]

Q5.



*the shape must be (roughly) circular **and** not shaded, for the mark*

accept the shape drawn in the key if it is not contradictory

1

(b) dominant

1

(c) (i) a half (50%)

1

(ii) Some of B's sperm cells have an X chromosome

1

[4]

Q6.

(a) water enters (funnel / sugar solution) **or** water diffuses in (to the funnel)
*do **not** accept if diffusion of sugar*

1

membrane partially / selectively / semi permeable **or** by osmosis
allow description

1

because concentration (of sugar) greater
inside funnel than outside / water / in beaker

assume 'concentration' refers to sugar unless candidate indicates otherwise

the position of the solutions may be implied

1

(b) (level / it) rises more slowly **or** levels out earlier **or** does not rise as much
accept inference of less steep gradient (of graph)



allow less / slower osmosis / diffusion / less water passes through or less water enters funnel

allow water enters / passes through slower

1

less difference in concentration (between solution / funnel and water / beaker)

accept due to lower diffusion / concentration gradient / described

1

[5]**Q7.**

(a) (i) capillary

1

(ii) diffusion

1

(iii)

Carbon dioxide	low(er)	high(er)
----------------	---------	----------

1

Oxygen	high(er)	low(er)
--------	----------	---------

1 mark for each correct row

1

(b) (i) red blood cells

1

(ii) haemoglobin

1

[6]**Q8.**

(a) (i) (too) big

1

cannot fit / pass through filter / through (pores) in membrane / cannot be filtered
too big to be filtered = 2 marks

1

(ii) water

1

(iii) partially permeable

1

(b) any **two** from:

- hazards of operation / named eg
- may be rejected **or** need to use immunosuppressant drugs / long term drug use **or** transplant may need to be replaced

- susceptible to other infections
- shortage of donors
- high initial cost

2

[6]

Q9.

(a) (i) (cell) membrane

1

(ii) vacuole

1

(b) any **two** from:

- (cell) wall
- chloroplast(s)
ignore chlorophyll
- vacuole
ignore cell sap

2

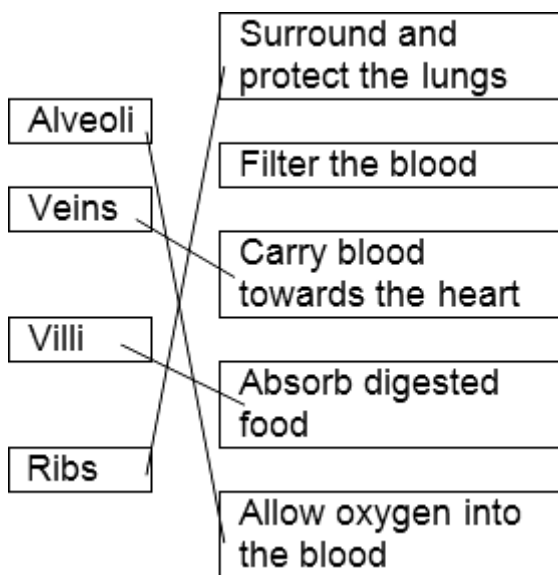
(c) diffusion

1

[5]

Q10.

(a)



4 correct = 4 marks

3 correct = 3 marks

2 correct = 2 marks

1 correct = 1 mark



extra line from a structure cancels the mark

(b) diffusion

4

1

[5]

Q11.

(a) (i) diffusion is down the concentration gradient
for a description of diffusion
ignore along / across gradients

1

to enter must go up / against the concentration gradient
accept by diffusion ions would leave the root

or

concentration higher in the root / plant

or

concentration lower in the soil

1

(ii) active transport
allow active uptake

1

(b) (i) (root hairs →) large surface / area

1

(ii) (aerobic) respiration
*do **not** allow anaerobic*

1

releases / supplies / provides / gives energy
accept make ATP (for active transport)
*do **not** allow 'makes / produces / creates' energy*

1

(iii) starch is energy source / store (for active transport)
allow starch can be used in respiration
*do **not** allow 'makes / produces / creates' energy*

1

[7]

Q12.

