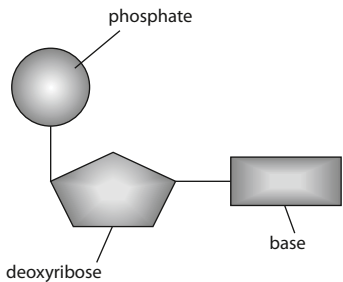


Answers to exam-style questions

Topic 1

- 1 B [1]
- 2 D [1]
- 3 hydrophilic head groups point outward;
hydrophobic tails point inward;
forms a lipid / phospholipid bilayer;
ions and polar molecules cannot pass through
hydrophobic barrier;
helps the cell maintain internal concentration and
exclude other molecules [2 max]
- 4 mitochondria and chloroplasts have similar structural
properties to prokaryotes:
have their own circular DNA molecules, which
resemble plasmids;
contain ribosomes that are identical in size to those of
prokaryotes;
have their own membrane;
can replicate by fission [3 max]
- 5 a active transport requires energy input, facilitated
diffusion does not;
active transport moves substances against a
concentration gradient, facilitated diffusion cannot [2]
- b exocytosis uses membrane-bound vesicles to
transport molecules;
vesicles fuse with plasma membrane to release
molecules outside the cell [2]
- 6 a mitotic index = $\frac{(21 + 24 + 7 + 17)}{529} = 0.13$ [2]
- b involved with microtubule formation;
chromatid alignment;
interact with CDK (cyclin-dependent kinases) to
direct enzyme formation [3]
- 7 a a mitochondrion [1]
- b different functions of the cell occur in organelles;
which are separated from the cytoplasm;
by their own membranes [3]
- c resolution is the ability to distinguish two separate
points or structures viewed in a microscope [2]

Topic 2

- 1 B [1]
- 2 D [1]
- 3 condensation;
involves the removal of water to join monosaccharides
together / equation to show this;
catalysed by enzymes;
consists of many monosaccharides linked (glycosidic
linkages) to make polysaccharide [2 max]
- 4 enzymes are specific to their substrate / lock-and-
key model / energy requirements for reactions with
substrates vary;
each step of the pathway is unique / different
substrate at each step;
finer control of metabolic pathways [2 max]
- 5 a optimum is pH 2 [1]
- b no data below pH 1 but at about pH 3 rate falls to
50% of its maximum value, so from the data given
the range would be about pH 1 to pH 3 [2]
- c pH 2 for pepsin to act close to its maximum rate of
efficiency [1]
- 6  [1]
- all three parts correctly positioned;* [1]
- correct labels* [1]
- b DNA is double stranded, while RNA is single
stranded;
DNA contains deoxyribose, while RNA contains
ribose sugar;
DNA contains A, C, G and T, while RNA contains
U not T
*All three needed and comparisons must be made, answer
may be tabulated.* [3]
- c the base A always pairs with T, and C always pairs
with G [2]
- d ACG [1]
- e serine [1]

7 a Measuring the distance moved by the pigment from the top of each band (the pigment front):

i R_f for chlorophyll $a = \frac{1.7}{7.5} = 0.23$ [1]

ii R_f for carotene = $\frac{7.1}{7.5} = 0.95$ [1]

b i all wavelengths between 400 and 700 nm are absorbed;
maximum absorption takes place at 430–460 nm (blue) and 670–690 nm (red) [2]

ii they correspond, the rate of photosynthesis is determined by the amount of light of different wavelengths that is absorbed [2]

c carotene traps wavelengths of light that are not absorbed by chlorophyll a ;
it is an accessory pigment [2]

8 i 32.3 [1]

ii 31.1 [1]

iii The weightlifter is unlikely to be obese because his body mass will be due to large muscles [1]

The office worker is probably obese and should consider reducing her body fat. [1]

Topic 3

1 C [1]

2 A [1]

3 B [1]

4 C [1]

5 B [1]

6 B [1]

7 a C–A–C [1]

b glutamic acid is replaced by valine [1]

c the altered amino acid causes the hemoglobin molecule to fold in a different way;
and the red blood cells become sickle shaped in low oxygen concentration;
sickled cells carry less oxygen leading to anemia [3]

8 Ludovica has alleles I^A and I^B .

Mikhail must have alleles I^A and i because he is group A but his mother is group O with the genotype ii .

