



SOLUTION TO F/M/19/22

QUICK ACCESS GRID

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S1

C

All animals and plants show the following 7 characteristics:

1. **M**ovement ✓
2. **R**espiration (is different from breathing!) ✓
3. **S**ensitivity
4. **G**rowth ✓
5. **R**eproduction ✓
6. **E**xcretion
7. **N**utrition

*MRS GREN



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S2

A

The binomial system uses a two-part name for an organism.

First part	Generic name*	<i>Homo</i>
Second part	Specific epithet**	<i>sapiens</i>

The specific name may be single or compound.

It may include the name of the discoverer in full or in abbreviation.

The name is printed in italics and underlined in a handwritten description.

*Generic = of the genus

**Specific = of the species

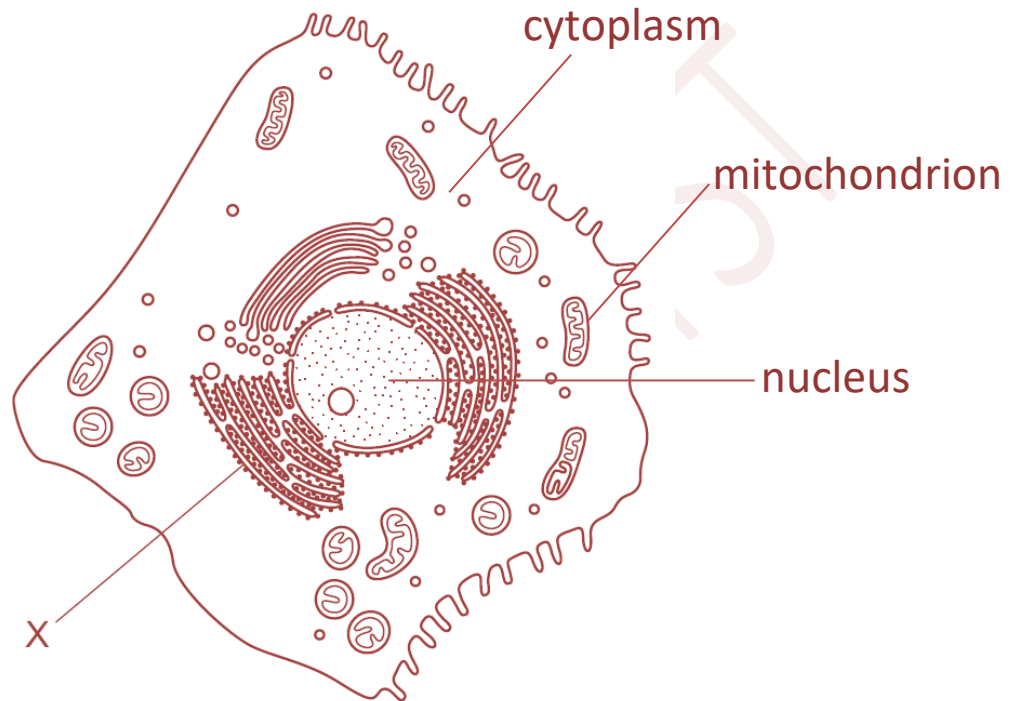
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S3

D



Structure X is **rough endoplasmic reticulum**.

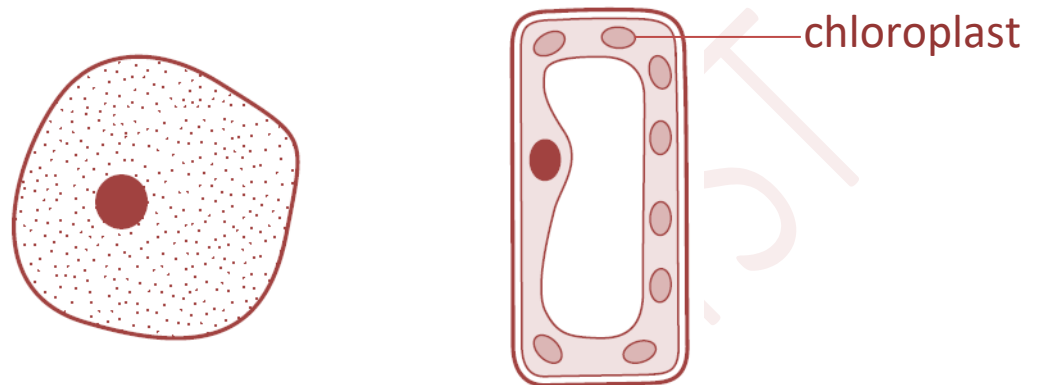
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S4

C



Starch is made by the plant cells by the process of photosynthesis. The presence of Chlorophyll is essential for photosynthesis. Chlorophyll is present in chloroplasts.

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S5

C

The root hair and the xylem are part of the same **organ and organism**.

The root hair cell absorbs water and minerals from the soil.

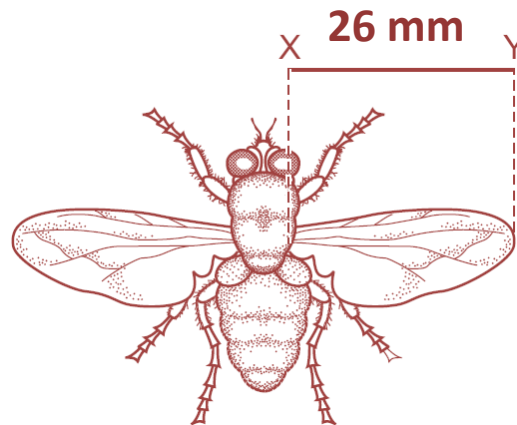
The xylem vessel transports water and supports the plant.

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S6

B

$$\text{Magnification} = \frac{\text{size of diagram}}{\text{actual size of specimen}}$$

$$\text{Magnification} = \frac{26}{4} = 6.5$$

∴ magnification of the diagram = **×6.5**

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**S7****A**

	from the frog into the water	from the water into the frog
A	carbon dioxide	oxygen
B	carbon dioxide and oxygen	no movement
C	oxygen	carbon dioxide
D	no movement	carbon dioxide and oxygen

