Cambridge Assessment International Education

Predicted paper May/June 2025

Cambridge IGCSE™

CANDIDATE NAME: Solved by Anubha Roberts

CENTRE NUMBER | | | | | |

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BIOLOGY **0610**

Paper 4 Theory (Extended)

1 hour 15 minutes

You must answer on the question paper.

No additional materials are needed.

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You may use a calculator.
- You should show all your working and use appropriate units.

INFORMATION

- The total mark for this paper is 80.
- The number of marks for each question or part question is shown in brackets [ ].

For any further queries please contact on email below-

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1 Fig. 1.1 shows a diagram of human skin in hot weather.

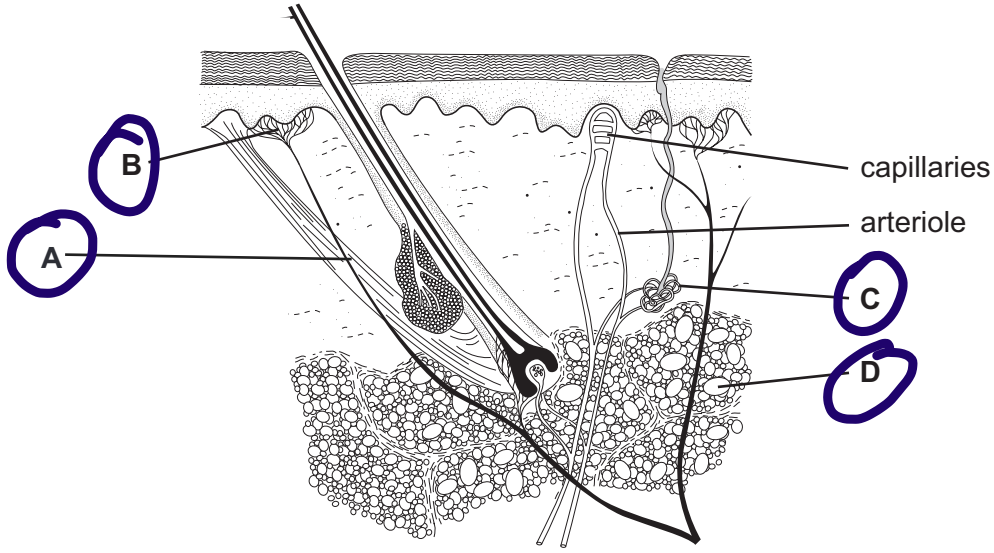


Fig. 1.1

(a) Name structures **A** to **D**.

A Sensory neurone

B Thermbreceptor

C Sweat glands

D Fat tissue [4]

(b) Describe how the structures (**A** to **D**) in the skin help to maintain a constant body temperature. You may refer to the structures by their letters.

Increase in temperature is detected by thermoreceptor B. The send information to hypothalamus using A. Hypothalamus sends impulses to C sweat production to produce cooling effect on evaporation. Hair erector muscles relax to lie flat and trap no air.

[4]

(c) **(i)** Blood flow through the skin changes in response to changes in the air temperature.

State **and** explain what happens to blood flow through the skin when the temperature of the surrounding air becomes very cold.

Vasoconstriction of arterioles supplying blood to the skin and more blood flows through shunt vessel. So that blood flow skin capillaries is reduced

(ii) Explain how the changes you have described in **(c)(i)** reduce heat loss.

less heat is lost by blood through radiation. Less overall heat loss of body.

[5]

(d) The control of blood glucose is an example of negative feedback.

Explain how negative feedback controls the blood glucose concentration of a person who has **not** eaten for a day.