Punnett grid:

		gametes from Mikhail	
		I^A	i
gametes from Ludovica	I^A	$I^A I^A$ group A	$I^A i$ group A
	I^B	$I^A I^B$ group AB	$I^B i$ group B

[4]

9 Award 7 max if no named example given. Award 5 max if both possible benefits and possible harmful effects are not addressed.

named example of desired outcome e.g. herbicide resistance;

Possible benefits:

specific characteristic(s) can be selected / less

random than selective breeding;

faster than selective breeding;

desired characteristic(s) may not be present in gene pool / selective breeding cannot produce desired phenotype;

increased crop yield / less land required for production;

reduced use of chemicals (e.g. pesticides);

crops that can grow in extreme conditions e.g. salt tolerance;

drug production e.g. pharmaceuticals in milk / human insulin; [4 max]

Possible harmful effects:

transferred gene may be harmful / cause suffering to animal;

unknown effects of gene interaction;

organism could escape into environment and

compete with the naturally occurring species;

once in the environment could not be recovered / controlled;

engineered gene could cross species barriers

[4 max]

[total 8 marks]

10 DNA profiling:

sample of DNA / blood / saliva / semen is obtained;
PCR used to amplify / produce more copies of the DNA;

DNA broken into fragments by restriction enzymes;

DNA fragments separated by gel electrophoresis;

DNA separated into a series of bands;

bands compared between different DNA samples;

if banding pattern is the same then DNA is (almost certainly) from same source;

if some bands are similar then individuals are (almost certainly) related; [4 max]

Specific example:

testing of paternity / forensics / classification /

archaeology / pedigree / another specific example

[1 max]

[total 5 marks]

11 Application of karyotyping:

testing for chromosome structure abnormality;

testing for chromosome number abnormality;

extra 21 indicates Down syndrome / other

chromosome number abnormality (e.g. Klinefelter's syndrome) [2 max]

Obtaining chromosomes:

fetal cells obtained from amniotic fluid;

by amniocentesis / CVS;

white blood cells separated out;

allowed to divide;

mitosis / division blocked in metaphase;

slide prepared / stained (and chromosomes

examined)

[3 max]

[total 5 marks]

Topic 4

1 B [1]

2 A [1]

3 C [1]

4 D [1]

5 pyramid shows three levels, widest at the bottom and narrowest at the top (*not necessarily to scale*); lowest level labelled 'producers', middle level 'primary consumers' and top level 'secondary consumers'; calculations of energy at each level: $400 \text{ kJ m}^{-2} \text{ y}^{-1}$ for bottom level (producers), $40 \text{ kJ m}^{-2} \text{ y}^{-1}$ for middle level (primary consumers) and $4 \text{ kJ m}^{-2} \text{ y}^{-1}$ for top level (secondary consumers) (*units required*) [3]

6 a i for the cow: $(\frac{0.9}{7.5}) \times 1000 = 120 \text{ kg per tonne}$ [2]

for the rabbits: $(\frac{3.6}{30.0}) \times 1000 = 120 \text{ kg per tonne}$ [2]

ii The table gives the total daily mass increases for the cow and for the 300 rabbits, while the values calculated in part a i take into consideration the amounts eaten – they are the daily mass increases for the cow and for the 300 rabbits per tonne of food consumed. [2]

b Heat loss is dependent on surface area so the 300 rabbits, which have a greater total surface than one cow, lose heat more quickly. [2]

7 a algae → fish → sea lions [3]

b algae: 1

fish: 2

sea lions: 3

[2]

c detritivore

[1]

8 a i ecosystem [1]

ii because it consists of living organisms and the non-living environment (e.g. the 'earth') [1]

b birds feed on plants;

birds nest in plants;

birds feed on insects, which eat the plants [2 max]

c insect-feeding birds are secondary consumers [1]

d dead plant and animal material falls to the ground;

and is broken down by bacteria and fungi

(saprotrophs); releasing inorganic material

[3]