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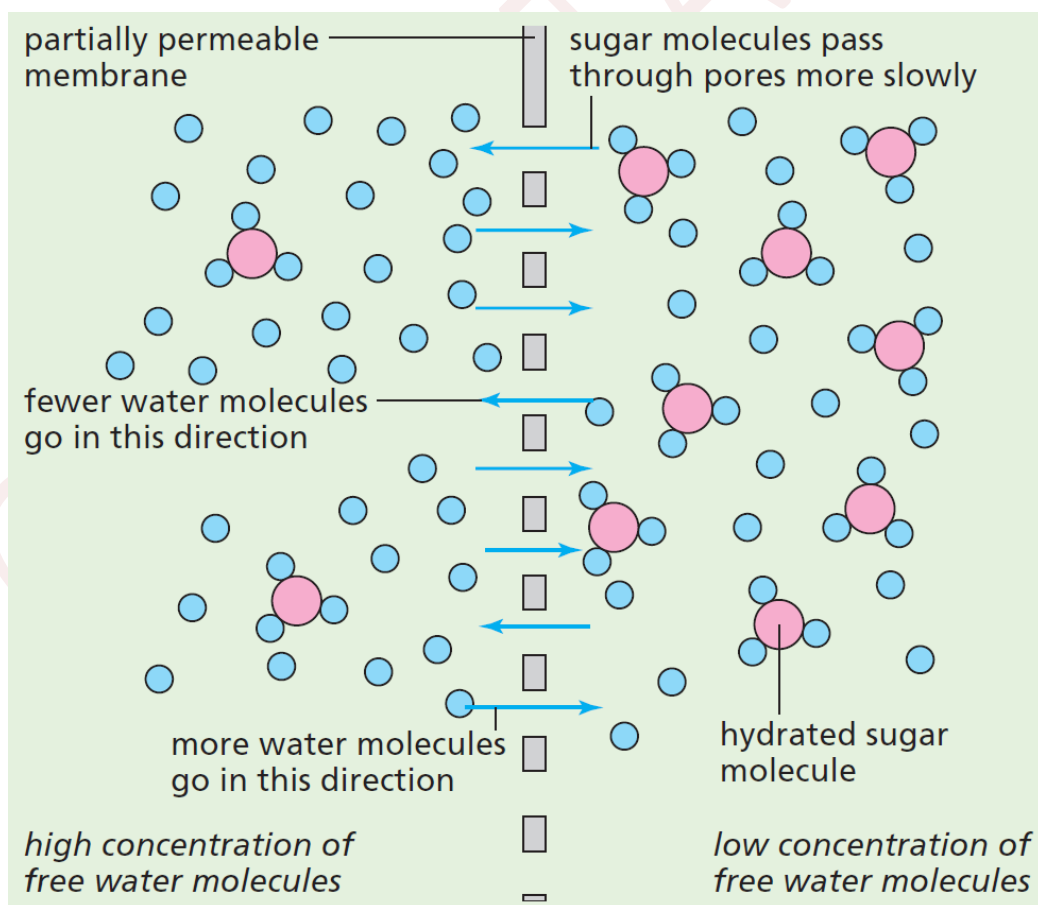
S8

C

Osmosis can be defined as:

- the spontaneous diffusion of water molecules
- from a region of higher concentration of water molecules to a region of lower concentration of water molecules
- down a water potential gradient
- through a partially permeable membrane.

The process is spontaneous; energy is not required.





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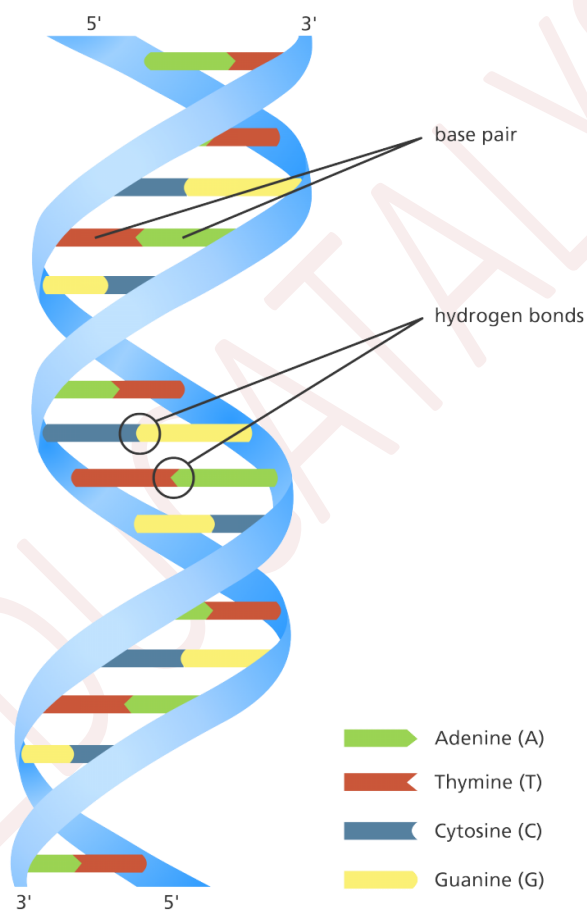
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S9

A

DNA contains the bases A, C, G and T.



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S10

D

Proteases are enzymes that breakdown (digest) proteins.

The enzyme in question is a stomach protease.

The stomach protease works best at very low pH values (highly acidic).

Increasing the pH to 7.5 would alter the natural structure of the enzyme and significantly lower the enzyme activity.

This would **reduce** the rate of production of amino acids.

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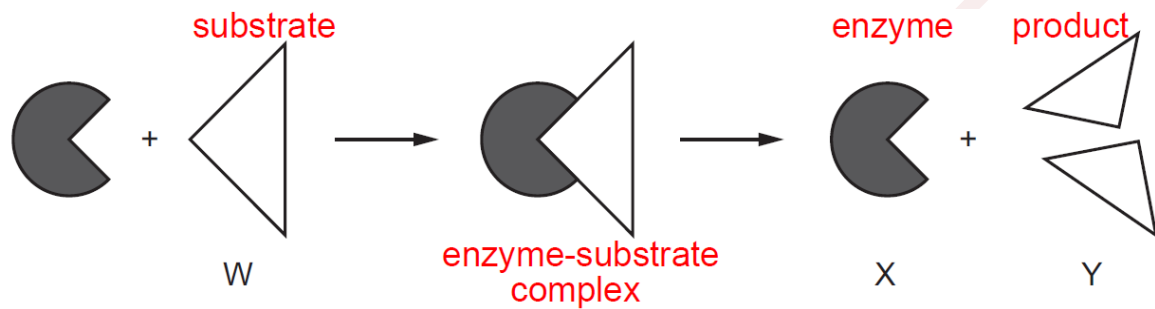
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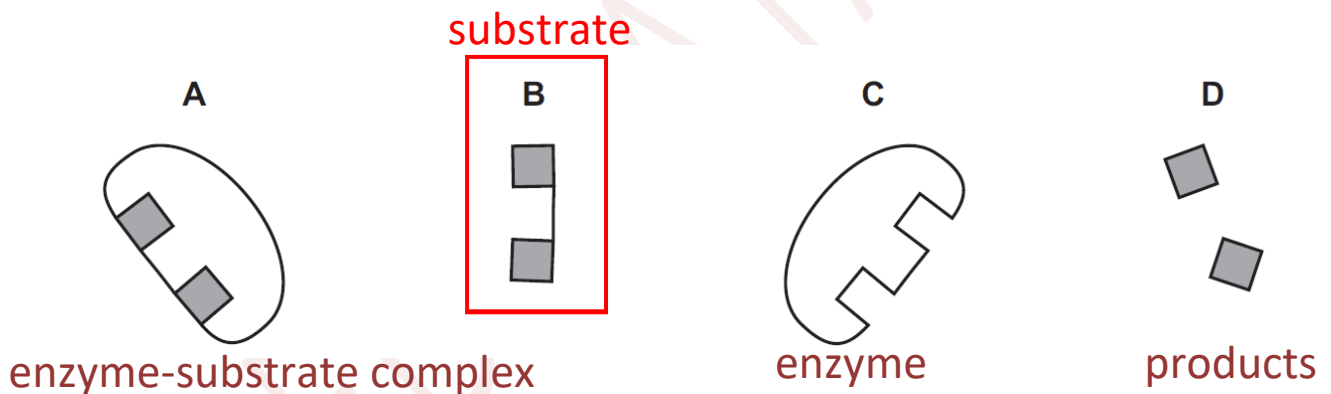
S11

B

The diagram illustrates the lock and key model of enzyme action.