Blood glucose falls below normal which is detected by Pancreas. Pancreas secretes glucagon. Glucagon acts on liver cells to breakdown glycogen to glucose and restores blood glucose concentration. [3]

[Total: 16]

2 Fig. shows a fetus in the uterus immediately before birth.

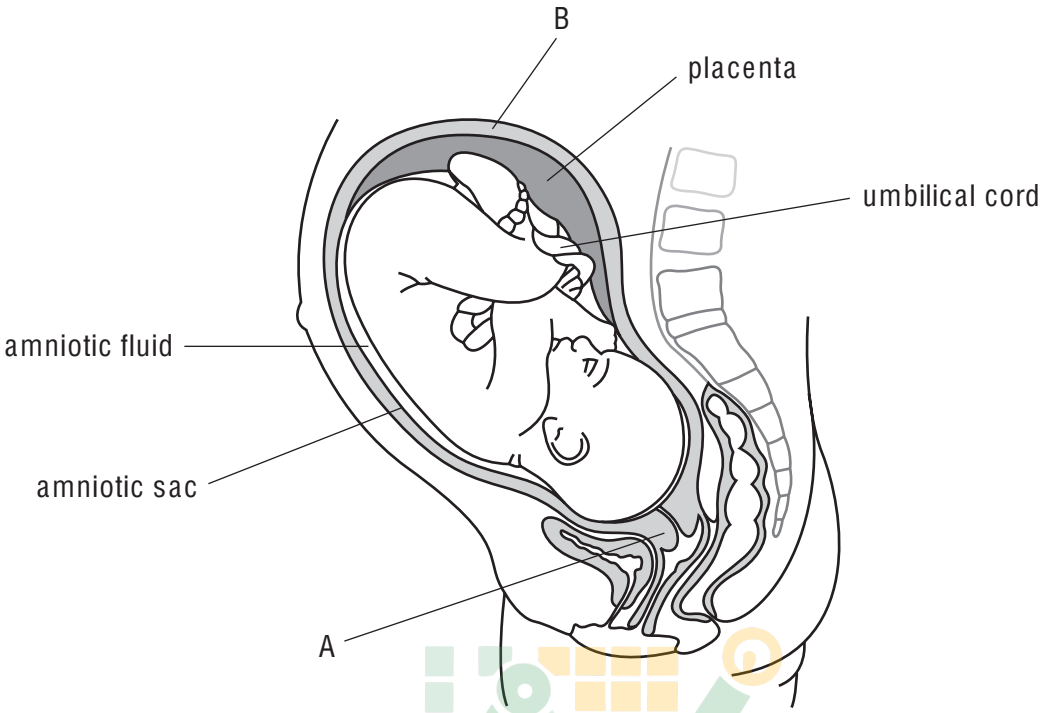


Fig.

(a) Describe the functions of the amniotic sac and amniotic fluid.

→ Amniotic sac helps to maintain temperature of baby.

Amniotic sac acts as cushion to

→ protect babies from mechanical injuries.

→ Amniotic fluid protects the pathogens from reaching baby.

→ Amniotic fluid allows baby to move. [4]

(b) List three functions of the placenta.

1. Placenta supplies nutrients like glucose, amino acids to baby.
2. Placenta remove wastes like CO_2 and urea out of babies' blood.
3. Placenta secretes hormones like oestrogen during pregnancy. [3]

(c) Discuss two of the advantages of breast-feeding.

→ Breast milk provides balanced nutrition for growth of baby.
→ It has antibodies to provide passive immunity to baby against infections [2]

(d) Outline the events that happen after insemination till implantation.

→ Sperms travel to the oviduct.
→ Sperm fuses with egg cell. Haploid nuclei of egg and sperm
→ fuse to form diploid zygote called fertilization.
→ Zygote divides by mitosis to
→ form ball of identical cells called embryo. Embryo implants
→ in the wall of uterus by placenta. [4]

[Total: 13]

3 Penicillin is an antibiotic produced by the fungus *Penicillium chrysogenum*.

Fig. 4.1 shows the process used to produce penicillin.