(a) (i) diffusion

1

(ii) A

1



- (b) (i) osmosis 1
- (ii) R 1

[4]

Q13.

- (a) *correct names of cell components are required*
it = cell in sugar solution

any **two** from:

accept reverse only if clearly stated answer refers to cell in distilled water

- smaller vacuole
- smaller / less cytoplasm
allow protoplasm for cytoplasm
- cell membrane / cytoplasm not (fully) against cell wall
accept plasmolysed / flaccid / less turgid

or

cell membrane / cytoplasm (partly) pulled away from cell wall
ignore reference to nucleus / water
ignore explanations

or

space / liquid / sugar solution between cell membrane / cytoplasm and cell wall

2

- (b) water passed / moved out (of cell) by osmosis / diffusion
accept reverse answer if clearly refers to cell in distilled water

1

more concentrated (solution) outside

assume reference to

concentration refers to solute

concentration unless answer refers to water concentration

or

less concentrated (solution) inside

or

lower water concentration outside

accept references to hypertonic / hypotonic solutions or water potential

or

higher water concentration inside

1

[4]

Q14.

- (a) (i) capillary 1
- (ii) diffusion 1
- (b) (i) Z
ignore any names 1
- (ii) large / increased surface / area / **or** to absorb more food **or** improved diffusion
allow all food absorbed 1

[4]

Q15.

- (a) large surface / large area 1
- thin / short distance (from air to blood) / one cell thick / two cells thick 1
- good blood supply / many capillaries / capillary network / many blood vessels
ignore moist surface 1
- (b) (i) diffusion
ignore gaseous exchange 1
- (ii) brings (more) oxygen / air into the lungs / alveoli 1
- keeps O₂ level high in alveoli
- or**
- maintains concentration difference (between alveoli and blood) / keeps O₂ concentration in alveoli > O₂ concentration in blood gains **2** marks 1

[6]

Q16.

- active transport needs energy **or** diffusion is not energy-dependent 1
- any **three** from:
- (energy from) aerobic respiration
 - more respiration with O₂ **or** more energy release with O₂



- (aerobic) respiration / energy release occurs in mitochondria
do not allow anaerobic
- xylose / other sugars absorbed by diffusion / not by active transport
allow active transport is selective / specific
or active transport can distinguish glucose and xylose

3

[4]

Q17.

- (a) because water enters (the cell / it / named cell)
do not accept salt / sugar / solution entering

1

by osmosis / diffusion

if osmosis / diffusion not given accept concentration inside cell greater than outside cell
assume concentration refers to solute concentration unless answer indicates otherwise
allow water goes up the concentration gradient
allow water goes down its concentration gradient
do not accept if diffusion of salt / sugar

1

through a partially permeable membrane

allow semi / selectively permeable membrane or description

1

- (b) (plant cells) have (cell) wall
accept animal cells have no (cell) wall
ignore reference to cell membrane
do not accept reference to other organelles or any implication that animal cells have a cell wall eg plant cells have a thicker cell wall

1

[4]

Q18.

- (a) (protein molecules too) big or larger than pore size
allow cannot fit through the pores / hole / gaps

1

- (b) (i) diffusion

1

- (ii) high to low concentration

ignore along gradient / across gradient

or high concentration in blood, low concentration in dialysis fluid
allow there is none in dialysis fluid

or down concentration gradient

or correct use of numbers

1

(c) any value between 3.15 and 3.25 (inclusive)

1

(d) (i) any **two** from:

- kidney works all the time **or** dialysis works for short time
ignore enables an active life

or

dialysis needs regular trips to hospital / regular treatment / long term treatment

accept kidney transplant is one off treatment

- kidney maintains correct concentration all the time **or** no build-up as between dialysis sessions
- no need to regulate diet **or** correct example – eg low salt / low protein / low fluid intake as with dialysis
- cheaper in the long term

2

(ii) any **two** from:

- rejection / described **or** need to use immunosuppressants **or** need to take drugs for life
allow may need later replacement
- susceptible to other infections
- hazards of operation / anaesthetic
- shortage of donors / match
- high initial cost

2

[8]

Q19.