Topic 5

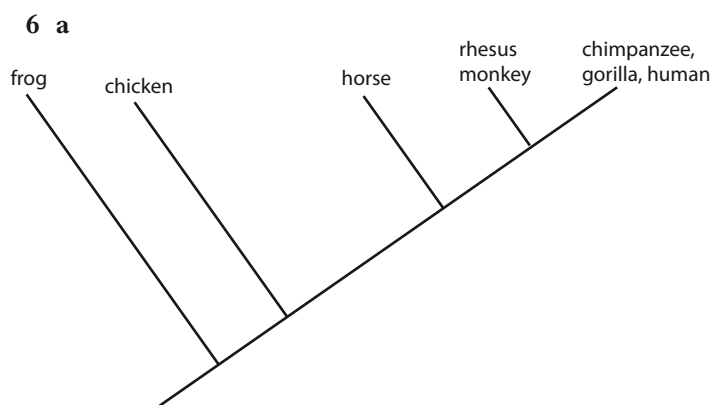
1 D [1]

2 B [1]

3 members of a population show variation; variation has its origins in sexual reproduction / meiosis / mutation; some variations allow an individual to be better adapted; better adapted individuals are more likely to survive to reproductive age; frequency of advantageous alleles increases (over time) [3 max]

4 analogous structures are brought about by convergent evolution; a cladogram is based on evolutionary / genetic relationships [2]

5 particular molecules carry out same function; related organisms will have similar structures for particular molecules; mutations / changes in the molecular structure occur at a particular rate; the number of differences can be used to indicate the evolutionary distance; amino acid sequence of cytochrome c / hemoglobin / other named protein; base sequence of DNA / mitochondrial DNA / mtDNA; DNA molecules can be compared using (DNA) hybridisation; DNA is a better indicator than protein as it accumulates more mutations; some mutations occur in introns / do not cause an amino acid change; changes / mutations do not always occur at same rate; several different molecules can be analysed and the number of changes compared [6 max]



[5]

b notochord; dorsal nerve cord; post-anal tail;
pharyngeal slit [3 max]

c i chimpanzee, gorilla, rhesus monkey, horse [1]

ii all mammals have hair follicles in their skin;
all mammals have internal fertilisation and development;
all mammals feed their offspring with milk

[2 max]

7 a thrushes (birds) took / fed on approximately twice as many banded snails as unbanded snails;
the unbanded snails were probably better camouflaged on the woodland floor, which would be covered in dead leaves in autumn, than the banded snails;
birds use their sight to find snails so the unbanded snails were better adapted to survive in the woodland in autumn [3]

b in different areas, snails patterns will vary;
snails that are better adapted (camouflaged) to avoid being eaten will survive longer;
they will be more likely to reproduce than poorly adapted individuals;
their offspring will carry the favourable (well-adapted) allele;
over a number of generations the proportion of snails in the population that carry the favourable allele will increase;
this may mean that different populations in different environmental conditions contain different proportions of banded and unbanded snails [max 4]

Topic 6

- 1 A [1]
2 C [1]
3 C [1]
4 D [1]
5 B [1]

6 B [1]

7

Hormone	Where produced	Main effects
estrogen	ovaries	development of female genitalia / secondary sexual characteristics; control of menstrual cycle and pregnancy
insulin	pancreas	regulation of blood glucose level
melatonin	pineal gland	maintenance of circadian rhythm
leptin	adipose cells	control of appetite and metabolism

[4]

- 8 Arteries** [1 mark for each, 3 max]:
thick wall / elastic fibres to help withstand the high(er) pressure;
outer fibrous coat prevents artery from rupturing under the high pressure;
lumen small compared to wall thickness to maintain high pressure;
layers of (smooth) muscle to allow arteries to contract / elastic recoil;
smooth muscle allows the pressure to be altered (vasoconstriction and vasodilation) [3 max]
Veins [1 mark for each, 3 max]:
lumen always large in relation to diameter;
thin wall / more collagen and fewer elastic fibres (than arteries) since pressure is low(er);
very little muscle since not needed for constriction;
valves to prevent back flow between pulses [3 max]
Capillaries [1 mark for each, 3 max]:
no muscle / elastic tissue since pressure is very low;
endothelial layer one cell thick to allow permeability / diffusion of chemicals / tissue fluid;
small diameter leads to exchange;
no valves since pressure very low [3 max]
[total 9 marks]