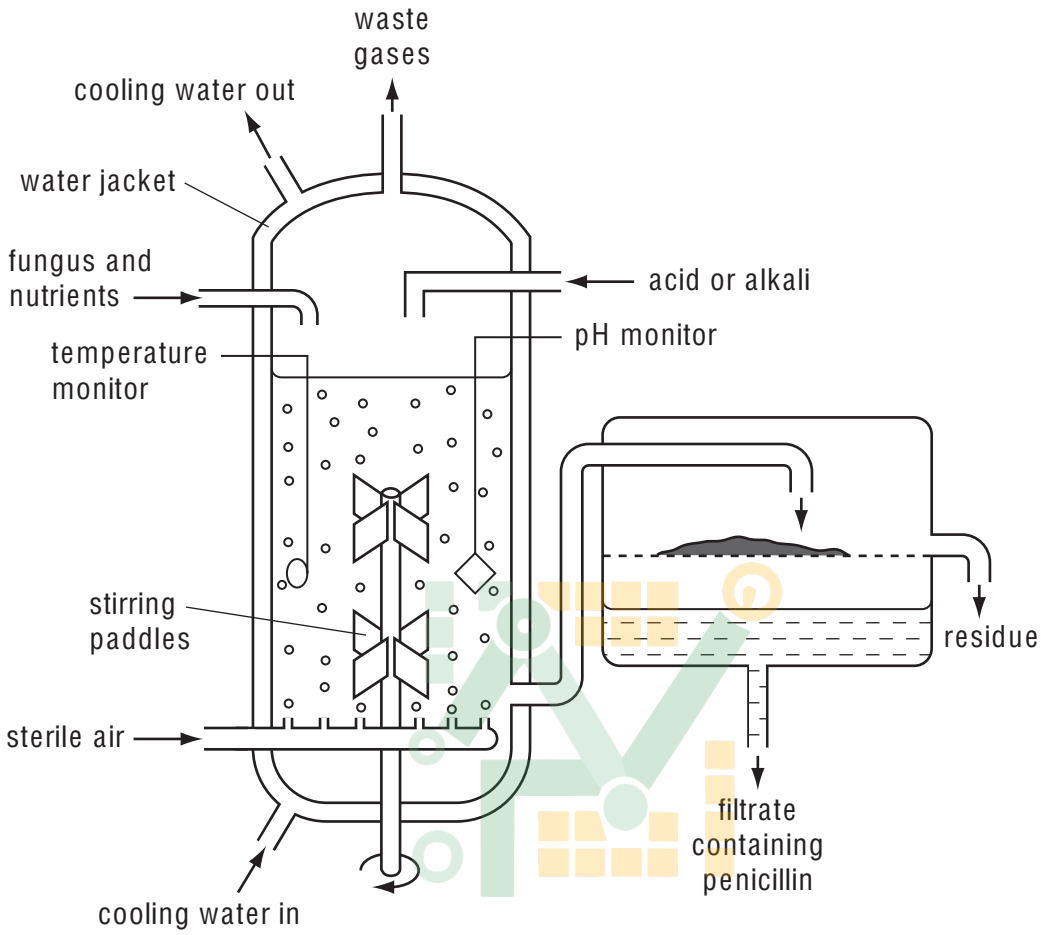


Fig. 4.1

(a) Enzymes in the fungus are used to make penicillin.

Explain why there is a water jacket around the fermenter and nutrients are added to the fermenter.

water jacket

Heat is produced as a result of aerobic respiration. Water jacket removes extra heat to maintain temperature and prevent enzymes from getting denatured.

Nutrients

Glucose to undergo aerobic respiration and release energy for growth.
Amino acids are used to make proteins and enzymes.

[6]

Fig. 4.2 shows the mass of fungus and the yield of penicillin during the process.