Substrate molecule fits exactly into the active site of the enzyme to form an enzyme-substrate complex.



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S12

D

Photosynthesis reaction

Carbon dioxide + Water → Glucose + Oxygen

The most abundant gas present at the top of the tube at the end of the experiment is **Oxygen**.

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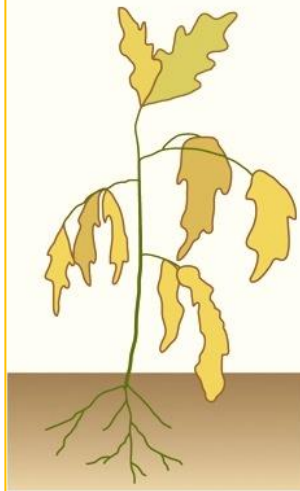
S13

C

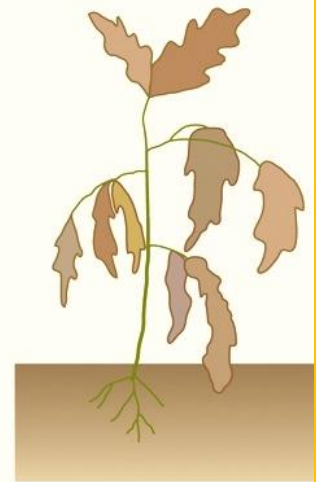
It will have small leaves and a thin stem.

Deficiency of nitrate ions results in stunted plant growth. A lack of nitrate ions results in the upper leaves turning pale green and the lower leaves turning yellow and dying eventually.

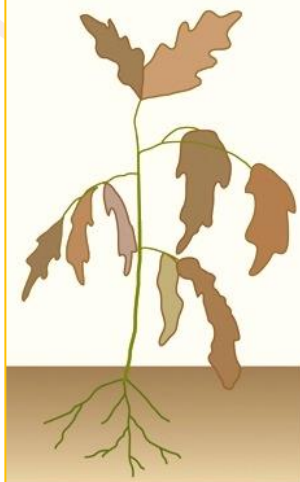
lacking → ● poor growth
nitrates ● yellow leaves



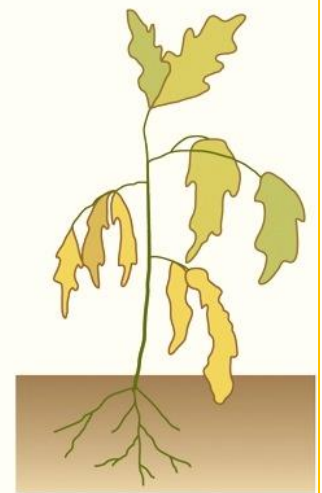
lacking → ● poor root growth
phosphate ● discoloured leaves



lacking → ● poor fruits and flowers
potassium ● discoloured leaves



lacking → ● yellow leaves
magnesium



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S14

A

Chemical digestion: Large insoluble molecules are broken down into small soluble molecules by the action of chemicals (enzymes).

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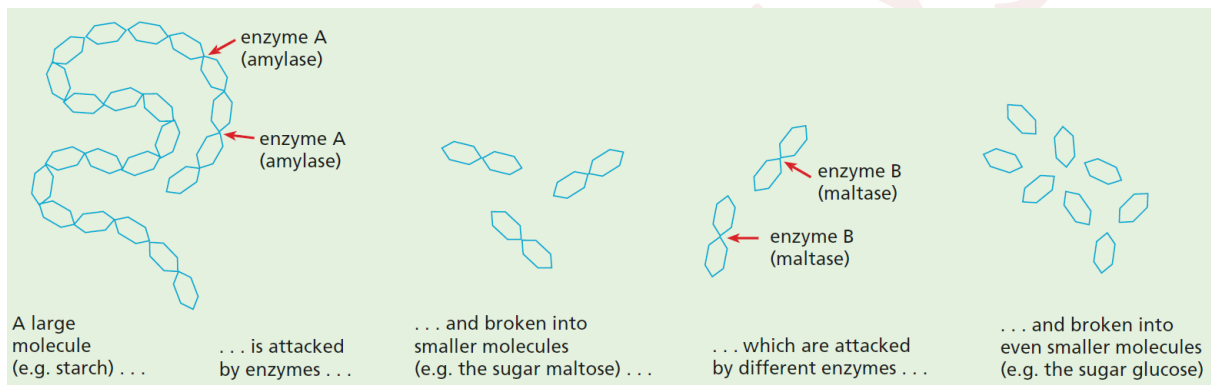


S15

C

The change in concentration at **X** is caused by the action of Maltase.

The digestion of carbohydrates (Starch) begins in the mouth by the salivary Amylase – enzyme which breaks down carbohydrates to maltose.



Maltose is broken down to glucose by the enzyme maltase, which is present in the membranes of the epithelial cells of the villi located in the small intestine.

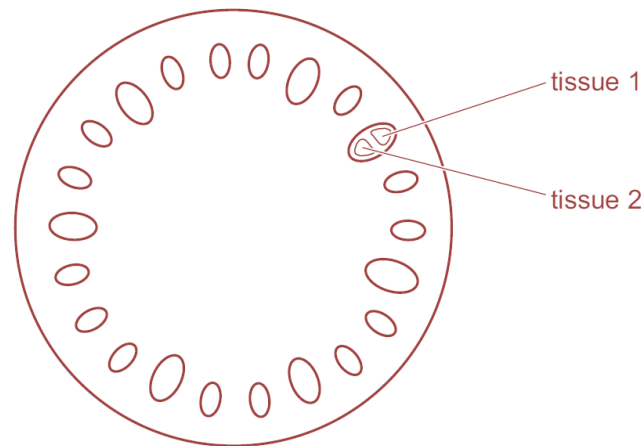
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S16

B



Tissue 1 is Xylem.

Transportation of water from roots to the rest of the plant occurs through **xylem**. It also provides mechanical support to the plant.

Tissue 2 is Phloem.

Transportation of nutrients occurs through phloem.



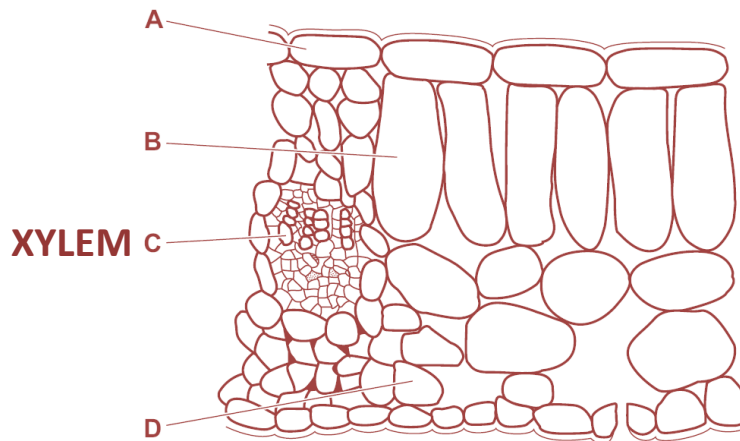
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S17

C



Transportation of water from roots to the rest of the plant occurs through **xylem**. Part C will therefore turn red.