D – *many* microvilli (1)

Ex – provide large surface area (1)

five points made

max 3 descriptions

max 3 explanations

D – *many* capillaries / *good* blood supply (1)

Ex – maintain concentration / diffusion gradient **or** quickly removes food (1)

D – thin wall / one cell thick surface / capillaries near surface (1)



allow villi are thin
ignore villi are one cell thick

Ex – short distance for food to travel (1)

D – *many mitochondria* (1)

Ex – provide energy / ATP for active uptake / transport (1)

[5]

Q20.

- | | | | |
|-----|------|---|---|
| (a) | (i) | villus | 1 |
| | (ii) | its outer surface is one cell thick
<i>cancel 1 mark for each extra box ticked</i> | 1 |
| | | it has a large surface area | 1 |
| | | it has good blood supply | 1 |
| (b) | | diffusion | 1 |

[5]

Q21.

- | | | | |
|-----|-------|-------------------|---|
| (a) | (i) | water | 1 |
| | (ii) | small | 1 |
| | (iii) | 3.15 | 1 |
| (b) | (i) | 21 000 | 1 |
| | (ii) | 2 years | 1 |
| | (iii) | prevent rejection | 1 |

[6]

Q22.

- | | | | |
|-----|------|--|---|
| (a) | (i) | root hair | 1 |
| | (ii) | any two from:
<i>ignore food</i> | |



- water
 - ions / minerals / nutrients / salts / correct named eg nitrates
ignore N,P,K
 - oxygen
- (b) (i) stomata 2
- (ii) diffusion 1
- [5]**

Q23.

- (a) (i) movement of atoms / molecules / ions
accept particles
allow dissolved substances
ignore reference to membranes 1
- (substance) moves from high to low concentration
allow down the gradient ignore
across / along / with a gradient 1
- (ii) any **two** from:
- movement of molecules / ions
accept particles
allow dissolved substances this point once only in (a)(i) and (a)(ii)
 - from low to high concentration
allow up / against the gradient
ignore across / along / with a gradient
 - requires energy / respiration
accept requires ATP 2
- (b) • **filtration** of blood **or**
described re small (molecules)through / large not
ignore diffusion 1
- max **four** from:
- **reabsorption** / substances taken back into blood
 - (reabsorption) of **all** of the sugar / glucose



- (reabsorption) of some of ions / of ions as needed by body
- (reabsorption) of some of water / of water as needed by the body
- urea present in urine
accept urea not reabsorbed
- reabsorption of water by osmosis / diffusion **or** reabsorption of sugar / ions by active transport

4

[9]

Q24.

- (a) (i) glucose **and** galactose

1

- (ii) any **three** from:

Evidence:

- absorption reduced by cyanide
allow converse
- absorb faster (than other sugars)

Explanation:

- active transport needs energy
- less / no energy available / released if cyanide is there **or** less / no energy if no / less respiration
allow energy produced
ignore cyanide prevents respiration

3

- (b) all / the sugars / they can be absorbed when gut poisoned / with cyanide **or** when no respiration

1

(diffusion) does not need an energy supply

1

[6]

Q25.

- (a) A

1

- (b) (i) diffusion

1

- (ii) respiration

1

- (iii) mitochondria



1

(iv) photosynthesis

1

[5]

Q26.

(a) mineral ions

1

water

each extra box ticked cancels 1 mark

1

(b) (i) blood plasma

1

(ii) dialysis fluid

1

(iii) diffusion

1

(iv) partially permeable

1

(v) small

1

(c) drug treatment is needed to suppress the immune system

1

[8]

Q27.

(a) root hair

1

(b) (i) 85

if incorrect unit added = 0

1

(ii) 0.85

*ignore working or lack of working
accept correct answer from candidate's (i) for 2 marks*

$\frac{85}{100}$ *with no answer or wrong answer gains 1 mark*

accept ecf

2

(iii) absorb more water / ions

allow 'get / collect / take in / take up / soak up / suck up' for absorb

allow 'lots' for more



allow 'moisture' for water

allow 'minerals / salts / nutrients' for ions

*do **not** allow food or named foods*

absorb water / ions gains 1 mark

or

large surface area to absorb water / ions (2)

large surface area linked to incorrect function = 1

ignore small so short diffusion pathway

2

[6]

Q28.