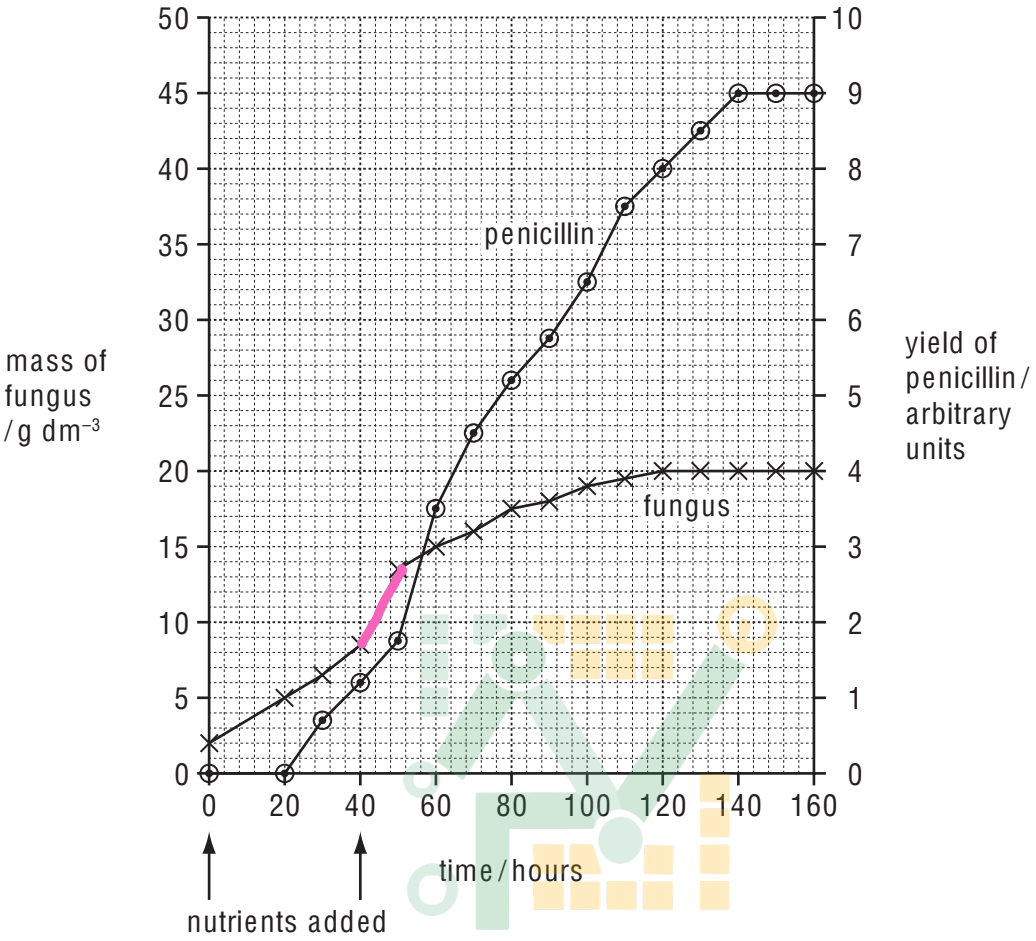


Fig. 4.2

(b) (i) State the time interval over which the fungus grew at the maximum rate.

40 - 50 hours ..... [1]

(ii) As the fungus grows in the fermenter, the nuclei in the fungal hyphae divide.

State the type of nuclear division that occurs during the growth of the fungus in the fermenter.

Mitosis ..... [1]

(iii) Explain why the growth of the fungus slows down and stops.

→ Limiting factors.
→ lack of nutrients of glucose
→ build up of toxic waste
→ lack of O_2 supply.
→ No space to grow. [3]

[Total: 11]