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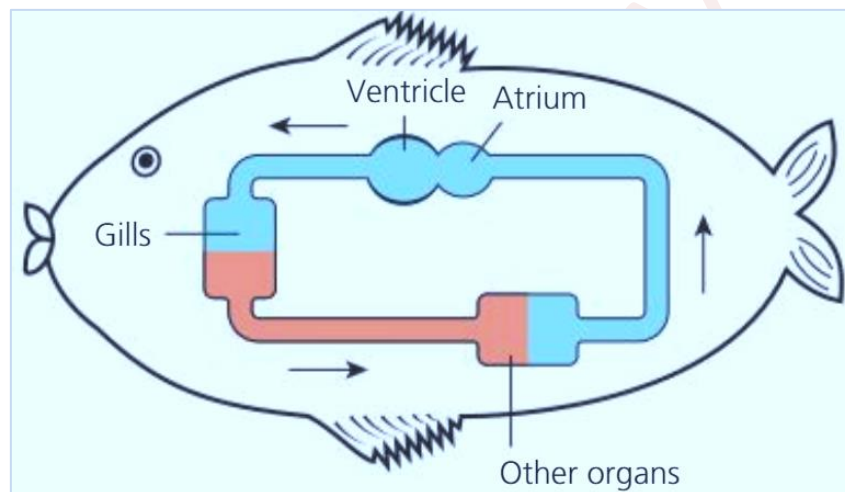


S18

C

Fish have a single circulation – blood flows through the heart only once for each circulation.

After leaving the heart, the blood will flow to the gills.



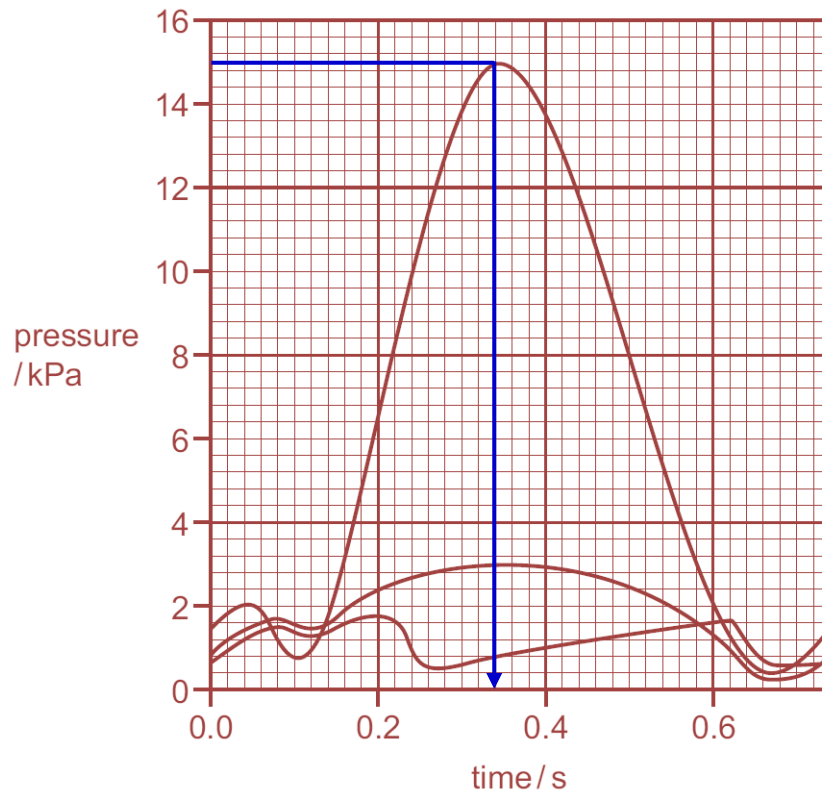
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S19

C



pressure in the right ventricle when the left ventricle is at its maximum pressure = 3.0 kPa

NOTE:

3.0 kPa is the closest option as can be seen from the graph.

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**S20****C**

Hairs in the nose and mucus secreting cells of the respiratory pathways prevent the pathogens from reaching the alveoli when breathing in.

The hairs propel a liquid layer of mucus that covers the airways.

The mucus layer traps pathogens (potentially infectious microorganisms) and other particles, preventing them from reaching the lungs.

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S21

C

Approximate percentages of oxygen and carbon dioxide in inspired air is the same as the percentages of these gases in pure and dry air.

Oxygen: 20 %

Carbon dioxide: 0.04%

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**S22****D**

All three routes involve the action of enzymes.

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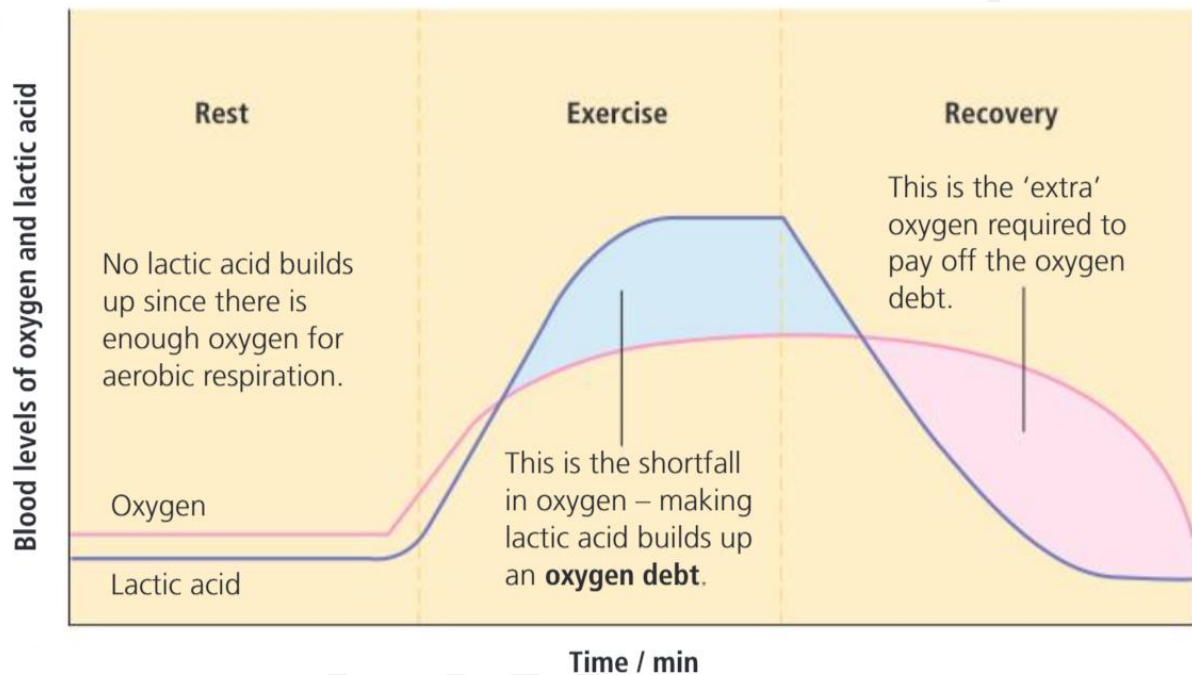
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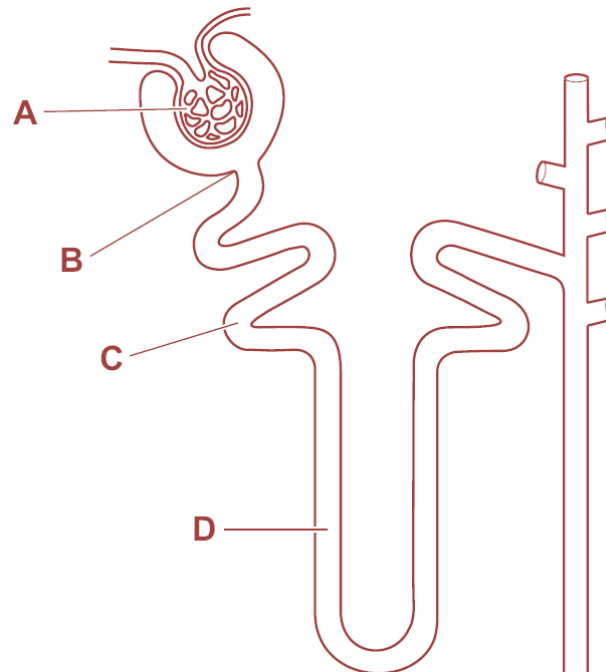