(a) No

no mark

if yes max 1 for correct statement

diffusion is down the concentration gradient

accept by diffusion ions would leave the root

1

to enter must go up / against the concentration gradient

or concentration higher in the root

or concentration lower in the soil

1

(b) (i) 0.9 **or** 3.25

for correct answer with or without working

*if answer incorrect 1.3 **or** their rate – 0.4 gains 1 mark*

***or** 130 – 40 **or** 90 gains 1 mark*

2

(ii) (uptake) by active transport

1

requires energy

more energy from aerobic respiration

1

or

more energy when oxygen is present

1

[7]

Q29.

(a) 4000

*award **both** marks for correct answer, irrespective of working*

1500 + 2000 + 500 gains 1 mark

2

- (b) day 2 (no mark)
- any **two** from:
- max 1 mark if correct day not identified or if no day given*
- more (water in) breath / breathing
 - more (water in) sweat / sweating
accept a lot of sweating
 - less (water in) urine
if no other marks awarded allow 1 mark for more water lost on day 2
- 2
- (c) (i) respiration
- 1
- (ii) cools / removes heat out
- ignore 'maintains body temperature' unqualified*
- 1
- (iii) osmosis
- 1

[7]

Q30.

- (a) any **two** from:
- transport up / against concentration gradient / low to high concentration
 - uses energy
 - use of protein / carrier
- 2
- (b) microvilli – large(r) surface area
accept have carriers
- 1
- mitochondria – release energy **or** make ATP
*do **not** accept 'makes energy'*
- 1

[4]

Q31.

- (a) **A** nucleus



1

B (cell) membrane

1

C cytoplasm

1

(b) (i) it is thin

1

(ii) diffusion

1

[5]

Q32.

(a) (i) 0

1

(ii) osmosis

1

(b) 0.5

1

no change in mass / weight

allow 'chip / it stays the same'

1

orno (net) osmosis / same amount of water in and out

(c) repeat / use more chips in each solution

*allow use of other people's results**do **not** allow 'get more results' unqualified**do **not** allow leave longer / use more concentrations / better instrumentation*

1

[5]

Q33.(a) any **two** from:

- large surface / area **or** many villi **or** have microvilli

accept big surface / area

- thin surface **or** thin wall **or** surface 1-cell thick **or** capillaries near surface **or** permeable **or** partially permeable

*accept they are thin**do **not** allow thin **cell** wall*

- many blood vessels **or** many capillaries **or** capillary network **or** good blood supply



ignore 'constant blood flow' owtte

ignore extras eg moist or reference to gases

- have enzymes

ignore release enzymes

- *accept reference to lacteal as 5th point*

- *allow reference to having mitochondria*

2

- (b) (i) small(er) (surface area) / flat(ter) / short(er)

or not as folded

or fewer capillaries owtte

allow small(er) lacteal

ignore references to wide / thick / spread out etc

1

- (ii) less absorption (of digested food) / less digestion / diffusion

accept slower for less

accept description of less digestion

accept less food can get in

*do **not** allow zero absorption*

*do **not** allow 'collection' of nutrients*

1

[4]

Q34.

- (a) (i) protein is large (molecule) / too big to pass through filter

1

- (ii) glucose is present in the filtrate

ignore units

1

or

0.8 in filtrate

no glucose is present in the urine

or

0 in urine

1

- (iii) active transport – up / against (concentration) gradient

it = active transport throughout

1

or

from low to high (concentration)

uses energy / ATP



accept needs specific carrier / specific protein (in cell membrane) for 1 mark

1

- (b) water reabsorption / taken out
other substances cancel mark

or

water taken into blood / body

1

[6]**Q35.**

- (a) correctly labelled on diagram

- (i) 'X' on an alveolus
*centre of X on the alveolus wall or
inside the alveolus
not if the centre is outside*