- 9** antigen causes an immune response to produce antibodies specific for that antigen;
antibodies produced in lymphocytes;
lymphocytes produced in bone marrow;
lymphocytes carried in blood;
helper T-cells are needed for antibody production [3 max]
10 the skin / mucous membranes act as a physical barrier;
skin has several layers of tough / keratinised cells;
the skin is dry, discouraging the growth and reproduction of pathogens;

skin / mucous membranes host natural flora and fauna that compete with pathogens;
the enzyme lysozyme is present on the skin's surface to break down pathogens;
the pH of skin / mucous membranes is unfavourable to many pathogens;
skin is a continuous layer;
mucus traps pathogens / sticky [3 max]
Award only 2 max if either skin or mucous membranes are not mentioned.

- 11 pancreatic cells monitor blood glucose;
insulin / glucagon is a hormone;
low glucose level induces production of glucagon;
 α cells of pancreatic islets produce glucagon;
glucagon stimulates the liver to break down glycogen into glucose;
glucagon leads to increase in blood glucose level;
absorption of glucose from digestive tract causes glucose levels to rise (after meals);
high level of blood glucose induces production of insulin;
 β cells of pancreatic islets produce insulin;
insulin stimulates uptake of glucose into cells (muscles);
insulin stimulates uptake of glucose into liver / storage of glucose as glycogen in liver;
insulin leads to decrease in blood glucose level;
homeostatic monitoring of blood glucose levels is constantly happening;
blood glucose regulation is an example of negative feedback

[8 max]

- 12 menstrual cycle is interrupted with hormone treatment;
FSH is used to stimulate the ovaries;
several eggs are harvested;
eggs are fertilised;
zygotes are incubated;
embryos are re-implanted into the uterus [6]
- 13 a i both structures correctly labelled for 1 mark (see Figure 6.2) [1]
ii longitudinal muscles contract while circular muscles relax (or the reverse);
contraction of the circular muscles pushes food forward;
the process is known as peristalsis [2 max]
b i both structures correctly labelled for 1 mark (see Figure 6.3) [1]
ii epithelium is a single layer of cells so that the diffusion distance is small;

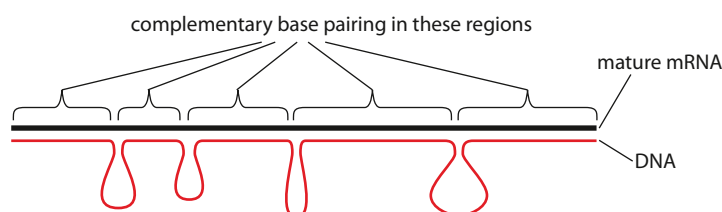
digested materials are carried away in the blood capillaries so that a diffusion gradient is maintained [2]

- 14 a C [1]
b contraction of muscles does not make any sound
as the heart fills there may be some sound but only the valves snapping shut will cause two distinct sounds [2]
c Arteries are slightly flexible / they expand;
as blood is pumped into them / during systole;
during diastole they recoil to their original diameter and push blood onward [3]

Topic 7

- 1 D [1]
2 B [1]
3 A [1]
4 A [1]
5 C [1]
6 D [1]
7 three stages: initiation, elongation and termination;
mRNA translated in a 5' \rightarrow 3' direction;
mRNA binds to ribosome / small subunit;
first (charged) tRNA binds to start codon / to mRNA;
tRNA anticodon binds to mRNA codon;
by complementary base pairing;
AUG is the start codon;
second (charged) tRNA binds to ribosome / to mRNA;
large subunit binds (to small subunit);
amino acid on first tRNA is joined / bonded to amino acid on second tRNA;
by condensation (reaction);
peptide bond formed;
ribosome moves (in 5' \rightarrow 3' direction) by one triplet / codon;
first tRNA in exit site;
tRNA in exit site leaves and new / third (charged) tRNA binds;
repeats until a stop codon is reached;
polypeptide released;
tRNA-activating enzymes join correct amino acid to its specific tRNA [9 max]