S23

B



The graph at **Z** represents the recovery phase.
 Aerobic respiration of lactic acid occurs in the liver in this phase.
 The lactic acid is oxidised to carbon dioxide and water.

**S24****A**

Filtration occurs in A – the glomerulus (ball of capillaries).

Blood is filtered under high pressure.

Waste plus some useful molecules plus some water are filtered into the nephron (kidney tubule).

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S25

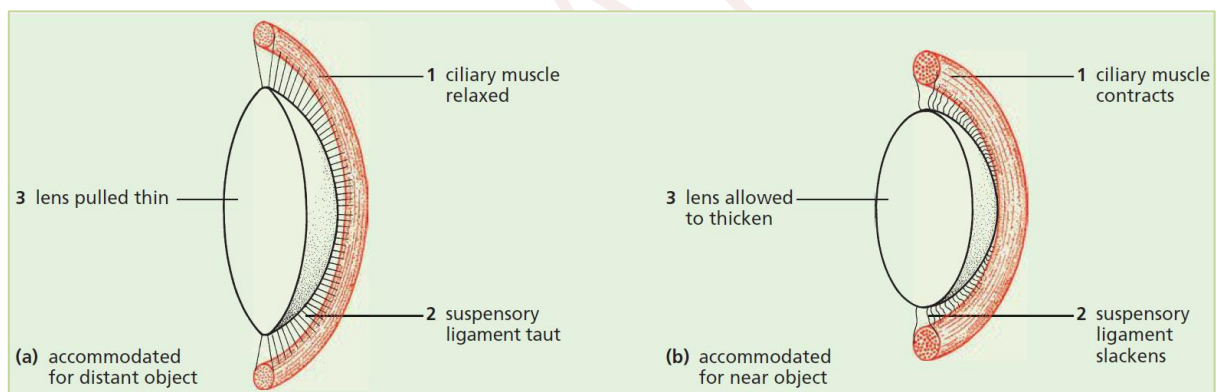
D

Suspensory ligaments connect the lens at its periphery to the ciliary body.

To focus light from a distant object, the ciliary muscles relax.

This increases tension on the suspensory ligaments (tighten) and flattens the lens.

To accommodate for a near object, the ciliary muscles contract, thereby decreasing tension in the suspensory ligaments and allowing the lens to spring back into a more rounded shape.



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**S26****B**

The overall effect of release of Adrenaline is to provide more Glucose and more oxygen for the working muscles.

Glycogen in muscles is converted to Glucose and released into the blood.

This increases blood glucose concentration.

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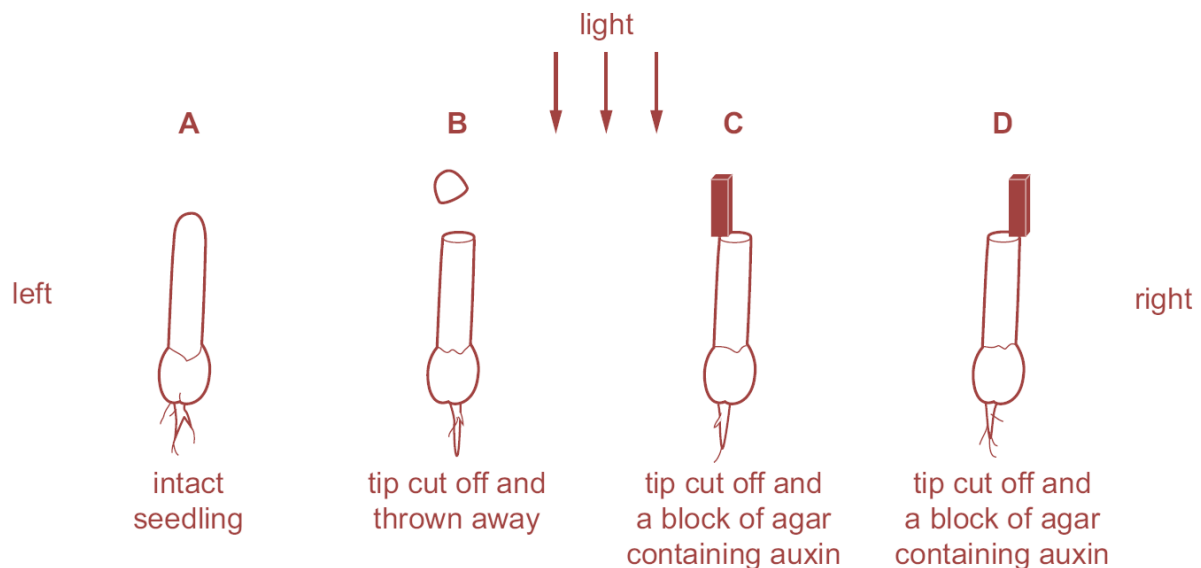
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S27

D



In seedling **A**, auxin is produced at the tip and diffuses slowly down the plant. Cells on both sides are affected equally and the seedling grows straight.

In seedling **B**, the tip is cut off, hence the shoot can no longer respond to stimuli (light).

The agar blocks containing auxin can allow the decapitated tips to respond to light.

When shoot tips are exposed to light from one side, auxin accumulates on the 'dark' side of the shoot. The auxin affects the growth of the 'dark' side of the shoot.

In seedling **D**, the agar block is placed on the right. This reduces the concentration of auxin on the right (the light side). Auxin will move to the dark side, that is, left side of the seedling and cause cells to elongate. The seedling therefore grows to the left.

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S28

A

MRSA is a bacterium.

Methicillin-resistant Staphylococcus aureus (**MRSA**) is a bacterium that causes infections in different parts of the body.

It is tougher to treat than most strains of staphylococcus aureus because it's resistant to some commonly used antibiotics.