4 Fig. 4.1 is a diagram of *Vibrio cholerae*, the bacterium that causes cholera.

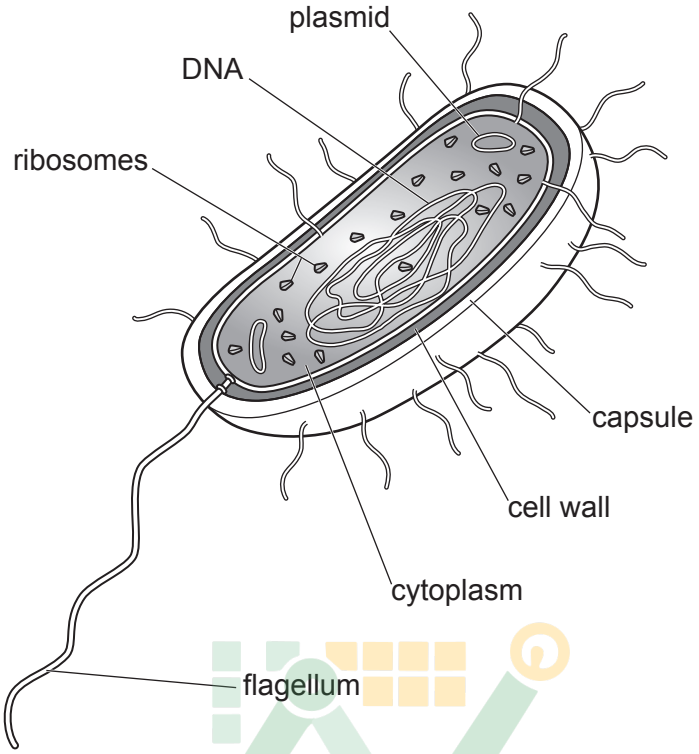


Fig. 4.1

(a) Explain how the cholera bacterium causes diarrhoea.

Cholera bacterium releases toxin which causes chloride ions to more in the lumen of small intestine and decreases water potential. water moves out of cells in the lumen by osmosis and results in watery faeces. [3]

(b) A scientist tested the resistance of one strain of bacteria to different antibiotics.

The scientist tested solutions of five different antibiotics, **A** to **E**.

She soaked a paper disc in each antibiotic solution.

The paper discs with antibiotics were placed in a Petri dish containing bacteria on agar jelly.

Fig. 4.2 is a diagram of the appearance of the Petri dish after 48 hours. The shaded areas show where bacteria grew. The clear areas show where bacteria did **not** grow.

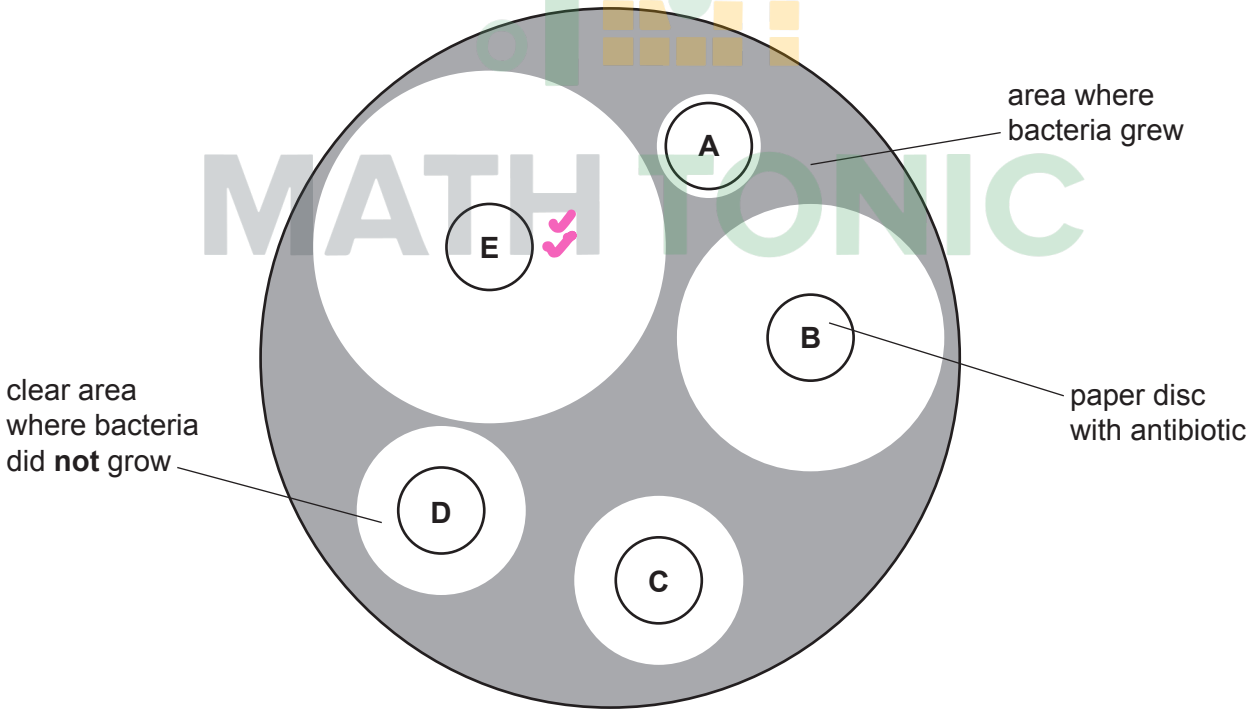


Fig. 4.2

(i) The strain of bacteria used in this investigation causes a disease.