1

- (ii) arrow pointing downwards
accept anywhere but must point down

1

- (b) in sequence

1 trachea

2 bronchi

3 bronchioles

4 alveoli

1

- (c) diffusion

accept positive indicator

1

[4]

**Q1.**

- (a) (i) 6 1
- (ii) 4 1
- (b) (i) pancreas
ignore islets of langerhans 1
- (ii) 'X' anywhere between >1 and ≤ 2 hours
anywhere in that column 1
- (c) any **four** from:
- water movement
do not accept solution
- out of cells
- dilute to concentrated solution
*accept reference to correct gradient -
high Ψ to low Ψ or high to low 'water concentration'
must be unambiguous – i.e. not 'high to low concentration'
accept low to high concentration*
- reference to partially / selectively
permeable membranes **or** described
- cells shrink / get smaller
*allow crenated
ignore plasmolysed / flaccid / floppy
etc*

4

[8]**Q2.**

- (i) in diffusion: material moves high to low concentration 1
- here: concentration in cells $>$ concentration in water **or**
uptake is against the concentration gradient **or** by diffusion ions would move out 1
- (ii) active transport / active uptake 1

[3]**Q3.**

- (i) On diagram:

For more help, please visit our website www.exampaperspractice.co.uk



- oxygen arrow to blood from air **and** CO₂ arrow to air from blood
1
- oxygen arrow to red blood cell
1
- CO₂ arrow from plasma
1
- (ii) diffusion
1
- (iii) large surface **or** large area
do not accept space
1

[5]

Q4.

in correct sequence:

- breathing
1
- diffusion
1
- respiration
1

[3]

Q5.

- (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]

Q6.

- (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]**Q7.**

- (i) any
- two**
- from:

urea

carbon dioxide

water

lactic acid

For more help, please visit our website www.exampaperspractice.co.uk



- (ii) higher concentration of glucose **or** more glucose in blood than cells 1
- diffuses across 1

[4]

Q8.

- (a) (i) change in weight was due to changes in potato
or osmosis **or** not due to outside liquid
ignore 'to make fair test' 1
- (ii) beaker 2 = 15.1(%) gain
allow 15% 1
- beaker 4 = 21.8(5) loss
not 21.7
allow -22%
if no minus or no 'loss' check graph 1
- beaker 5 = 29.8(%) loss
allow -30% 1
- (b) (i) both axes correct values
and scales > ½ of each axis
ignore lack of minus signs on vertical axis 1
- points correct
< ± ½ square
allow answers in (a)(ii) 1
- line correct
allow curve of best fit which can miss 10, 15
or straight lines between points
do not allow one straight line or sketched line
bar graph zero marks 1
- (ii) point where line crosses axis (eg 15-16% sucrose)
allow point from candidate's graph (± 0.5%) 1
- (iii) any **two** from:
looking for understanding that water in equilibrium
no change in mass

not **net** movement of water
 or water entry and exit are equal

because sucrose solution same
 concentration as cell sap or sucrose has
 same water potential as cell contents

allow because the concentrations are the same (inside and out)

2

[10]

Q9.

(a) mutation

for 1 mark

1

(b) fall,

idea that resistant beetles more likely to survive to breed,
 ∴ their offspring more likely to appear in the next generation

for 1 mark each

3

(c) inbreeding between resistant brothers and sister,
 will produce some individuals with 2 copies of the resistance allele,
 if 2 of these individuals breed all their offspring will be resistant

for 1 mark each

3

[7]

Q10.

(a) correctly labelled structures (i – iv)

each for 1 mark

*(allow labels as words or numbers: allow without guidelines
 if unambiguously labelled)*

4

(b) *ideas of*
 diffusion

greater concentration of oxygen in alveolus / high to low oxygen concentration
 membrane / alveolus permeability

any two for 1 mark each

2

[6]

Q11.

ideas that

sugar has dissolved in moisture (on surface of fruit)
 this solution more concentrated than solution inside fruit
 osmosis / diffusion movement of water out of fruit
 through partially permeable membrane (of fruit cells)



any four for 1 mark each

allow explanations in terms of concentrations of water molecules for full marks

[4]

Q12.