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S29

C

	egg	sperm	zygote
A	diploid	diploid	diploid
B	diploid	diploid	haploid
C	haploid	haploid	diploid
D	haploid	haploid	haploid

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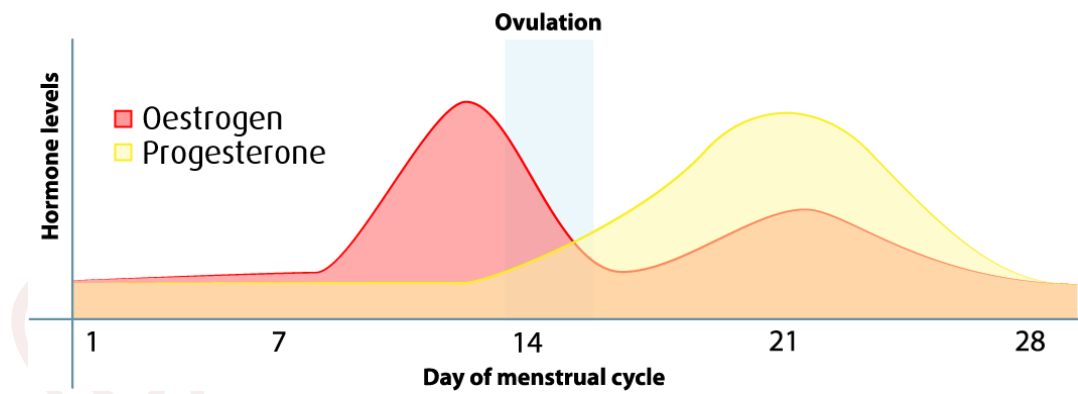
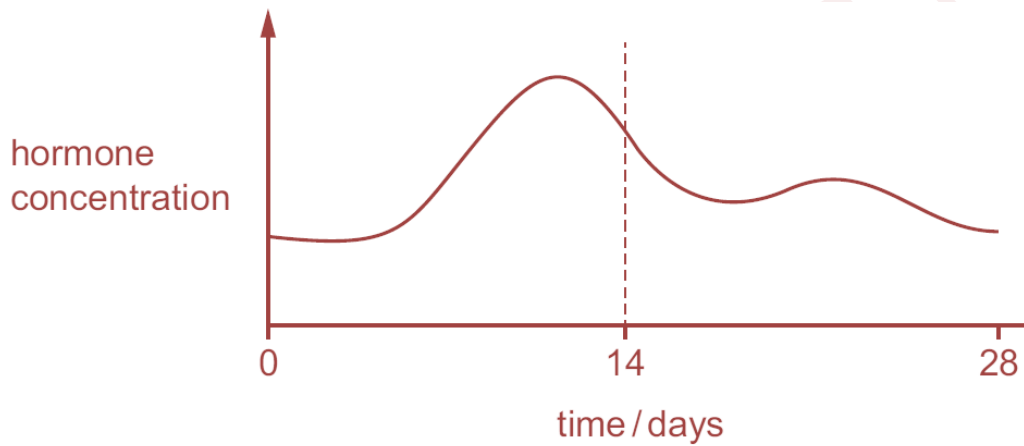
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S30

C

The graph shows **Oestrogen**.



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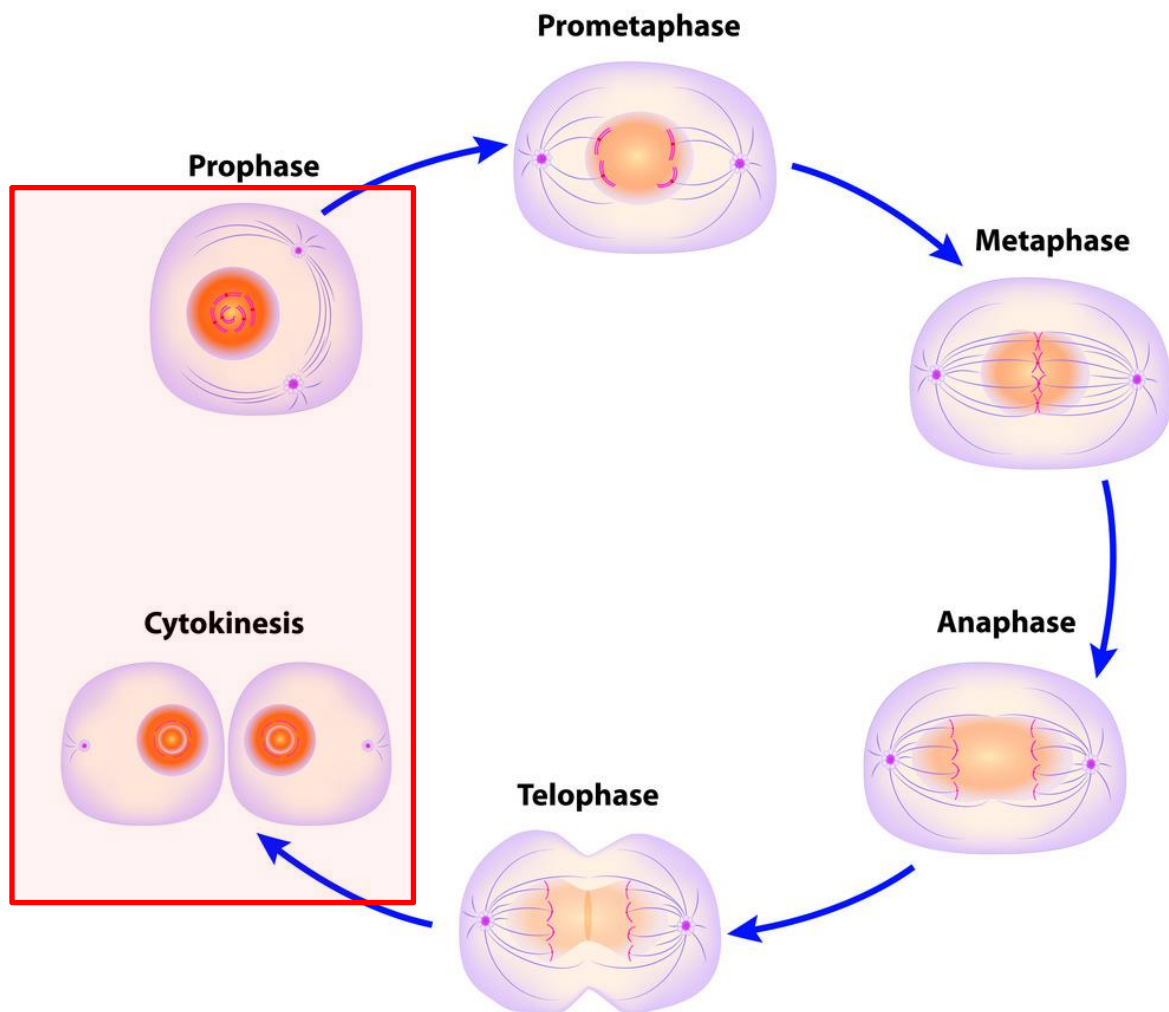


S31

B

Mitosis is copying division which produces genetically identical daughter cells. The daughter cells have the same number of chromosomes as the parent cell.