- 8 drawing similar to the one below showing five regions;
which are paired using complementary base pairing;
and other regions which are not (indicated by the loops);
upper strand labelled 'mature mRNA', and the lower strand 'DNA' [4]



- 9 a 4 [1]
b the primer on the right, closest to 4 [1]
c DNA polymerase I [1]
d DNA ligase [1]
e A [1]
[total 5 marks]

Topic 8

- 1 B [1]
2 B [1]
3 A [1]
4 A [1]
5 D [1]
6 C [1]
7 D [1]
8 B [1]
9 a greater surface area for the pigments / chlorophyll;
more light (energy) can be absorbed [2]
b tree leaves reduce amount of light reaching ground level;
light has already passed through leaves so most of the useful wavelengths / red and blue light has been removed or converse only green / yellow / orange light remains [2]
c catalyses first reaction in the Calvin cycle;
used for carbon fixation;
carbon fixation is essential to the plant / carbon dioxide is needed for synthesis of sugars [2 max]
[total 6 marks]

- 10 pyruvate enters the mitochondrion;
pyruvate is converted to acetyl CoA;
by oxidation (and decarboxylation) / $\text{NADH} + \text{H}^+$ and CO_2 formed;
acetyl CoA enters the Krebs cycle / coenzyme A release for recycling;
during one Krebs cycle (two) further (decarboxylation) reactions remove CO_2 ;
during Krebs cycle hydrogen is removed by NAD^+ and FAD to form $\text{NADH} + \text{H}^+$ and FADH_2 ;
occurs in mitochondrial matrix;
electrons released from $\text{NADH} + \text{H}^+$ and FADH_2 onto electron transport chain (ETC);
ETC proteins on inner mitochondrial membrane / cristae;
energy released from electrons flowing along chain pump protons into inter-membrane space;
protons flow (passively) from inter-membrane space back to matrix through ATP synthase;
oxygen is final electron acceptor and water is produced (using protons) [8 max]

- 11 light-independent reaction fixes CO_2 ;
to make glycerate 3-phosphate;
glycerate 3-phosphate / GP becomes reduced;
to triose phosphate;
using $\text{NADPH} + \text{H}^+$;
using ATP;
from the light-dependent reaction;
ATP needed to regenerate RuBP [5 max]

- 12 a *Diagram should show:*
double membrane, stroma, grana containing chlorophyll, matrix [2]
Annotations:
contains chlorophyll to capture light energy;
grana have large surface area for chlorophyll to be sited;
thylakoid membranes have small spaces for chemiosmosis [2 max]
Award 1 mark for a clear, accurate diagram.
b reactions occur in the thylakoid membranes;
light energy is used to split water (photolysis);
hydrogen is removed and held by NADP^+ ;
excited electrons are passed along a chain of electron carriers;
some energy causes H^+ ions to be pumped into the thylakoid spaces;
proton gradient leads to chemiosmosis;
ATP is generated from ADP and P_i ;
oxygen is released [5 max]
c oxygen is produced during light-dependent reaction – this is essential for respiration of all

living things;
ATP is used in the formation of glucose, which is the source of food for heterotrophs [4]
If products only are stated, award only 2 marks.

Topic 9

- 1 B [1]
2 A [1]
3 D [1]

4 shoot is illuminated from one side;
auxin produced in shoot tip;
auxin accumulates on shaded side / transported to shaded side;
auxin stimulates increased growth on shaded side;
by stimulating cell elongation (*reject 'stimulating cell division/mitosis'*) [3 max]

5 *Transport:*
xylem vessels transport the water;
water molecules held together by cohesion / hydrogen bonding;
creates continuous column of water between leaf and root / in xylem;
water evaporates from leaves;
creates transpiration pull;
transpiration stream is flow of water through xylem / within plant;
capillarity / adhesion (to xylem walls) raises water (a short distance);
osmosis / osmotic pressure raises water (a short distance) [3 max]