- (a) (cell) wall
(cell) membrane
cytoplasm
vacuole

for 1 mark each

4

- (b) (i) A
(ii) B

for 1 mark each

2

- (c) diffusion (reject osmosis)
for 1 mark

1

[7]

Q13.

- (a) (i) A
(ii) B

for 1 mark each

2

- (b) diffusion
(reject osmosis)
for one mark

1

- (c) C
because uptake against a concentration / diffusion gradient
(reject osmosis)
(if C not given, then idea of movement essential)

for 1 mark each

2

[5]

Q14.

- (a) (i) carbon dioxide / CO₂ (reject CO)
(ii) oxygen / O₂ / O (water vapour neutral)

for 1 mark each

2

- (b) (provides) energy



for one mark

1

- (c) starch insoluble therefore water not taken in by osmosis
or
 sugar is soluble / has small molecules may diffuse out therefore lost
(ignore ref. to cells bursting)

or
 starch has large molecules
 cannot diffuse therefore retained

for 1 mark each

3

[6]

Q15.

- (a) (i) water (molecules) enter(s) (the cell)
or *water (molecules) pass(es) through the (semi-permeable) cell membrane*

1

by osmosis

or *because the concentration of water is greater outside (the cell than inside it the vacuole)*

accept because of the concentration gradient provided there is no contradiction

1

- (ii) any **one** from

(it is) elastic

(it is) strong

(it is fully) permeable (to water)

or *water can pass through it*

do not credit semi-permeable

do not credit cell membrane is semi-permeable

1

- (b) (the piece of) potato shrinks
or *loses its turgor*
or *becomes flabby*
or *becomes flaccid*
or *plasmolysis occur*
or *cytoplasm pulls away from the cell wall*

(because) concentration of sugar

or *because concentration of water*

1

(solution) is greater than concentration inside the cell / vacuole
inside the cell / vacuole is greater than concentration (of water) outside

1

water is drawn out of the cell

1

[6]

Q16.

any **four** from

molecules / ions

do not credit mineral salts

move(d) through / across the cell

wall / membrane

against (a / the) concentration

gradient

by a series of chemical

reactions

(because) diffusion cannot occur

energy (required)

(supplied by) respiration

oxygen required for respiration (to occur)

[4]

Q17.

(i) $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$

energy is neutral

1

formulae all correct

with no omissions / deletions

correctly balanced

credit 1 mark if the answer is the exact reverse of an incorrect answer for (a)

1

(ii) and **three** from

take up of (soluble) substances / ions against the concentration gradient
or when the concentration (of the

For more help, please visit our website www.exampaperspractice.co.uk

substance / ions) is

greater inside the
cell / cytoplasm than outside it

through the (semi-permeable) (cell) membrane energy from mitochondria

or energy from respiration
not just energy

3

[5]

Q18.

- (a) (i) increasing one increases the other

gains 1 mark

but

they increase in proportion/ 1/5 taken in at first / 3/10 taken in after 2 weeks

gains 2 marks

2

- (ii) *idea that more/faster diffusion with higher concentration*
for 1 mark

or

with more oxygen particles/molecules (in same space)

1

- (b) (i) can take more oxygen from (the same) air/changes from 30 to
45/increases by 15

gains 1 mark

but

takes 50% more or 1.5 times as much

gains 2 marks

or

increases by 15 mg breath

2

- (ii) more red blood cells develop
or
more haemoglobin in the blood
(*not just 'acclimatises'*)

for 1 mark

1

- (iii) 75
60

each for 1 mark

2

[8]

Q19.

- (a) 1



	<i>for 1 mark</i>	1
(b) (i)	there will be less / no sodium (per day) (in her urine) <i>for 1 mark</i>	1
(ii)	<i>idea that</i> she should take in more (sodium (chloride) / salt) (<i>allow</i> stay indoors / in shade or be less active) <i>for 1 mark</i>	1
(c)	active transport / uptake (<i>do not allow</i> diffusion / osmosis) the concentration / gradient <i>for 1 mark each</i>	2

[5]