Cell division (mitosis)

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**S32****A**heterozygous father with blood group A: $I^A I^O$ heterozygous mother with blood group B: $I^B I^O$ offspring with blood group O: $I^O I^O$

	I^A	I^O
I^B	$I^A I^B$	$I^B I^O$
I^O	$I^A I^O$	$I^O I^O$

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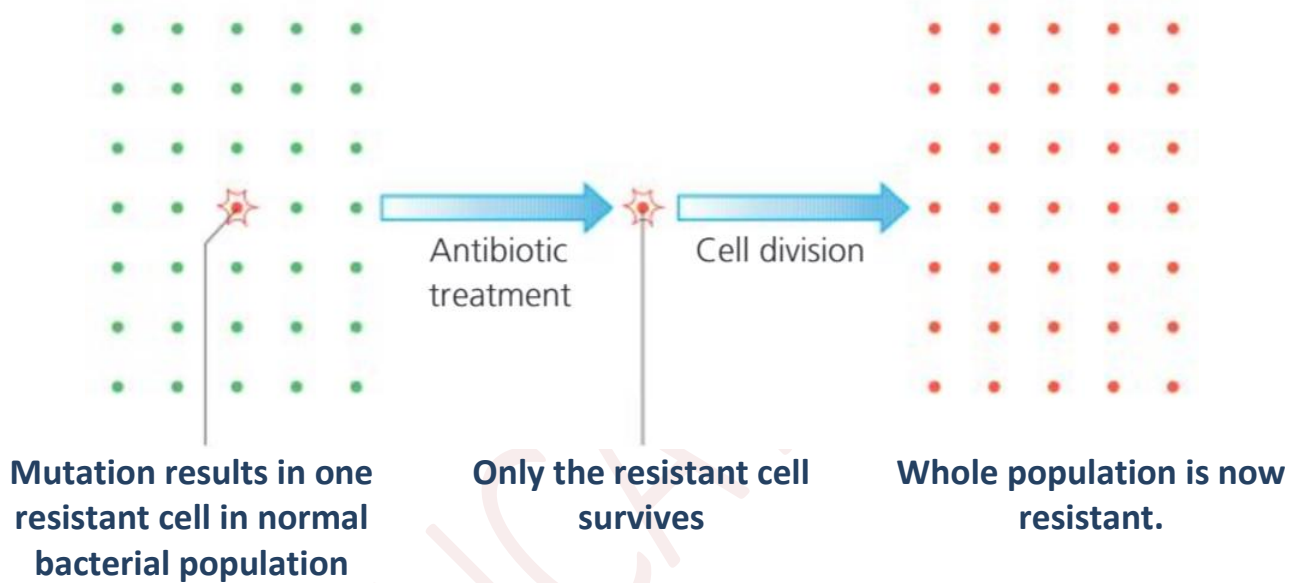
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S33

D

The development of antibiotic resistant bacteria is an example of **NATURAL SELECTION**.



The antibiotic is the selection pressure.

Resistance is the survival advantage.

The antibiotic does not create resistance but selects it in the population.

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S34

A

correct definition of a gene mutation: **a change in the base sequence of DNA**

A mutation is a spontaneous genetic change.

Gene mutation occurs when part of the base sequence of the DNA on a single chromosome is changed.

As a result, a defective protein may be produced or no protein may be produced.

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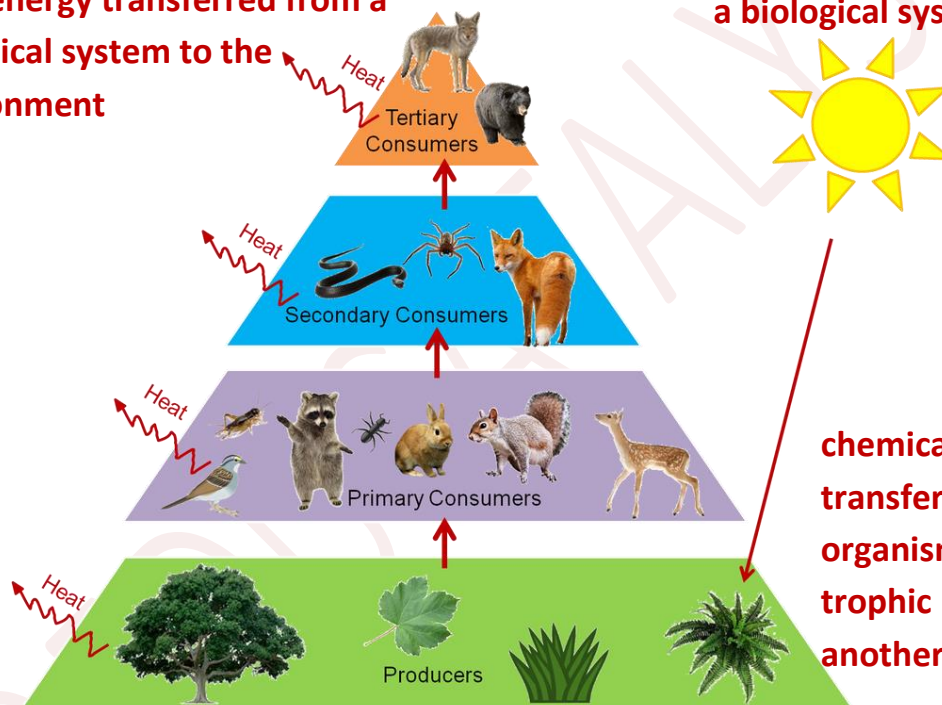
S35

D

Energy first enters the food chain in the form of **light energy**.

Heat energy transferred from a biological system to the environment

Light energy entering a biological system



chemical energy transferred between organisms from one trophic level to another

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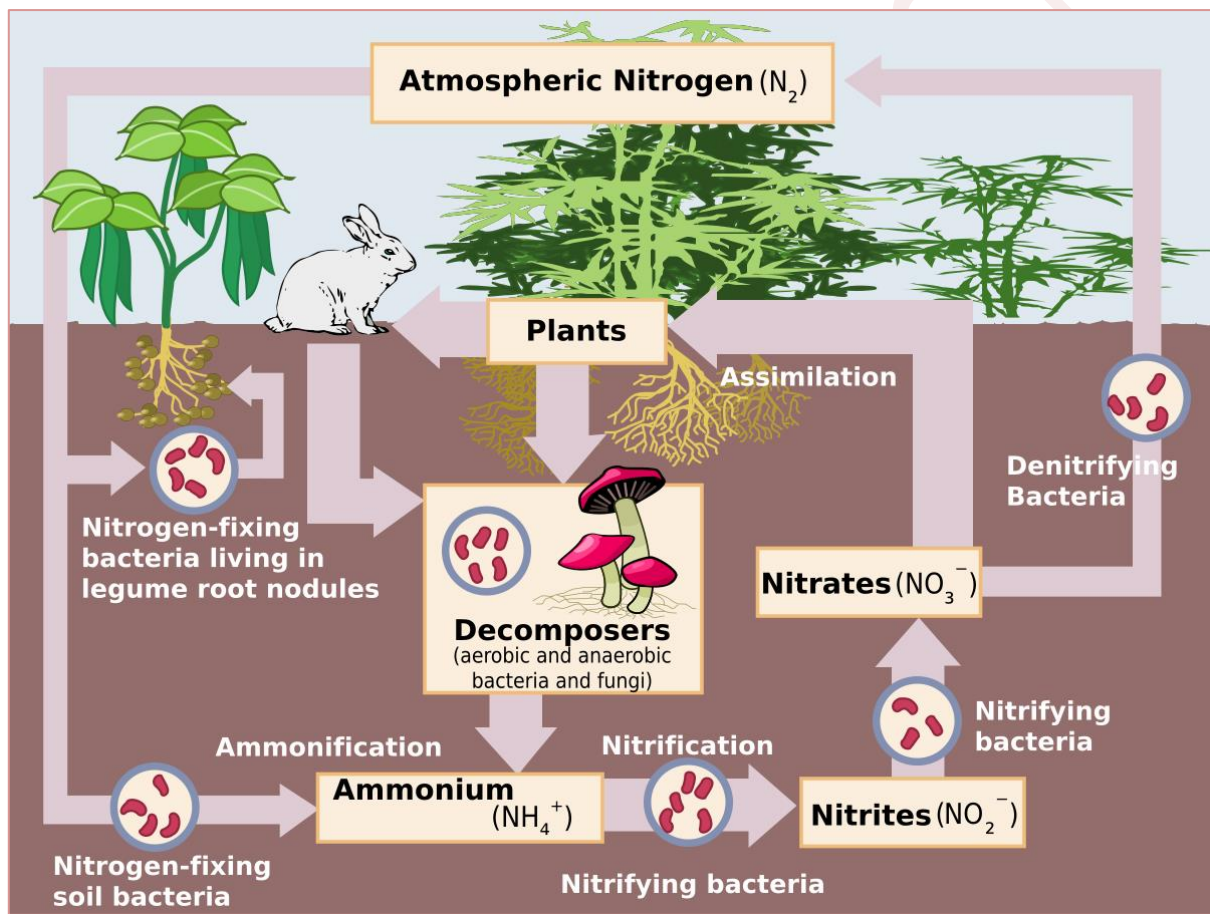
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S36