Using the information in Fig. 4.2, explain why antibiotic **E** would be the most effective at treating this disease.

Zone of inhibition or clear area is largest.

[1]

(ii) The results in Fig. 4.2 show that this strain of bacteria is resistant to antibiotic **A**.

Five years ago, a similar investigation found that the clear area for antibiotic **A** was the same size as antibiotic **B** is in Fig. 4.2.

Explain how bacteria become resistant to antibiotics.

Some bacteria have resistant genes because of mutation.
When antibiotic is used it causes resistant bacteria to survive and non resistant to die. due to natural selection.
Resistant bacteria reproduce with competition and increase resistant alleles in population.

[4]

(iii) Describe how to minimise the risk of antibiotic **B** developing the same results as antibiotic **A**.

By taking correct dose and not overusing it.

[1]

[Total: 11]

5 (a) A student investigated the effect of different concentrations of sodium chloride solution on osmosis in potatoes.

The student's results are shown in Table 1.1.

Table 1.1

concentration of sodium chloride solution /mol per dm^3	potato cylinder initial mass/g	potato cylinder final mass/g	percentage change in mass
0.0	1.13	1.32	16.8
0.2	1.03	1.08	4.9
0.4	1.19	1.06	–10.9
0.6	1.13	0.86	–23.9
0.8	1.14	0.82	-28.1

Initial Final

(i) Using the information in Table 1.1, calculate the percentage change in mass for the potato cylinder in the 0.8 mol per dm^3 sodium chloride solution.

Give your answer to **one** decimal place.

Space for working.

$$\frac{0.82 - 1.14}{1.14} \times 100$$

-28.1 ..... %

[3]

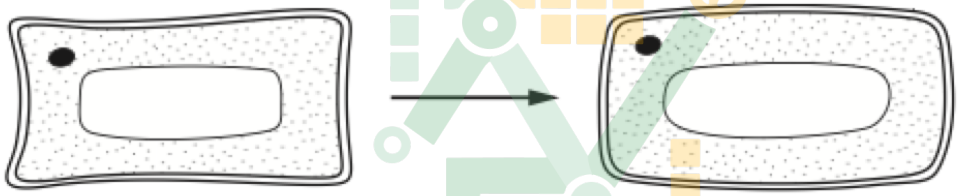
FORMULA FOR PERCENT CHANGE

$$\frac{\text{Final} - \text{Initial}}{\text{Initial}} \times 100$$

(ii) Using the information in table, explain why the difference in loss was greater in 0.8 $mol\,dm^{-3}$ sodium cloride solutions.

0·8 mol dm^{-3} solution has lower water potential than other salt solution. More water molecules are lost due to steeper concentration gradient which results in more decrease in mass. [3]

(b) The diagram below shows the expected appearance of cell after it is immersed in distilled water for 30 minutes.



Outline three differences that will take place in the cell after 30 minutes of immersion in distilled water.

1. Vacuole size increases
2. Cell swells up.
3. Cytoplasm and cell membrane pushed against cell wall. [3]

(c) Describe how the process of active transport differs from diffusion.

Active transport requires energy from aerobic respiration while diffusion doesn't.
Active requires carrier proteins but diffusion doesn't.
Active transport is from low concentration to high concentration and diffusion from high to low. [3]

[Total: 12]

6 The ribcage and diaphragm are involved in the breathing mechanism to ventilate the lungs.

Fig. 3.1 is a flow chart that shows the changes that take place when breathing in.