Abiotic factors (accept opposites):

temperature – higher temperature increases evaporation, therefore increasing transpiration flow
wind – increasing wind / air speed increases evaporation, therefore increasing transpiration flow
light – increasing light intensity opens stomata / expands guard cells increasing evaporation, therefore increasing transpiration flow
humidity – higher humidity decreases evaporation, therefore decreasing transpiration flow [3 max]
[total 6 marks]

6 flowering plants are either short-day / require short days to flower;
or long-day / require long days to flower;
key factor is length of dark period;
key factor is wavelength of light / far red light / 730 nm;
plants are grown in buildings where day length can be controlled;
short-day plants have artificially shortened day;

long-day plants have artificially lengthened day;
dark period need only be interrupted briefly / for a few minutes by light for long-day plants;
regulated by phytochrome / P_{fr} [6 max]

7 water absorbed through the micropyle;
gibberellin formed in cotyledon;
gibberellin stimulates formation of enzymes / amylase (in aleurone layer);
amylase breaks down / digests starch in cotyledon to maltose / enzymes break down / digest food stores in cotyledon;
nutrients / soluble food molecules moved to embryo for growth / transport [4 max]

8 phloem is composed of sieve tube cells and companion cells;
companion cells synthesise ATP;
transport occurs both up and down phloem / bi-directional;
transports sugars / (soluble) organic molecules;
tissues can act as either source or sink;
molecules move from source to sink;
named example of source and sink;
ATP used to pump sugar / organic molecules into / out of sieve cell;
water follows by osmosis;
creates pressure gradient / mass flow / pressure flow in sieve cell [6 max]

9 a the experiment shows that negative pressure (tension) is being exerted on the column of water and mercury;
as water evaporates at one end [2]
b a cohesive force holds the molecules of water together in the column;
and must hold the water molecules to the mercury;
atmospheric pressure also affects the apparatus [2 max]
c the mercury falls to atmospheric pressure, which can be variable depending on location of the apparatus and local conditions [1]
[total 5 marks]

10 a auxin stimulates the growth of shoots; [1]
but inhibits the growth of roots; [1]
as the concentration of auxin increases to 10 ppm the effect of auxin on shoot growth also increases; [1]
but the inhibiting effect of auxin on root growth does not become stronger as auxin concentration increases [1]

- b** auxin causes the cell walls to become more flexible so that they can elongate more quickly and the plant can bend [1]
the herbicide has a similar structure to auxin and probably interacts in a similar way with the molecules in the plant cell walls [1]
- c** as the herbicide falls on certain parts of a plant it will cause these parts to elongate and make the plant bend
the herbicide will not reach the parts of the plant normally influenced by auxin and so the shape of the plant will not be normal [2]
[total 8 marks]

Topic 10

- 1** A [1]
2 D [1]
3 C [1]
4 D [1]
- 5** crossing over / chiasmata;
exchanges / mixes alleles;
random orientation of chromosomes;
at metaphase I;
at metaphase II [2 max]
- 6** linked genes occur on the same chromosome / chromatid;
genes / alleles inherited together / not separated / do not segregate / do not assort independently;
diagram to show crossing over;
non-Mendelian ratio / example(s) of ratio(s);
specific example of linked genes;
Award 1 mark for each of the following in an example of a cross between two linked genes:
key for alleles involved in the example of a cross;
parental genotypes and phenotypes shown;
F₁ genotypes and phenotypes shown;
recombinants identified;
recombinants result from crossing over;
clear diagram of cross / Punnett grid [9 max]

- 7 a DdTt;**
all have dark body and straight bristles [2]
b gametes are **DT, Dt, dT, dt** and **dt**;
F₂ genotypes are **DdTt, Ddtt, ddTt** and **ddtt**;
1 dark body, straight bristles : 1 dark body, dichaeete bristles : 1 ebony body, straight bristles : 1 ebony body, dichaeete bristles [3]
c (autosomal) linkage (*reject 'sex linkage'*) / genes are on the same chromosome / genes do not assort independently;

dark body, straight bristles and ebony body,
dichaeete bristles are parental combinations / dark body, dichaeete bristles and ebony body, straight bristles are the recombinants;
recombinants are produced by crossing over [2 max]
[total 7 marks]