B

Denitrifying bacteria and plants are responsible for removing nitrate ions from soil.



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S37

C

Bacteria are particularly useful in biotechnology and genetic engineering because:

- they reproduce very rapidly so scientists can build up large populations very quickly
- they can produce complex molecules, such as enzymes and the hormone insulin
- their **genetic code is the same** as that in more complex organisms (even humans!)
- they have extra pieces of DNA — **plasmids** — which scientists can use to carry genes from one cell to another
- people are less worried (**lack of ethical concern**) about experiments on bacteria than on more familiar, larger, organisms such as mice, rabbits and dogs

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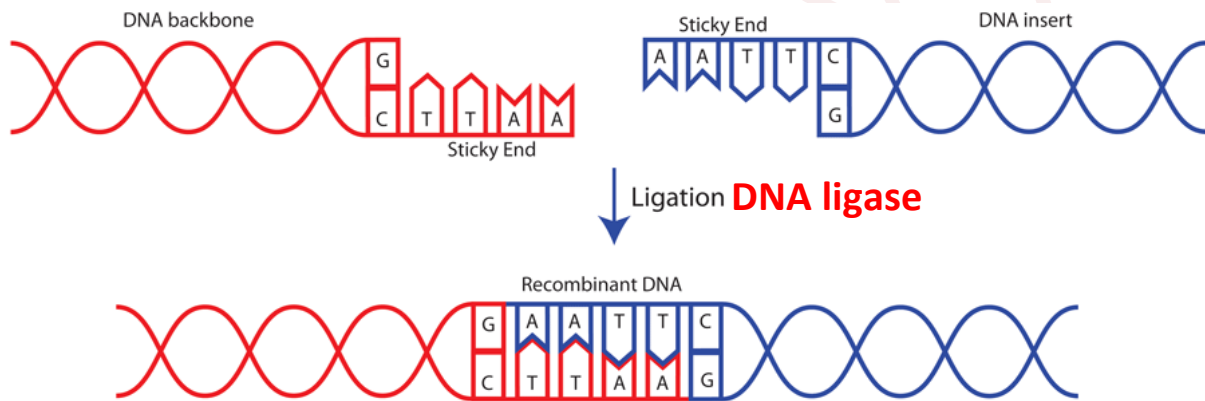
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S38

B

The enzyme DNA ligase splices the desirable gene into the vector – **joins the human gene to the plasmid.**



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S39

D

Water must always be available to allow seeds to germinate.

Conditions for germination:

A seed needs the following to germinate:

- a supply of water
- oxygen for aerobic respiration
- a temperature suitable for the enzymes involved in germination

Some seeds have other requirements as well as the ones shown in the diagram. A few need particular conditions of light (for example, lettuce).

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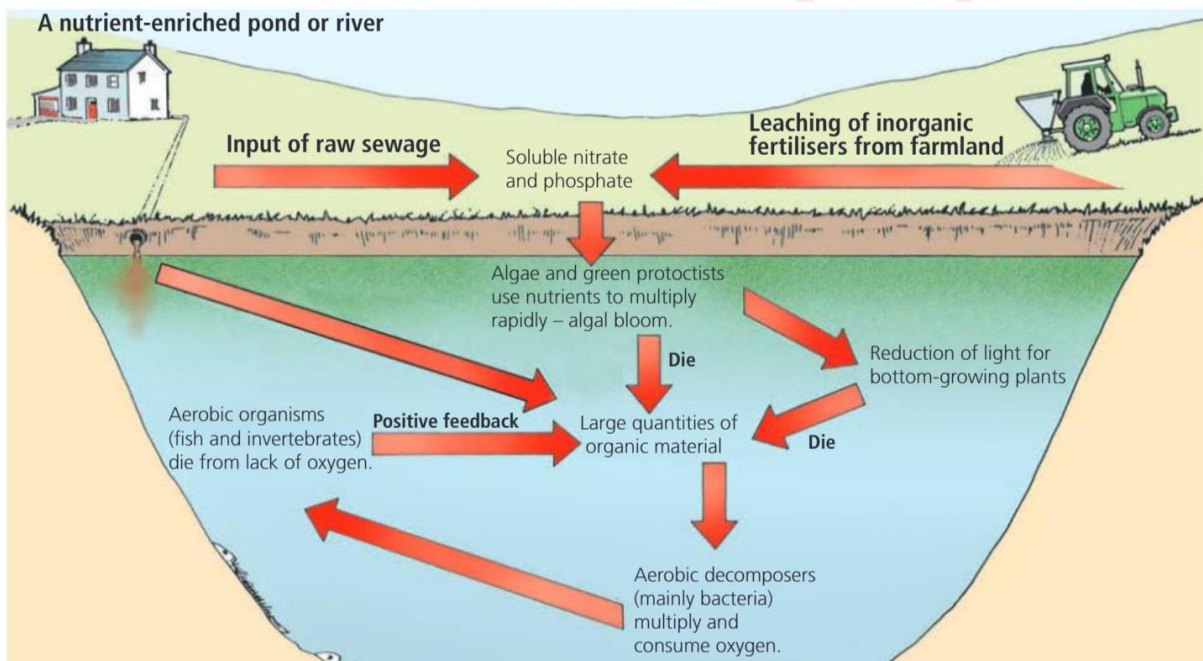
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S40

B

- B**
- 1 increased growth of plants
 - 2 dead plants decompose
 - 3 increase in aerobic bacteria
 - 4 decrease in dissolved oxygen



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