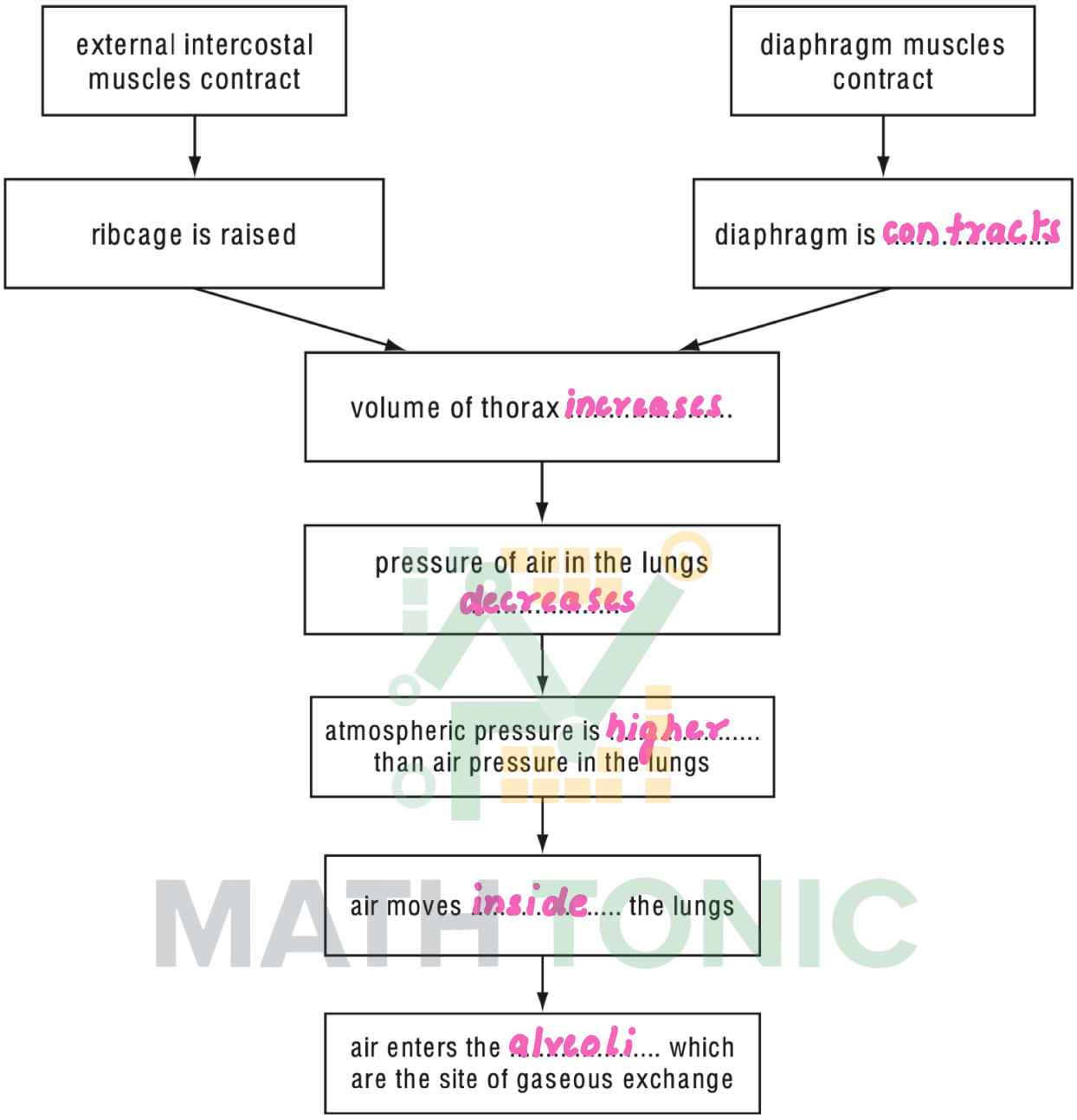


Fig. 3.1

(a) Complete Fig. 3.1 by writing appropriate words in the spaces provided. [6]

[Total: 6]

7 Marine conservationists are concerned that fish stocks in the sea are decreasing. Drastic measures will have to be taken to stop the extinction of many fish species.