- 8 a** there is a close fit between the observed and the expected values / no significant difference from the expected value;
probability of a deviation of 0.47 is between 0.90 and 0.95 significance level or much lower than the 0.05% value [2]
- b** both parents are pure breeding i.e. homozygous;
round and yellow are dominant alleles;
as shown by all the F₁ being round and yellow;
parental genotypes are **RRYY** and **rryy** [2 max]
all F₁ are **RrYy**; [1]
the chi squared test indicates genes are not linked;
F₁ cross can be shown as a grid / must show correct gametes / and phenotypes / and genotypes

Gametes	RY	Ry	rY	ry
RY	RRYY	RRYy	RrYY	RrYy
Ry	RRYy	RRyy	RrYy	Rryy
rY	RrYY	RrYy	rrYY	RrYy
ry	RrYy	Rryy	rrYy	rryy

[4]
[total 9 marks]

Topic 11

- 1** B [1]
2 A [1]
3 D [1]
4 D [1]
- 5** antigen causes production of antibodies specific for that antigen;
antigen taken up by macrophage;
antigen presented on surface of macrophage to helper T-cell / TH cell;
helper T-cell divides into clone(s) of (memory cells and) active cells;
active helper T-cell activates B-cell;
with antibody specific for the antigen;
B-cell activated and divides into clones of active / plasma cells and memory cells;
active B-cells / plasma cells secrete large quantities of antibody [5 max]

- 6 efferent arteriole has smaller diameter than afferent arteriole;
to increase (hydrostatic) blood pressure in glomerulus / glomerular capillaries;
glomerular capillaries fenestrated / have pores;
Bowman's capsule cells have processes / podocytes;
gaps between processes / podocytes allow filtrate to pass through easily;
basement membrane between capillaries and podocytes / Bowman's capsule cells acts as (ultra) filter;
basement membrane only allows substances below a certain size to pass through;
process of ultrafiltration is passive **[4 max]**
- 7 large surface area;
produced by microvilli and basal infoldings;
large numbers of mitochondria;
to provide energy for active transport **[3 max]**
- 8 arrival of impulse depolarises the muscle membrane;
(voltage-gated) channels are opened in the sarcoplasmic reticulum;
allowing release of calcium ions;
cross bridges form between myosin heads and (binding sites on) actin;
myosin head bends, pulling actin;
cross bridge is broken;
ATP is required;
myosin head returns to start position;
contraction stops when calcium ions are pumped back into sarcoplasmic reticulum **[5 max]**
- 9 progesterone level falls;
oxytocin (from pituitary gland) secreted;
oxytocin causes uterus muscle to contract;
estrogen makes uterus muscles more sensitive to oxytocin;
increased pressure on cervix causes further oxytocin secretion;
through nerve impulses to pituitary gland;
which further increases muscle contraction;
positive feedback **[5 max]**
- 10 a 10 times **[1]**
b dialysis is indicated by a fall in the blood urea/g dm⁻³ on 10 occasions (graph 1) **[1]**
c 31st October **[1]**
d the loss in body mass is equivalent to the mass of excess (accumulated) water that had not been completely removed during dialysis;
kidneys are more efficient than dialysis so more water is lost/levels of ADH are suppressed/
hormone levels are changing **[any 2]**
[total 5 marks]
- 11 a i higher concentrations of lead in the placenta are associated with lower birth weight;
there is a positive correlation between the concentration of zinc in the placenta and the birth weight of the babies **[2]**
ii lead may be preventing the transfer of oxygen and glucose across the placenta to the baby;
zinc may be enhancing transfer of these materials; **[2]**
b 2.00–2.49 kg and 4.50–4.99 kg **[2]**
c villi increase the surface area for the exchange of materials;
the diffusion distance between the mother's blood and the baby's blood is small;
a large surface area can maintain an efficient diffusion gradient;
or other sensible suggestion **[2 max]**
[total 9 marks]