Fig. 5.1 shows a marine food web. Tuna are large carnivorous fish that are an important human food. Dolphins may be caught in fishermen's nets and die.

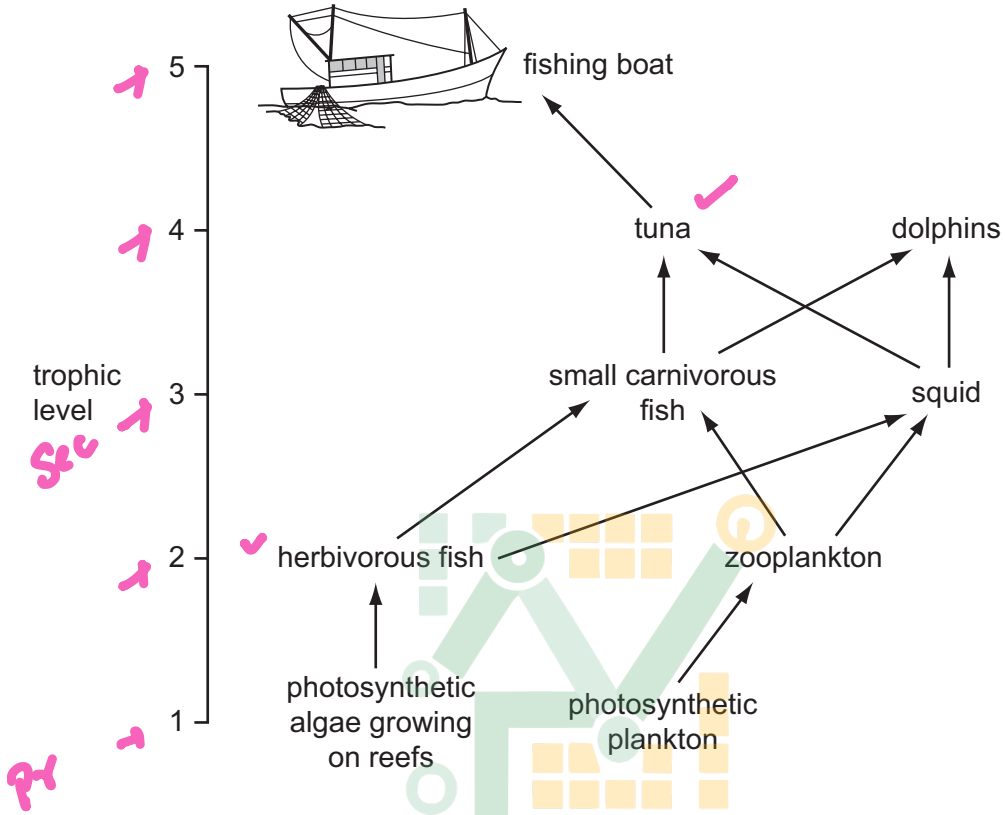


Fig. 5.1

(a) State the names given to trophic levels **1** and **3**.

1 Producer .....

3 Secondary consumers ..... [2]

(b) Explain why it is more energy efficient for humans to eat herbivorous fish rather than tuna.

→ Energy transfer between trophic levels is inefficient.
→ Energy is lost in respiration, excretion, between trophic levels.
→ Herbivorous fish is more near to producers has more energy than tuna.

[3]

(c) Explain why it is necessary to conserve animals, such as tuna and dolphins, which are at trophic level 4.

→ to prevent disruption of food chain
→ to maintain biodiversity.
→ less food will be available for consumers.
→ Can cause extinction of species
→ Reduce the number of herbivores [4]

(d) Many seas are polluted by non-biodegradable plastics.

Suggest the likely effects of this pollutant on the marine environment.

→ Can get entangled around neck of fish and cause suffocation.
→ Can be eaten up and lead to death as no space for food.

→ Doesn't breakdown naturally and releases toxic chemicals in
→ soil and harm soil microbes.
Can be mistaken as food
by many organisms. [4]

[Total: 13]